OURS

2024 Online Undergraduate Research Symposium

May 20, 2024

UC San Diego

UNDERGRADUATE RESEARCH HUB

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Outstanding Mentor Spotlights

María José Aragón

Please tell us a bit about your educational background and current research.
I received my PhD in Education from the University of California, Santa Barbara. My research examines language and literacy practices in K-12 classrooms with a focus on how emergent bilinguals and students from minoritized backgrounds employ their linguistic and cultural resources to learn and engage with others. Currently, I am working on a study on novice teachers' experiences learning about and implementing equity-oriented teaching practices designed to support bilingual learners.

Did you do research as an undergraduate student? How did you get started in your current field?
I was fortunate enough to do research as an undergraduate student and spent a lot of time doing classroom observations as part of my coursework in the department of Human Development. Those experiences sparked many questions for me about what happens in classrooms and why there are such vast disparities in students' educational opportunities and trajectories.

Who are some of your most memorable mentors? How did you meet them?
My undergraduate mentor, Judith Ross-Bernstein, was my instructor for several courses in Early Childhood Education and an outstanding educator. She inspired me to study abroad in Sweden and to spend my senior year interning in a Head Start classroom, which led me to pursue a career in the field of education. At the graduate level, my advisor, Dr. Richard Durán, was instrumental in exposing me to new perspectives and guiding me through the joys and challenges of becoming a researcher. I am especially grateful to him for showing me how to do work that is grounded in addressing issues that affect students most marginalized in our education system, particularly those from linguistically, culturally, and racially minoritized communities.

Why do you enjoy being a mentor?
I love learning alongside students and watching them discover for themselves what questions drive them. I am inspired by their curiosity and find that these collaborative relationships push the boundaries of my own thinking.

What is the most useful piece of advice a mentor gave you?
While it is not a specific piece of advice, my graduate advisor truly modeled what it means to be a lifelong learner. He remained humble and never stopped wanting to learn from others or getting excited about pursuing new questions.

Isabella Maita

Please tell us a bit about your educational backgrounding current research.
I received a BS in Neuroscience from Lafayette College in 2017, and my PhD in Neuroscience from Rutgers University in 2023. My previous research experience has been in neurobiology, studying stress and reward-related neural circuits in mouse models of mood disorder. I am new to the world of Discipline Based Education Research (DBER) and have enjoyed the challenge of linking my translational research on stress (in mice) to factors affecting academic stress (in university students!).

Did you do research as an undergraduate student? How did you get started in your current field?
I attended a small liberal arts college, and had the privilege of joining a very small lab studying dyslexia across species. This experience got me excited about translational neuroscience, so I found summer research programs at the National Institutes of Health and Rutgers University. I was not sure of my career goals until my 3rd year of college, and these lab experiences strengthened my interest in attending graduate school.

Who are some of your most memorable mentors? How did you meet them?
At my undergraduate college, my mentor Dr. Lisa Gabel was on sabbatical while I completed my honors thesis. I remember video calling her at 7 AM, as she was across the world in Germany while I was located in Pennsylvania. This experience helped me learn that I appreciate a mentoring style that fosters independence and permits me to try (and fail) on my own, while also serving as an encouraging and sage resource. I found this mentoring style in my graduate mentor, Dr. Benjamin Samuels, and his mentorship allowed me to grow as a scientist while approaching experiments with as much creativity as behavioral neuroscience allows.

Why do you enjoy being a mentor?
I find mentoring curious, passionate students to be a highly rewarding experience. While guiding students as an “expert” can be enjoyable, I find that exploring a brand new topic with students that are just as curious as I am to be an exciting and illuminating process.

What is the most useful piece of advice a mentor gave you?
My graduate mentor told me to choose two projects: one project that is a sure thing, and one that is a risk. This approach to science creates a path lined with smaller wins, while encouraging creativity and novel thinking.

Chadwick Campbell

Please tell us a bit about your educational background and current research.
I am originally from Baton Rouge, LA and started my educational journey as a major in Engineering and then Business. I moved to the SF Bay Area in 2002, and after volunteering and eventually becoming staff at the Stop AIDS Project, one of the first HIV prevention organizations in the 1980s. I fell in love with the work and saw that there were a number of social and structural influences on HIV risk and the lives of the people we served. That was my inspiration to complete my undergraduate education in Sociology at San Francisco State. I subsequently earned my Master of Public Health from SF State and my PhD in Medical Sociology at UC San Francisco. I primarily conduct qualitative research focused on exploring the socio-structural factors that contribute to disparities in HIV diagnoses and care and treatment outcomes among gay and bisexual men and other historically and contemporary marginalized communities.

Did you do research as an undergraduate student? How did you get started in your current field?
I was already working in research before I returned to school to complete my undergraduate studies. Working in HIV prevention in San Francisco, I had the opportunity to work as a research assistant on a small CDC-funded project, and subsequently, I worked on a large NIH funded project prior to completing my bachelor's degree. I worked in research throughout my undergraduate, masters, and doctoral training. All of that work was in socio-behavioral HIV research and was the foundation for the research I do today.

Who are some of your most memorable mentors? How did you meet them?
I have had amazing mentors throughout my career. There are three, in particular, who have been incredibly supportive of me at every stage. I met each of them when I applied for jobs and they hired me to work on research studies with them. They each gave me opportunities to write manuscripts, get additional training, present at conferences and two ultimately served on my dissertation committee. At this stage in my career, I still look to them for advice and guidance as I navigate my role as a faculty member.

Why do you enjoy being a mentor?
I know how important my mentors have been to my success. They taught me how to do research, how to engage community, and how to write manuscripts and grants. It is part of my personal mission to do the same for other young scholars. I love being in the classroom, and learning theory and key skills and practices in public health is essential. But when a student tells me that they have an interest in research or they are trying to figure out the next step in their educational journey, I relish the opportunity to do whatever I can to help them along the way. Mentorship allows me to help them to connect what they learn in their classes to real world public health challenges, and to gain skills and experience that will be valuable to their careers.

What is the most useful piece of advice a mentor gave you?
This is a hard one! I think the one I value the most is to stay true to who I am and what I value. For example, when I was younger, I had a hard time saying no when an opportunity presented itself. Taking opportunities when they come is not a bad thing. However, the advice was that some opportunities may not help me to achieve my goals or may not be focused on topics that relate to what I am passionate

about. I always share this with mentees as well. Consider every opportunity but be thoughtful about how they align with your goals and your own interests before saying yes.

Angela Booker

Abstracts

Abigail Sanchez

General Biology/Psychiatry, Warren
Mentored by Dr. Giordano De Guglielmo

Perinatal Fentanyl Exposure in a Rat Model: Investigating Long-Term Neurobehavioral Consequences and Implications for Neonatal Opioid Withdrawal Syndrome

Neonatal Opioid Withdrawal Syndrome (NOWS) is associated with long term neurobehavioral deficits and is currently increasing in prevalence due to opioid use by pregnant women. There is an urgent need for preclinical models that accurately recapitulate perinatal drug use. Fentanyl, a highly potent synthetic opioid, is particularly understudied in this context, especially considering that it is the leading driver of the opioid epidemic. Adult male and female heterogeneous stock rats were genetically characterized as high responders for opioid intake. Dams were implanted with an osmotic minipump containing fentanyl solution prior to establishing breeding pairs. Control dams were implanted with identical minipumps containing saline. Minipumps remained in the dams throughout the entire pregnancy and until pups were weaned at P21. Beginning at P21, pups were assayed for various physiological and behavioral deficits that resulted from perinatal fentanyl exposure including body weight, spontaneous withdrawal symptoms, sucrose splash test, mechanical nociceptive Von Frey test, tail immersion test, and fentanyl self-administration. Fentanyl-exposed pups were severely underweight at P35 and onward when compared to controls. They also exhibited severe somatic withdrawal symptoms, as well as behavioral deficits and hyperalgesia in the sucrose splash test and Von Frey test, respectively. Fentanyl-exposed pups demonstrated dysregulated addiction-like behaviors when allowed to self-administer fentanyl as adults. Our findings demonstrate that perinatal fentanyl exposure via osmotic minipump serves as a reliable model for human opioid use during pregnancy. Fentanyl-exposed pups exhibit behavioral withdrawal symptoms and long-term behavioral deficits like those observed in humans with NOWS.

Adi Krishnamoorthy

Mathematics - Computer Science
Mentored by Paul Siegel

Coding Theory for DNA Storage: Synthesis, Sequencing, and Reconstruction

In the age of information, the large amount of data being generated at every moment in time has accelerated the search for innovative and sustainable storage solutions. DNA storage is a relatively new technology that allows for the storage of vast amounts of

information for years at a time. However, DNA storage technology does come with a few caveats, one of the main ones being that it is relatively error-prone. Errors can occur during DNA synthesis, storage, and reconstruction. Some of these errors include substitution errors, where a nucleotide is swapped for a different nucleotide, insertion errors, where one or more nucleotides are inserted into a DNA strand, or deletion errors, where one or more nucleotides are removed from a DNA strand. Entire strands of DNA can be lost during the sequencing and recovery process. In DNA storage, relative to other storage technology, insertion and deletion errors occur at a much higher rate, which can cause information to become noisy. We attempt to address that problem. We use and evaluate a new coding framework to enhance the efficiency and reliability of DNA as a storage medium, specifically concerning its synthesis, retention, and reconstruction. We will apply a cutting-edge coding framework recently developed and use software tools such as SOLQC and DNAStoralator to evaluate its efficacy in the encoding and decoding processes integral to DNA storage. We want to know whether this new framework can surmount the hurdles of the large insertion and deletion error rates in DNA data storage.

Alana Tamyo

Biochemistry, ERC
Mentored by Dr. Fred Gage

Direct Reprogramming Technology for Aging in Sporadic Alzheimer's Disease: How CK2 influences rRNA transcription in AD neurons

Alzheimer's Disease (AD) is the most common type of dementia among the elderly, with 95% of AD cases classified as sporadic, meaning the cause is unclear other than aging. However, the mechanism behind aging-related susceptibility to sporadic AD is unknown. To separate aging and disease components that distinguish causes of AD, direct reprogramming technology called induced neurons (iNs) is utilized. By directly reprogramming human skin cells (fibroblasts), the aging profile of donors is retained in the converted neurons. In Gage Lab, we have found that ribosomal RNA (rRNA) synthesis is enhanced in AD-iNs compared to healthy aged control. Ribosomal biogenesis is a highly energy-dependent process that requires the coordinated action of the RNA polymerases I, II, and III. Disruption at various steps, with either increased or decreased expression of different ribosomal components, can promote cellular senescence or apoptosis. Importantly, neuronal senescence and CK2 upregulation are key components of AD pathology. CK2 is a protein kinase whose activity has been associated with growth through increasing Pol 1 activity which directly transcribes rRNA. Therefore, we hypothesize that the enhanced activity of CK2 promotes increased rRNA transcription leading to neuronal senescence in AD-iNs. We will test this idea by inhibiting CK2 activity and analyzing the effects on rRNA levels.

Alex Morgan

Human Biology, Global Health, ERC
Mentored by Giordano DeGuglielmo

Developing a model of oral alcohol self-administration in mice

Background: Approximately 10% of Americans have an alcohol use disorder (AUD) and it causes a huge societal burden with adverse health outcomes, strains on relationships, and negative economic implications. Mechanisms underlying the development of AUD are still poorly understood. Rat models of alcohol dependence have shown to be valid and translational; however, similar models are underdeveloped in mice. This study aimed to generate a model of alcohol dependence in mice that shows similar validity as the models that are widely used in rats in order to better understand mechanisms leading to the development of AUD and to evaluate novel treatments.

Alex Winicki

History, Political Science, ERC
Mentored by Tal Golan

Comparison of Societal Responses between the first and fourth industrial revolution.

The founder and chairman of the World Economic Forum Klaus Schwab popularized the term, "Fourth Industrial Revolution," to describe the rapid technological and industrial advancement of the 21st century with his 2016 book of the same name. Technologies such as robotics, bioengineering, and now artificial intelligence are seeing major breakthroughs and investment from both public and private interests. With these breakthroughs comes concerns over the role individuals and their labor will have in this changing economic climate. Artificial intelligence has elicited a wide range of debate over the relationship between humanity and technology, especially in the academic sphere. Robotics has already transformed industries such as car manufacturing, raising concerns over future mass unemployment. Bioengineering has led to new advancements in healthcare and food production while also creating moral debates over its use.

Almeera Siddiqui

Biochemistry, Revelle
Mentored by Dr. Erik Romero

Unveiling the Efficacy of Allyl Iodide in Synthetic Reactions Using Photochemistry

Due to proprietary information this abstract has been redacted.

Amit Namburi

Computer Science and Engineering, Sixth
Mentored by Professor Julian McAuley

Harmonizing User Preferences - Recommendations Systems through Deep Content Analysis and Audio Interest Points

This paper explores the enhancement of music recommendation systems through the integration of deep learning techniques that directly analyze audio content to identify user-specific interest points. Traditional methods that rely on collaborative filtering and metadata often fail to fully capture the unique preferences of individual users. By employing deep convolutional neural networks (CNNs), this study aims to dissect complex audio signals to retrieve both subtle musical elements and numerical music elements—such as pitch, tempo, and rhythm—that resonate with users at a personal level. Additionally, the research leverages natural language processing (NLP) to summarize these features into descriptive generated captions that enhance content discovery and personalization on streaming platforms. Along with this, finding the 'Interest Points' for a given audio file and coming up with a predictive heat-map will be useful to predict the engagement graph and see how it would be perceived in the real world. The effectiveness of this approach is quantified through comparative analysis with baseline models, employing metrics that reflect improved user engagement and satisfaction. Ultimately, this paper proposes a novel framework that not only advances the technological aspects of music recommendations but also enriches the user experience by making it more tailored and immersive, focusing particularly on leveraging musical interest points to refine recommendations further.

Ana Zamudio

Clinical Psychology, Muir
Mentored by Dr. Gregory Light

The Effects of Memantine on Trained Cognitive Training for Schizophrenia

Schizophrenia is a debilitating mental disorder characterized by hallucinations, delusions, a lack of motivation, and deficits in cognition that act on information processing, working memory, and attention. This study tests the ability of memantine, an FDA approved drug, to increase the effects of Targeted Cognitive Training (TCT), a neuroplasticity-based training program that has shown clinical, cognitive and functional improvements in some antipsychotic-medicated schizophrenia (SZ) patients. Participants underwent two initial tests to assess their auditory processing speed (APS), one in the absence of a drug, and another in which they've been randomly assigned to memantine or placebo. Through a double-blind design, participants then continue to receive either 30 sessions of placebo and TCT or 30 sessions of memantine and TCT followed by a durability assessment 12 weeks after the treatment phase. Cognitive and functional assessments administered periodically reveal preliminary results supporting the augmenting abilities of memantine on TCT for antipsychotic-medicated SZ patients.

Anica Xie

Art History, ERC

Mentored by Professor Page duBois

The Curated World: an Absurdist Phenomenon as Explored Through Queer Fashion

Curation, the deliberate arrangement of objects to convey a specific aesthetic or theme, is an abstract perception-changing tool. Often overlooked, its influence rivals scientific and religious doctrines. This largely owes to the term's heavy association with museums, where immobility greatly dilutes curation's culture-shaping potential. An examination into museum associated media events like the Met Gala reveals not only the extent of its exertion on the human psyche but also its apt ability to guide societal transformation as a discreet biopower. Just as Greek temples and theaters collaborated in ancient times, modern museums and galas unite as two conduits suited for introspective reflection and societal discourse respectively. The audacious, judgemental, and memorable discussions with room for debate generated by the mass media friendly Met Gala show how, more than museums, informal and dynamic events can work with curation to better elevate the productivity of gallery theses. The gala corresponding to MET Museum's 2019 exhibition, Camp: Notes on Fashion illustrates this, where rebellious pink color curation for the gala created a safe space to celebrate the quirks of queer expression where a red carpet's traditional history would repress it. Looking at the appearance of Billy Porter, a black queer performer, illustrates my point. Galas have the potential to curate urgent topics and encourage diverse conversations, including those concerning queer identity. Their ideal position to engage both elite and public patrons places them as catalysts for cultural shifts.

Anirudh Vaiyapuri

Neurobiology, Revelle
Mentored by Giordano De Guglielmo

Nicotinic a3b4 receptor modulates addiction-like-behaviors in alcohol dependent rats

Alcohol and nicotine co-use is a prevalent issue, particularly among individuals with alcohol dependence; therefore, developing treatments that reduce both alcohol and nicotine intake is of great interest. Targeting nicotinic receptors with antagonists or partial agonists can successfully decrease nicotine use, and emerging evidence suggests this approach may also work for alcohol use. ATRX-52, an α3β4 nicotinic acetylcholine receptor (nAChR) functional antagonist, has shown promising results on attenuating drug + cue-primed reinstatement of nicotine-seeking behavior. In this study, we investigated the effectiveness of ATRX-52 in reducing alcohol consumption under fixed ratio and progressive ratio responding as well as a cue-seeking test in rats. Rats were characterized for their alcohol addiction-like behavior by pairing chronic intermittent access to alcohol vapor with measurements of self-administration and motivation for alcohol during withdrawal. Rats with high and low addiction indices (n=16/group) were treated with ATRX-52 (0.2, 0.4, 0.8 mg/kg) or vehicle injections, administered 30-min prior to self-administration sessions. ATRX-52 was also evaluated in a separate group of rats self-administering saccharin or nicotine. ATRX-52 dose-dependently decreased ethanol intake

in all rats in both the fixed and progressive ratio schedules of reinforcement. Notably, the treatment was more effective in rats with high addiction indices compared to those with low addiction indices. ATRX-52 (0.4 mg/kg) also reduced cue seeking and nicotine self-administration in high addiction rats.

Anna Linnik

Neurobiology, Marshall
Mentored by Dr. Jyoti Mishra

Beta frequency oscillations mediate behavioral flexibility impairments during the probabilistic reversal learning task following traumatic brain injury

Traumatic brain injury (TBI) is non-penetrative head trauma often resulting in long-term behavioral changes in cognition, specifically reward learning, executive function, and decision-making. Prefrontal cortex (PFC) TBI can lead to increased impulsivity and decreased behavioral flexibility, as well as neuropsychiatric disorder onset. Here, using a bifrontal cortical controlled impact model of TBI, we investigate the neurobiological mechanisms behind these chronic impairments, and develop ways to remediate brain function post-TBI. Via the probabilistic reversal learning task (PRL), we find that rats with TBI (n=12) perform fewer reversals ($p<0.001$) than Sham rats (n=10), and have disrupted win-stay ($p>0.05$) and lose-shift behavior ($p=0.033$). Additionally, local field potential recordings in TBI rats show diminished differences in beta-oscillation power between rewarded and non-rewarded trials compared to Sham rats, particularly in the lateral orbitofrontal cortex (lOFC). In an attempt to induce changes in the corticostriatal signaling and behavior, we optogenetically stimulated the lOFC at beta frequency (20Hz) during the PRL. In Sham rats (n=11: 5 ChR2, 6 eYFP), stimulation during rewarded outcomes did not improve performance. Notably, stimulation during non-rewarded choices caused significantly fewer reversals ($p=0.001$) and win-stay behavior ($p=0.018$), but had no significant effect on lose-shift behavior ($p=0.1$). To conclude, altered beta-oscillatory patterns throughout cortico-striatal networks, particularly in the lOFC, may drive reward discrimination impairment, making it harder to discriminate between optimal and non-optimal choices. Future studies will test the effect of beta-frequency optogenetic stimulation of lOFC in TBI rats.

Annie Tang

Psychology, Seventh
Mentored by Dr. Celeste Pilegard

What Can Eye Movements Tell Us about Spatial Contiguity and Expertise in a Multimedia Lesson?

The spatial contiguity principle of multimedia learning suggests that people learn better when a lesson's corresponding text and images are located close to each other, rather than far away. Previous research has demonstrated that while spatial contiguity improves

learning in low-knowledge learners, its effectiveness is reduced for experts. Since eye movement can be utilized as a process measure for learning, this study utilizes eye tracking to investigate the effects of spatial contiguity and expertise on eye movements and learning outcomes. The study is a mixed-subject design, with spatial contiguity as the within-subject variable, and expertise as the between-subject variable through separate recruitment. In the study, participants' eye movements are tracked while they view two engineering lessons: one spatially contiguous (text close to diagram), one non-spatially contiguous (text far from diagram). Dependent variables of this study are retention and transfer test scores and number of integrative eye movements (eye movements that transition between text and image). We hypothesize that experts will outperform novices on the learning tests due to their prior knowledge on the topics; in addition, spatial contiguity will benefit the learning outcomes of novices more so than that of experts. We also predict that the influence of spatial contiguity on integrative saccades will depend on learner expertise. Results of this research will provide theoretical understanding of how learners at different levels of expertise process multimedia information, as well as practical insight into how multimedia lessons can be best designed for learners at different levels of expertise.

Annika Kirsten Ancheta

Literature Writing, Revelle
Mentored by John D. Blanco

Weapons of Warfare, Courtesy of Aswang: Christian Theology's Mutation of Filipino Folklore

The Spanish colonization of the Philippines substantially changed much of the cultural identity of its inhabitants, including but not limited to folklore. Multiple stories and accounts detail indigenous people's encounters with the supernatural world. However, the Christianization of these myths has brought up questions about how drastically these stories have shifted over time, as well as how they may have contributed to the conquest propaganda of Spanish missionaries. My goal for this project was to investigate the relationship between the folk catholicism of the Philippines and the various elements found and interpreted within Christian belief to uncover why and how the folklore of the Philippines shifted the way it did. I did this through a comparative analysis between three examples of folkloric entities from Philippine Lower Mythology – the tikbalang, the aswang, and the engkanto – and aspects of Christian theology, such as its interpretations of demonology, gender, and ethics. Through this, I have made the deduction that Christianity's nature enforces a reinterpretation of Filipino folklore, a mutation, which centers Christianity as a primary safeguard for survival within the supernatural world and therefore necessitating it for the Filipino people. However, its nature is also flexible, cultivating a situation in which the pre-colonist beliefs of the Filipino can adapt and live on, albeit now inextricably, in conjunction with Christianity.

Antara Sengupta

Cognitive Science w/Spec Machine Learning and Neural Computation, Revelle
Mentored by Dr. Andrea Chiba

LIGHT Hypnotherapy Treatment to Alleviate Physician Burnout

Physician burnout is a rampant crisis in the U.S., worsening after COVID-19. This results from a work-life imbalance, strenuous working conditions, and the physician's neglect of their own needs. Light-Induced Guided Healing Therapy (LIGHT) is a self-protocol that implements a hybrid of hypnosis and guided imagery to promote self-efficacy. By activating imagination, LIGHT boosts resilience and fosters self-compassion. We aim to identify if LIGHT hypnotherapy can increase resilience to stressors and reduce burnout within healthcare workers. Reduced burnout and depression can be assessed biologically and behaviorally. Frontal alpha asymmetry (FAA) in the brain has been linked with reduced anxiety and depression. Heart rate variability (HRV) reflects the relationship between sympathetic and parasympathetic engagement of the autonomic nervous system (ANS). Increased parasympathetic regulation can reflect a state of decreased arousal, supporting a calmer body and mind. We collected EEG, ECG, and survey data from the first, middle and last sessions of healthcare participants receiving 5-8 weeks of LIGHT treatment. Preliminary analysis through Python and Matlab showed a significant shift from right to left frontal brain dominance, potentially indicating higher levels of positive affectivity. Elevated HRV above baseline was observed, implying increased activation of the parasympathetic nervous system. Behavioral data displayed a significant decrease in burnout and increase in self-compassion. These results indicate a transition from self-preservation to self-efficacy and support an initiative to improve the physician burnout crisis. Incorporating meditation and self-care can potentially improve both the well-being of healthcare providers, and the overall effective function of the healthcare system.

Antonio Catanzarite

Ecology, Behavior and Evolution, Marshall
Mentored by Tom Corringham

ASSESSING THE ACCURACY OF TOTAL WATER LEVEL FLOOD FORECASTS AGAINST COASTAL FLOODING EVENTS IN SAN DIEGO

Coastal flooding in Southern California, particularly in San Diego County, poses a significant threat intensified by climate change and sea level rise. This research investigates the most extreme simulated total water level (TWL) max events across San Diego County since 2015 and their correlation with photographic and video evidence of flooding. The study integrates MOnitoring and Prediction (MOP) transect data from the Coastal Data Information Program with visual evidence to validate flood event reports and locations accurately. Utilizing R programming, temporal trends reveal clear seasonal variation in coastal flooding, particularly during winter months, especially January. Annual trends analysis suggests heightened flooding in 2016, 2021, and 2023, potentially linked to El Niño and atmospheric river phenomena. Spatial analysis reveals different locations endure different flooding frequencies and identifies Imperial Beach as a hotspot

for flooding impacts. Preliminary findings suggest that peak TWL values correspond to significant flood events, confirming the validity of TWL data.. However, the study acknowledges weaknesses in data collection methodologies, such as convenience sampling, which may introduce biases. The research aims to inform policymakers and researchers on effective mitigation strategies. Future research directions include further investigation into El Niño and atmospheric river impacts and improving data collection methodologies for a more representative sample. This project is a partnership between the California-Nevada Applications Program, California Sea Grant, and the Center for Climate Impacts and Adaptation, all programs at Scripps Institution of Oceanography, all seeking to understand and address coastal flooding issues.

Aran Zakeri

Human Biology, Warren
Mentored by Jay Desgrosellier

Chronic Nicotine Inducing Breast Cancer Aggression

Breast cancer is the second most common cause of death in women, accounting for 30% of the malignancies in females, nationally (1, 2). Smoking has been known to be associated with modestly increased breast cancer among women who started smoking in adolescence and pre-menarcheal ages, in which its use is associated with an increased risk of developing aggressive breast cancer, however, the cause remains unclear. Minority and underserved populations are more prone to smoking-associated breast cancer; African American and Hispanic women breast cancers are more likely to metastasize and become fatal (3,4,5,6). Nicotine, as a common product of e-cigarettes (values) and cigarettes, has been proven to play a role in breast cancer carcinogenesis. It’s been shown that (4-methyl nitrosamine)-1-(3-pyridyl)-1-butanone (NNK) and N-nitrosonornicotine (NNN), which are nicotine-derived metabolic by-products, can contribute to carcinogenesis in breast, bladder, and lung (7, 8, 9). Additionally, the Women's Healthy Eating and Living (WHEL) Study analysis showed that mortality risk among current and former heavy smokers is equally distributed (10). To this end, we hypothesize that the consumption of nicotine can have short or long-term effects on the possibility of breast cancer development even if cessation occurs. The mechanisms should be well studied to propose new treatments that can hinder aggressiveness in breast cancer. We aim to understand the mechanism and contributions of nicotine to breast cancer aggressiveness, proliferation, and induction by utilizing cancer cell models, mice models, and patient samples

Arlene Grace D. Nagtalon

Molecular & Cell Biology, Revelle
Mentored by Dr. Angela Booker

Unity - A Board Game: A Study in Gamified Changemaking

The ramifications of the COVID-19 pandemic disrupted normalcy in community building in various spheres, leaving individuals questioning and re-evaluating how to create positive change during a time driven by social upheaval. Consequently, research displayed that deficiencies in social cohesion led to unpreparedness when combating pre-existing and exacerbated injustices, leading to increased multigenerational burnout, cynicism, and anxiety. This study highlights how and why board games are ideal environments where community building can thrive through amending knowledge gaps, learning beneficial mindfulness techniques, and adapting a civically-engaged mindset. Through exposure to scenarios focusing on diversity, equity, inclusion, and belonging (DEIB) efforts inspired by the Social Justice Standards, addressing power dynamics, obtaining diverse perspectives, and understanding the influence of unconventional learning tools is achievable through Unity, a new board game. This design-based study involved playtest sessions conducted with three participant groups: high school students, undergraduate students, and industry professionals. Unity was utilized to observe evolving attitudes towards changemaking with participants selected by a sample of convenience. Semi-structured interviews and field notes recording game play observations offered insights into how players applied skills to real-life events. Analysis of the responses demonstrated that board games offer a valuable space for players to foster collective autonomy and control of their futures. Findings indicate that board games provide friendly, effective simulations for players to facilitate meaningful discussions while being introduced to controversial issues in a digestible manner. Actions made during gameplay can translate into concrete actions to keep players inspired, empowered, and motivated to see themselves as changemakers.

Arvie Cabal

Human Biology, Marshall
Mentored by Dr. Nicholas Webster

Examining the Influence of BMAL1 Receptor in Cancer Proliferation

Considerable studies suggest hyperinsulinemia's role in driving breast cancer growth and dysregulation of the circadian clock component, BMAL1. Our lab has demonstrated that time-restricted feeding (TRF) inhibits tumor growth and corrects disturbed circadian synchronization that manifest in cancer cells, by reducing insulin levels in mouse models. Thus, it is evident that high insulin is a driver of cancer phenotype, but the mechanism by which it functions is still unknown. We aim to investigate whether insulin is independently operating via insulin-receptor (IR), or is interacting with circadian component BMAL1 to promote in-vitro cancer proliferation. We are using wild-type PY230, IR-knock out (IR-KO), and BMAL1-knock out (BMAL1-KO) cells, where gene knock-out was induced using an electroporation approach. This study is focusing on effects on cell proliferation, colony proliferation, and spheroidal development in BMAL1-KO PY230 cells when they are treated with complete medium, 0.5% medium with insulin, and 0.5% medium.

Augie Resendiz

Music, Seventh
Mentored by Jann Pasler

The Piano Transcriptions of The Nutcracker (A Historical and Analytical Overview)

The music of The Nutcracker has since its premiere in 1892, made its way into the piano repertoire in the form of piano transcriptions. These include transcriptions of both the suite and the entire ballet made for solo piano, piano duet, and two pianos. The arrangers of the piano works in this research include names such Sergei Taneyev, Eduard Langer, Nicholas Economou, and Mikhail Pletnev, and Tchaikovsky himself. With the concept of a Lisztian tradition of transcription in mind, these transcriptions vary significantly in terms of virtuosity, unique departures from the original score as determined by the arranger, and fidelity to the original score where a true recreation of an orchestral work on piano is kept in mind. Despite the many transcriptions of the Nutcracker that exist, only two are regularly performed (the arrangements by Economou and Pletnev) and arguably, only one has entered the standard piano repertoire and is regularly performed (Pletnev's arrangement). Both of these transcriptions share the characteristics of virtuosity and sincere adherence to the original score. However, there still remains a gap to bridging the music of the Nutcracker into the piano world — a full virtuosic and Lisztian recreation of the Nutcracker ballet similar in style to Pletnev's and Economou's arrangements.

Aylin Paez

Political Science w/ Spec. in Political Theory, Marshall
Mentored by Dr. Amy Bintliff

Understanding Self Efficacy & Equity

Self-efficacy, defined as the confidence in one's abilities to execute actions necessary to achieve specific outcomes, significantly influences student performance and motivation. This study explores the impact of self-efficacy on students at New Horizons High, a newly established school serving predominantly Latine and low-income communities. By addressing the research question, "In what ways does the concept of self-efficacy impact students?" this investigation seeks to identify practices that promote and sustain academic efficacy. The research will focus on uncovering the sources of cultural wealth and contributors to self-efficacy, thereby providing an equitable representation of the students' capabilities. Through qualitative methodologies, including student empathy interviews, student leadership observations, and teacher surveys, this study aims to amplify student voices and experiences. Ultimately, this research will contribute to the broader discourse on educational equity and efficacy, offering insights into how schools can better support diverse student populations in achieving academic success.

Benjamin Savala

Physics, Chemistry, Muir
Mentored by Richa Rashmi

Understanding nuclear quantum effects in the solvation structure and hydrogen bond dynamics of fluoride hydration

Ion hydration is integral to biological functions, pharmaceutical applications, and future green-energy endeavors. Classical molecular dynamics simulations have been able to predict numerous properties of ion hydration in good agreement with experiments. However, since nature is inherently quantum mechanical, classical molecular dynamics simulations are not sufficient in providing a realistic representation of ions in solution. In this work, we aim to employ highly accurate potential energy surfaces for fluoride ion and water to study the role of nuclear quantum effects in the hydration structure and dynamics of water molecules around fluoride ion. We will present our preliminary findings on the hydration structure and infrared spectrum of fluoride ion in water.

Brandon Lin

Emergency Medicine, Warren
Mentored by Dr. Benjamin Supat

Rural vs. Urban: Overview of the Distribution of High Complexity Elderly Patients Presenting to Emergency Departments

Over the past decade, rural hospitals and associated emergency departments have been facing increased financial instability and closures, with previous studies showing that critical access hospitals in rural areas were less likely to have intensive care units and had lower performance of care overall. This has large implications for the rural, elderly population, with the steadily aging population and increasing burden of comorbidities. The emergency department acts as a crucial point of contact for care and treatment for high-complexity, elderly patients. However, the distribution of high-complexity, elderly patients admitted to emergency departments between urban and rural hospitals has not been analyzed. We used HCAI from 2016 to 2021 to measure the admission rates of high-complexity, elderly patients into EDs to determine whether there was a disproportionate burden between rural and urban hospitals. ED admission rates within rural and urban hospitals were relatively equal, but transfer rates of patients from rural hospitals to other facilities were higher compared to urban hospitals, potentially attributed to the lack of adequate resources required to treat patients in rural emergency departments.

Calvin Xiao

Neurobiology, Sixth
Mentored by Stefan Leutgeb

Control of Circuit Computations for Cue-Guided Movement Initiation by Dopamine

Recent recording studies have demonstrated that direct and indirect pathway medium spiny neurons behave similarly during simple motor behaviors, suggesting the coordinated activation of both pathways is critical during action selection. Thus, the standard model of basal ganglia function must be revised to account for these recent findings. Our aim is to shed light on this matter and further investigate the contribution of the dorsal striatum and its downstream targets in motor control. We will use the MitoPark mouse model at different severities of dopamine depletion to study the onset and progression of basal ganglia dysfunction. Our experiments will involve acute, head-fixed electrophysiological recordings in awake mice navigating a virtual linear track to obtain sugar rewards. Since previous PD studies have shown memory deficits precede motor impairment, we hypothesize the firing activity of striatal circuits involved in cognitive control to be disrupted at an earlier timepoint than the firing activity of striatal circuits engaged in sensorimotor integration. Preliminary behavioral data from our study suggests that both MitoPark and control mice learn our behavior task within a week of training. After 2 weeks of training, 8-week-old MitoPark and control mice have an accuracy score (#valve openings / #tone outputs) greater than 70%. In contrast, after 4 weeks of training, 10-week-old MitoPark mice have a notably lower accuracy score compared to control mice even though both phenotypes travelled about the same overall distance. Our study will provide insight into how large-scale activity and oscillation patterns contribute to motor and cognitive function.

Carlos Aguilar

Neurobiology, Muir
Mentored by Dr. Lindsey Powell

Comparing univariate and multivariate approaches to fNIRS data analysis

Adult neural responses to perceptual stimuli and cognitive tasks exhibit strong, reliable spatial organization within and across people. The emergence of this functional brain organization in infancy and childhood may underlie associated perceptual and cognitive development, so it is important to refine cognitive neuroscience methods that can capture the existence of and change in patterns of neural specialization in the first months and years of life. In methods with high spatial resolution, such as fMRI multivariate analysis techniques can capture fine-grained neural patterns associated with highly specific aspects of perception and cognition. Recently, researchers have begun to apply similar approaches to data collected using functional near infrared spectroscopy (fNIRS), a neuroimaging method well-suited to research with awake infant participants. However, the spatial resolution of fNIRS is much lower, and researchers often measure from units spanning one or more lobes of the brain, rather than from within a functional region of interest. Using multiple existing fNIRS data sets, we tested if multivariate analyses of fNIRS data actually provide more sensitivity to functional organization than univariate analyses. We found that while we were able to successfully implement multivariate decoding in some fNIRS datasets, it may depend on the presence channels with strong functional preferences that are also evident in univariate analysis. The goal of the project

is to uncover when it is appropriate and the best opportunity to run a multivariate analysis on fNIRS data in comparison to univariate analysis.

Chiraag Kambalimath

Neurobiology, Warren
Mentored by Dr. Tony L. Yaksh

Assessment of Nav 1.7 Binding in Neuronal Lipid Rafts

Due to proprietary information this abstract has been redacted.

Chloe Vitali

Political Science w/ Spec in International Relations, ERC
Mentored by Lauren Prather

Does Terrorism Cause Repression?

Since the end of the Cold War, the world has been in a state known as the “Long Peace” marking a period in which no major powers have fought interstate wars. However, this period has been characterized by two other, newer forms of violence: civil wars and terrorism. This project seeks to explain how terrorism's existence in civil wars influences the choices of a government in the post-conflict period of a civil war. Drawing and expanding on previous work observing both state behavior after civil war and terrorist behavior, this project observes how terrorist groups’ involvement in a civil conflict can contribute to government repression in a post-conflict setting. Specifically, I will note how governments respond to violent groups’ actions after a conflict and argue that the intensity of terrorism during a conflict facilitates governments to use repression against citizens in the post-conflict period.

Christy Zha

Mentored by Justin Eldridge

Pattern Analysis on EEG Data for Enhanced Depression Diagnosis

Due to proprietary information this abstract has been redacted.

Cindy Zhong

Human Biology, ERC
Mentored by Dr. Jean Y. J. Wang

Regulation of CHK1 Expression by Replication Stress

Due to proprietary information this abstract has been redacted.

Claire Mallela

Cognitive Science, Interdisciplinary Computing and the Arts, Seventh
Mentored by Dr. Imani Munyaka

Race & Gender Bias in Facial Recognition Algorithms

This study explores the growing use of facial recognition models in computer vision technology and the accuracy of these algorithms being employed in public spaces. Recent research on the types of data used to train these models have been proven to show bias against certain demographics, specifically ones concerning social identities such as race and gender. In order to identify the biases that may be present in current facial detection algorithms and analyze the security risks associated with false identifications, this project includes background research on similar projects that have been conducted surrounding the topics of racial bias and facial recognition algorithms, building and implementing a physical interactive installment to feature the algorithm, and collecting data from people that willingly interact with the mirror in a public place.

Daniel Gurholt

Mentored by Dr. Maripat Corr

Toll-like receptors 7 & 9 Regulate Sex Differences in a Murine Arthritis Model

Due to proprietary information this abstract has been redacted.

Daniel Xie

Cognitive Science, ERC
Mentored by Michel Estefan

UCSD Social Connection: Understanding Student Social Interactions

This research project analyzed the social interactions and social connections between the student body at UCSD to determine what typical student interactions at UCSD are like, if there are existing socialization challenges among students and what are some potential ways to resolve these challenges. To answer these questions, this project conducted an online survey targeting second year and above current UCSD students with 25 students responded. 6 out of the 25 students were later interviewed online about their UCSD social experiences. The results demonstrated that UCSD students have relatively neutral perceptions of social culture at UCSD. However, from both surveys and interviews, it is clear that there are social challenges such as unresponsiveness from most students and lack of balance between school and social life. The research also gathered evidence about

some approaches from students that improved their social experience at UCSD. This project discovered evidence for unsolved student interaction issues at UCSD, introduced methods that UCSD students can potentially utilize to their own social interactions, and emphasized the need for student interaction improvements.

Deepansha Singh

Mathematics, Seventh
Mentored by Dr. Nadir Weibel

Using ML to Analyze Patient-Provider Interactions

Due to proprietary information this abstract has been redacted.

Dia Celaya Carrillo

Public Health w/Spec in Community Health Sciences, Warren
Mentored by Dr. Chadwick Campbell

The health implications of labor-intensive work for Latinx immigrant workers within the San Gabriel Valley

Latinx immigrant labor-intensive workers are at a higher risk of developing chronic diseases and long-lasting health problems. Public health research over the years has explored the troubling concerns that may deteriorate a person's well-being, whether through their everyday job, illness, life experiences, or even how their upbringing left them more vulnerable to poor health conditions.

Dominika Sandel

Human Biology, Marshall
Mentored by Carlos Vasquez

Functional Characterization of the SDHB Mutant Enabled Through Base Editing Technology

Succinate dehydrogenase (SDH) is a critical enzyme in cellular metabolism, composed of multiple subunits, crucial for the citric acid cycle and the electron transport chain. Notably, Succinate Dehydrogenase Subunit B (SDHB) plays a fundamental role in catalytic activity and enzyme stability. Mutations in the SDHB gene often lead to hereditary paraganglioma-pheochromocytoma, a form of aggressive lung cancer. However, over 600 SDHB mutations remain classified as variants of uncertain significance (VUS) by ClinVar, an NIH database. It is imperative to conduct thorough investigations into these mutations to enable future detection methods, potentially

improving the chances of early tumor detection and increasing the likelihood of full recovery. Our project focuses on leveraging base editing technology to generate SDHB variant cell lines and establish an SDHB knockout cell line, followed by the evaluation of their pathogenicity using chemical and biochemical techniques. In the “Functional Characterization of SDHB Variants” poster presentation, we demonstrate the initial phase of our project, detailing the creation of our knockout cell line.

Dylan Dahlke

Physics, Muir
Mentored by Grady Kestler

Characterization of Hermite-Gaussian Modes for Experiments with Ultracold Strontium

Sensitive and accurate rotation sensing is vital in applications like inertial navigation, north-finding, geophysical analysis, and tests of general relativity. Currently, Sagnac interferometry, where a wave of light splits in two, travels a large enclosed path, and recombines, is a common method for this. Instead of using light waves for a Sagnac interferometer, Barreiro Lab uses matter waves, which allows for improvements in gyroscopic technology by up to 10 orders of magnitude.
In order to produce matter waves, strontium atoms can be laser cooled to microKelvin temperatures, where they begin to exhibit wave-like properties. At ultracold temperatures, matter waves can be confined near the surface of specially designed photonic devices called “optical waveguides.” Such devices are often smaller than the wavelength of light passing through, so that some of the guided light leaks out and produces “evanescent fields.” The intense evanescent fields near the device surface, lock the cooled strontium atoms in place around a ring. Unwanted atom-surface interactions can be avoided by balancing the optical trap through the use of attractive(i.e., red-detuned) and repulsive(i.e., blue-detuned) wavelengths of light.
To provide confinement in all three dimensions, the use of blue-detuned light and specific spatial distributions, known as TEM Hermite-Gaussian modes, are required. In this project, I will build an optical interferometer setup focusing on generating and characterizing the TEM01 mode.

Elizabeth Velazquez

Biochemistry, Revelle
Mentored by Dr. Richard Childers

Randomized Trial- Price Sensitivity of Urgent Care Patients with Respiratory Illness Symptoms

With the rise of the Covid-19 global pandemic, concerns have arisen towards how patients cope with healthcare costs, specifically costs for medications. There are also concerns about the inappropriate use of antibiotics as well as the minimal benefit and potential risks patients are exposed to. This price-sensitivity randomized trial study serves

the purpose in determining how patients can be affected when they are provided educational pamphlets highlighting their symptoms, treatment, benefits and risks of antibiotics, and cost of antibiotics. Patients at the UCSD La Jolla Urgent Care presenting with Acute Respiratory Infections (ARI) such as cough/bronchitis, sore throat/pharyngitis, and/or sinus congestion/sinusitis are given the opportunity to be part of this research project and randomly given a pamphlet which contains cost or no cost for antibiotics. Through this study, secondary aims can also be assessed such as the rate of antibiotic prescription in study subjects versus patients not enrolled in the study and the rate during the preceding year.

Ellie Tam

Biochemistry, Muir
Mentored by Prapida Ghosh

Role of macrophage non-canonical-G-protein signaling in Atherosclerosis

Due to proprietary information this abstract has been redacted.

Everlynn Khamjoi

Communication, Sixth
Mentored by Andrew DeWaard

Assetization in a Technoscientific Capitalist Gaming Industry

Assetization can be understood as a process in which anything can be transformed into an asset form. Birch and Ward (2022) assert that “an asset is both a resource, which generates income streams, and property, whose value is determined by capitalizing its future income streams and their relationship to broader political-economic trends (e.g. long-term rates of return).” With this definition of an asset, one would be able to find many different asset forms within the gaming industry such as intellectual property (IP) games are based off of, live-service games, free to play games, the asset forms that are derived from the games: skins, loot boxes, and battle passes, as well as esports players and teams. This paper aims to clarify the role of these assets within the broader context of the gaming industry to better understand what comes to constitute capital in contemporary technoscientific capitalism. I will employ a critical political economy analysis of the IP Counter Strike as my case study, using gathered content related to the Counter Strike IP as my point of analysis.

Gaya Kalyan

Mentored by Dr. Rahul Nene, MD, Ph.D.

Opioid Use Disorder In Border City Populations

Due to proprietary information this abstract has been redacted.

Giselle Calvillo

Clinical Psychology, Muir
Mentored by Arpi Minassian

Characterizing Cannabis Use Patterns and Functional Outcomes: A Comparative Analysis

The proposed research study aims to characterize medicinal cannabis use, recreational use, and those who partake in both. Demographic differences between these populations will be analyzed. A second aim of the proposed study is to examine everyday function (i.e., ability to engage in everyday tasks) in recreational, medicinal, and cannabis users of both. A self-report measure will be used to determine participant intake of cannabis, mode of use, and types. Everyday function will be measured using the UCSD Performance-Based Skills Assessment (UPSA-2).

Gizem Altinok

Molecular and Cell Biology, Revelle
Mentored by Howard Wang

Investigating the Role of O-GlcNAcylation in Regulating Neuronal Antioxidant Defense Systems for Enhancing Brain Energy Efficiency

O-GlcNAcylation, a nutrient sensing-post-translational modification, involves the addition of a single carbohydrate onto serine and threonine residues of nuclear, cytoplasmic, and mitochondrial proteins. This transient modification is tightly regulated by O-GlcNAc transferase (OGT) and O-GlcNAcase (OGA) enzymes. Rate-limiting glycolytic enzyme Hexokinase-1 (HK1) has been observed to localize onto the mitochondrial outer membrane via increased O-GlcNAcylation, and it recruits other glycolytic enzymes to form metabolons. Among these enzymes are Aldolase A (Aldo A) and Pyruvate kinase isoform 2 (PKM2), rate-limiting enzymes in glycolysis. Aldo A catalyzes fructose 1,6-biphosphateinto glyceraldehyde 3-phosphate and dihydroxyacetone phosphate while PKM2 is the last glycolytic enzyme and generates pyruvate, pivotal for cellular metabolism. The localization of Aldo A and PKM2 to mitochondria holds significant implications about the regulation of metabolism in neurons. Thus, we propose that up-regulating O-GlcNAcylation may enhance the localization of Aldo A and PKM2 to mitochondria, increasing neuronal metabolism. Investigating this hypothesis could provide valuable insights into fundamental research of metabolism regulation in neurons. To test our hypothesis, we designed a plasmid for Aldo A using mScarlet fluorescence, which allowed us to image Aldo A alongside Mito-GFP. We chose mScarlet because its emission spectra do not overlap with those of Mito-GFP, enabling clear visualization of Aldo A localization. Additionally, we used a PKM2 plasmid with eGFP, which is 35 times

brighter than GFP, to facilitate the transfection of neurons in tandem with Mito-BFP for similar reasons. We cultured Sprague Dawley rat embryonic hippocampal neurons in vitro and transfected them at 10 days in vitro, then manipulated O-GlcNAcylation enzymes pharmacologically. Preliminary results from live confocal imaging indicate that both Aldo A and PKM2 localize to mitochondria with increased O-GlcNAcylation. This localization may clarify potential regulatory mechanisms and interactions between glycolysis and mitochondrial metabolism, which are crucial for energy production and cellular function in neurons.

Grace Lu

Molecular and Cell Biology, Global Health, Seventh
Mentored by Dr. Shaochen Chen

3D Bioprinting Glioblastoma Models for External Radiotherapy and Hypoxia Testing

Due to proprietary information this abstract has been redacted.

Hargen Zheng

Data Science, Mathematics-Computer Science, Sixth
Mentored by Justin Eldridge

Pattern Analysis on EEG Data for Enhanced Depression Diagnosis

Depression is a significant mental health concern that affects many individuals globally. The current diagnostic methods, primarily relying on questionnaires, have limitations in providing an objective measure of depression. The subjective nature of self-report scales and the difficulty in interpreting discrete rating scales can contribute to inaccuracies in diagnosing depression. Motivated by this issue, the aims are to explore a quantitative measure for diagnosing depression by utilizing unsupervised learning to uncover patterns and hidden structures within the EEG data that are associated with depression.

Harshita Devavarapu

Political Science, ERC
Mentored by Professor Valerie Soon

Protection for Climate Displaced Peoples

Recent climate and migration studies research shows that the number of people being displaced by climate change is going up and is expected to increase exponentially in the future. UNHCR reports that there were 32.6 million internally displaced people in 2022 alone. Considering that this problem is expected to be exacerbated in the near future, the need for establishing protection for this growing class of people in international law becomes apparent. Currently, the term ‘climate refugee’ is not recognized in international

law and the 1951 Refugee Convention does not protect this class of people. While there are some regional conventions, like the African Union's Kampala Convention, on displacement that recognizes climate change as a cause of displacement, there is a stark need for more comprehensive protections to be in place. This research paper proposes an answer to why a separate normative designation for climate refugees needs to exist in international law and what adequate protection for this class of people could look like. This research looks at the impacts of climate change on A) economic factors that create the need for pre-emptive migration, and B) the ability to continue cultural land-based practices as unique and morally relevant features of climate migration that necessitate the need for a normative designation. Martha Nussbaum's 'capabilities approach' is explored to ground criteria for the adequate protection of climate-displaced people. This research can further be used to evaluate existing frameworks to identify and fill protection gaps within international law.

Ian Gurholt

Mentored by Dr. Mona Alotaibi

Molecular Differences in Fatty Acids Metabolism Between Isolated Post-Capillary and Combined Pre- and Post-Capillary Pulmonary Hypertension

Due to proprietary information this abstract has been redacted.

Inaya Nicholls

Molecular and Cell Biology, Revelle
Mentored by Dr. Michelle St. Romain

Exploring Trends in Mental Health Outcomes of LGBTQ+ Intimate Partner Violence Survivors Admitted to the Emergency Department

Although concerns about IPV transcend gender identity and sexual orientation, current research predominantly focuses on heterosexual relationships, overlooking the experiences of LGBTQ+ individuals. With IPV prevalence rates comparable to or higher than heterosexuals and with particular vulnerability to mental health challenges, the ED is a critical point of contact for LGBTQ+ survivors. However, existing screening and care practices are flawed. This review aims to identify trends in types of IPV persistent among LGBTQ+ individuals and mental health outcomes of LGBTQ+ IPV survivors. Additionally, we will explore discrepancies in ED care contributing to ineffective responses to the multifaceted challenges presented by LGBTQ+ IPV. Our search was conducted across databases (PubMed, ScienceDirect, MEDLINE) for studies published from 2015 to 2024, excluding non-US and Canadian literature. Studies were screened based on relevance to IPV in LGBTQ+ relationships, mental health outcomes of LGBTQ+ IPV survivors, and LGBTQ+ survivor care in ED settings. We included 19 sources, comprising qualitative, quantitative, longitudinal, and retrospective studies as well as scoping and systematic reviews. Trends indicate higher prevalence rates of

LGBTQ+ survivors admitted to EDs, with psychological victimization as the most common IPV type. Moreover, LGBTQ+ survivors face high psychological distress, anxiety, and depression, compounded by the lack of gender-affirming care and sufficient understanding of LGBTQ+ experiences in EDs. LGBTQ+ survivors face heightened psychological health risks due to IPV and institutional discrimination, highlighting the urgent need for tailored interventions and support in healthcare settings, alongside future research centered around developing protocols for inclusive education and culturally competent care.

Jafer Vazquez Alcaraz

Psychology, Revelle
Mentored by Ariel J. Lang

Racism and Stigma: Barriers to Mental Health Care for Veterans of Color

The purpose of this research is to examine how racism and stigma may affect the willingness of Veterans of Color (VOC) to seek mental health services. Recent studies have revealed that VOC face mental health disparities, which can significantly impact conditions such as depression, anxiety, and post-traumatic stress disorder (PTSD). This study will utilize a phenomenological approach to gain insight into the personal experiences of VOC to understand how mental health stigma may connect to racism. Participants, who are Veterans who identified within the Black, Indigenous, and Person of Color (BIPOC) community, will be drawn from a study on the Race-Based Stress Trauma and Empowerment (RBSTE) group intervention. An Interpretative Phenomenological Analysis (IPA) approach will be used to analyze individual semi-structured interviews. The expected outcome of this study is to develop knowledge to foster the creation of strategies to facilitate VOC seeking mental health services. By understanding and addressing the unique challenges faced by VOC, the study hopes to foster greater empathy and reduce health disparities within this community. This research is critical for developing targeted interventions that acknowledge and address the specific needs of Veterans of Color in the healthcare system.

Jamila Piri

Cognitive and Behavioral Neuroscience, Sixth
Mentored by Dr. Giordano de Guglielmo

Exploring the Therapeutic Potential of the Nociceptin/Orphanin FQ-NOP Receptor Pathway in Opioid Use Disorder Treatment

Approximately 25% of chronic pain patients misuse prescribed opioids and 5 to 10% developing Opioid Use Disorder (OUD). Despite our understanding of the neurobiological targets of opioids, the molecular mechanisms driving addiction-like behaviors in certain individuals remain elusive. To investigate these mechanisms, we used heterogeneous stock rats, which mimic human behavioral and genetic diversity. We

characterized differences in addiction-like behaviors using an addiction index that incorporates the key criteria of OUD: escalated intake, highly motivated responding, and hyperalgesia. Our findings revealed that rats exhibiting high addiction-like behaviors (HA) displayed increased γ-aminobutyric acid (GABA) transmission in the central nucleus of the amygdala (CeA) compared to low addiction-like behavior (LA) and naive rats. Superfusion of CeA slices with nociceptin/orphanin FQ peptide (N/OFQ), an endogenous opioid-like peptide, normalized GABA transmission in HA rats. Intra-CeA levels of N/OFQ were lower in HA rats than in LA rats, and intra-CeA infusions of N/OFQ reversed the escalation of oxycodone self-administration in HA rats, but not in LA rats. This suggests the downregulation of N/OFQ levels in the CeA may be responsible for hyper-GABAergic tone in the CeA observed in individuals who develop addiction-like behaviors. We tested a novel NOP receptor-selective nonpeptide agonist on various OUD measures, such as motivation to seek heroin, withdrawal-induced hyperalgesia, and opioid-induced respiratory depression. Our results demonstrated that NOP agonism significantly reduced heroin motivation and seeking, alleviated withdrawal-induced hyperalgesia, and accelerated recovery from heroin-induced respiratory depression. Targeting the N/OFQ-NOP receptor system may represent a promising therapeutic strategy for OUD, offering improved efficacy.

Jaron Kam

Molecular and Cell Biology, Muir
Mentored by Dr. Kumud Tiwari

Changes in Vinculin and Zonula Occludens-1 Protein Expression in Hypertrophy Induced H9C2 Cardiac Cells

Among the many cell types in the heart, working muscle cells, also known as cardiomyocytes, contract and relax. Linking cardiomyocytes, there are bundles of structures called intercalated discs. These discs are responsible for important functions, such as force and electrical transmission, allowing the heart to function as one unit. Within each disc, many important proteins form complexes to maintain their structure and function. On a cellular level, these proteins are important for cardiomyocyte cell-to-cell communication to facilitate cell integrity and adaptive growth in response to stress. Alterations in intercalated disc protein expression can cause abnormalities in the cell growth response and lead to several responses including cardiomyocyte hypertrophy. In this study, we aimed to investigate if cardiomyocyte hypertrophy can also cause abnormal changes in intercalated disc protein expression. Cardiomyocytes, from the H9C2 cell line, were incubated with hypertrophic inducers named vasopressin, angiotensin II, and endothelin I, and the changes in expression of two intercalated disc proteins, vinculin and zonula occludens-1 (ZO-1), were measured. We discovered that after inducing hypertrophy in H9C2 cardiomyocytes, the expression of vinculin decreases, while the expression of ZO-1 increases. This shows the antagonistic nature of vinculin and ZO-1 to each other in the cardiac hypertrophic conditions studied in our model system. Hence, our study reveals a novel significant connection between intercalated disc proteins and cardiac hypertrophy.

Jasmine Barahona

Linguistics, Marshall
Mentored by Dr. Maria Jose Aragon

Implementing Translanguaging Practices in Bilingual Classrooms

This paper delves into the educational challenges faced by Latinx emergent bilingual students in the United States and explores the effectiveness of translanguaging pedagogy in addressing these challenges. With a focus on promoting equity and social justice in education, the study investigates how bilingual teacher candidates implement translanguaging strategies to support Latinx emergent bilingual learners in bilingual classrooms. Drawing on qualitative data collected through interviews with two cohorts of bilingual teacher candidates, the research examines effective teaching practices, translanguaging strategies, and challenges encountered in implementing bilingual teaching practices. The findings reveal that effective bilingual teaching practices such as using visuals, academic language instruction, building relationships, providing language scaffolds, and connecting content with students' cultural backgrounds contribute to fostering a supportive learning environment for Latinx emergent bilingual students. Additionally, translanguaging practices emerge as a powerful tool for promoting linguistic inclusivity, socio-emotional support, and building on students' linguistic repertoires. However, challenges such as program models, lack of teacher preparation, language proficiency, and resistance to translanguaging practices hinder the implementation of effective bilingual teaching strategies. Translanguaging is a promising approach to promoting equity and inclusion for Latinx emergent bilingual students by validating their linguistic identities and fostering a sense of belonging in educational settings.

Jasmine Lewis

Psychology w/Spec in Cognitive Psychology, Marshall
Mentored by Nicholas Oesch

The Output of Retinal Ganglion Cells to Superior Colliculus Using Fiber Photometry

Retinal output to retinorecepient structures has long been thought to be an exact copy of the information from the retina, however recent evidence has shown retinal ganglion cell axon terminals may be modulated by visually guided behaviors. In order to further understand how information from the retina may be modulated, we targeted the Superior Colliculus (SC) since, in the mouse brain 80-90% of retinal ganglion cells (the output cells of the retina) send their axons there. Using fiber photometry as a measure of retinal ganglion cell action potentials in SC we employed a classical conditioning behavioral task in which mice are trained to perform a visually guided behavior. Mice were injected with the calcium indicator GCAMP8 into the vitreous of the eye mediated by either the viral vector AAV9 or AAV1. Prior work has shown that AAV1 is capable of synaptic

transmission whereas AAV9 is restricted to the RGC terminals. We found dissociable visual and behavioral signals within SC. Mice injected with AAV1 displayed robust conditioned response mediated fiber photometry signals whereas AAV9 mice had increased signaling at the onset of the conditioned stimulus. These signals were unique to each population of neurons with AAV1 mice showing a depression and AAV9 mice showing an increase in activity. Taken together our results show RGC terminals are sending excitatory retinal information and being modulated via the conditioned response.

Jen Gonzalez

Mentored by Edward Castillo, Ph.D

The Emergence of MIS-C During the COVID-19 Pandemic
Due to proprietary information this abstract has been redacted.

Jenny Chau

Public Health, ERC
Mentored by Justin Seltzer

Efficiency of naloxone drips in Emergency Room Settings

Naloxone is an opioid overdose reversal drug that binds to opioid receptors to block the effects of the opioids. It can be given as an intranasal spray, as an injection in the muscle, vein, or under the skin, and as a drip. Injection and drips are used in the hospital setting more often, while the spray is usually used for personal use before heading to the ER for overdose.

Jessica Du

Neurobiology, Marshall
Mentored by Hiruy Meharena, Hung-hsiu Liin

Impact of Trisomy 21 on Neurodevelopmental Trajectory

Down Syndrome (DS), caused by trisomy of chromosome 21,leads to various developmental abnormalities, including significant impacts on brain development and function. This study investigates the premature differentiation of neural progenitor cells (NPCs) in DS by comparing iPSC-derived DS1 trisomy and DS2U control organoids. Organoids were cultured and analyzed at days 30, 120, and 180. Immunostaining for SOX1 and TBR1, both are neural progenitor markers, revealed a significantly lower percentage of SOX1+ cells in DS1 organoids. Additionally, significantly higher percentages of TBR1+ cells in DS1 organoids were observed at days 30 and 120. These findings suggest that trisomy 21 leads to early depletion of the NPC pool, potentially underlying the neurodevelopmental deficits in DS. Future research will focus on fact

based quantitative analysis of cell type proportions and developmental patterns to elucidate the mechanisms driving these abnormalities.

Jingyi Chen

Political Science, Marshall
Mentored by Professor Weijing Lu

Spousal Abuse and Women's Legal Consciousness: Cases from Periodicals in China in the 1930s

This research delves into legal consciousness and women's agency during the early 1930s in China. In 1931, the Nationalist government implemented the Civil Code of the Republic of China, which granted women important legal rights, such as expanded property ownership and marriage autonomy. Notably, the Code unprecedentedly allowed individuals to be granted divorce by the courts on the grounds of intolerable domestic abuse. While existing literature has suggested an increase in divorce litigations initiated by abused women, implying a rise in their legal awareness, there has been limited discussion on how women experiencing domestic abuse navigated their situations before taking formal legal action. How did women leverage available resources to address domestic abuse as well as socioeconomic challenges in the years following the 1931 Civil Code? Through archival research and in-depth qualitative analysis of legal inquiries made by individuals to three periodicals -- Ling Long, The China Times, and Sin Wan Pao -- from 1932 to 1935, this study reveals how some women analyzed their circumstances and strategically leveraged their familial and social networks and free legal consultation to resist and subtly alter their historical conditions. By contextualizing the findings within the sociopolitical contexts, this research provides insights into the complexities of Chinese women's history, challenging traditional narratives of women being passive victims of oppression and illustrating their active agency. Also, it sheds light on the life experiences of ordinary women in Chinese history, which have frequently been overlooked, suggesting valuable untapped primary sources for future studies.

Jinmiao Li

Public Health, Marshall
Mentored by Dr. Jose Luis Burgos

Access the Health Literacy of Patients in the HFiT Clinic in Tijuana

This study evaluates the health literacy (HL) levels of patients at the UCSD Health Frontiers in Tijuana (HFiT) Clinic, focusing particularly on the patients' ability to access healthcare services. The targeted patient populations are underserved in the Zona Norte region of Tijuana, Mexico, including individuals engaged in sex work, those experiencing homelessness, deportees, immigrants, and injection drug users. Unlike previous research, which predominantly assessed patients' reading comprehension of medical terms, this study employs the Health Literacy Survey European Questionnaire (HLS-EU-16Q) to

measure broader dimensions of health literacy, including patients' capacities to navigate and utilize healthcare resources around them. Patients who visited the HFiT clinic on Saturday mornings from March to May were given the Spanish version of the questionnaires after consent. By focusing on the U.S.-Mexico border region, where public health policies have undergone significant changes, this research aims to provide crucial insights into the barriers faced by marginalized groups in accessing healthcare services. The study's implications include informing interventions that can enhance patients' health literacy and improve healthcare access and outcomes in clinics serving the underserved like HFiT. Specific interventions at the clinic include providing more guidance on consultation and prescription to those who received scores of "insufficient health literacy" from the questionnaire.

Jiya Gupta

Psychology w/Spec in Developmental Psychology, Marshall
Mentored by Gail D. Heyman

Bridging Disciplines: Understanding Social Norms through a Conceptual Synthesis

We use social norms to guide our actions in complex situations. Social norms are unwritten standards that shape our individual behaviors, establish group expectations, and steer the functioning of societal structures. They are central to morality, conformity, and collective order. The goal of my project was to synthesize existing research across disparate disciplines (e.g., education, public health, economics, and politics) to understand how we develop, adopt, and express social norms. I conducted an extensive analysis of over forty peer-reviewed academic papers and used a standardized format to summarize the findings (key results and significant relationships) and conclusions (main takeaways and future implications) from each paper. I identified foundational theories surrounding norm learning, highlighted the variability in categorizing norms, listed the different factors affecting norm perceptions, and presented the current approaches used to enforce norms. My project offers three key outcomes. First, my paper offers insights from multiple disciplines about organizational structures and deviance to explain how communities can foster structural harmony. Second, I extend these findings to offer recommendations on how future research can fill current gaps and create a more comprehensive understanding of social norms. Third, using my takeaways, I propose ten specific research questions and methods for future studies to answer these questions. Together, my project accomplishes a holistic synthesis of the formation, fluidity, and force of social norms across disciplines, while simultaneously offering implications for future research.

Joyce Lai

Public Health,
Mentored by Dr. Jose Burgos

Access the Health Literacy of Patients in the HFiT Clinic in Tijuana, Mexico

Due to proprietary information this abstract has been redacted.

Julie Nguyen

Mentored by Jose L Burgos

A systematic review on the effects of Maternal Cannabis Use on Infant Neurodevelopment

Due to proprietary information this abstract has been redacted.

Julie Qian

Molecular and Cell Biology, Muir
Mentored by Wei Ying

The role of microglia and miR-690 in brain insulin resistance and Alzheimer's disease

Obesity is a primary risk factor for metabolic diseases, impacting 1 in 8 people in the world and standing as a foremost contributor to mortality rates. In obesity, adipocytes can expand in two ways in response to energy excess: hypertrophy and hyperplasia. Hypertrophy is an unhealthy way of white adipose tissue (WAT) expansion, associated with inflammation and insulin resistance. On the other hand, hyperplasia leads to more numerous and smaller adipocytes due to adipogenesis and lower levels of tissue inflammation and fibrosis. Adipogenesis, pivotal for hyperplasia, orchestrates the differentiation of adipose precursor cells (APCs) into adipocytes, therefore, the ability of APCs to undergo differentiation is essential for hyperplasia and metabolic health. In our lab, adipose tissue macrophage (ATM) was identified to secrete miR-690, an anti-inflammatory and insulin-sensitizing molecule. Here, we assessed the role of ATM and miR-690 in adipogenesis through a crosstalk between ATM and APC. Macrophage-depleted mice were generated by clodronate liposome treatment. Mice were fed with high-fat diet (HFD), normal chow diet (NCD), or underwent a diet switch (DS) (14 weeks HFD and then switched to four weeks NCD). APC and CD9+ ATM populations (pro-inflammatory ATMs) in eWAT were analyzed by flow cytometry. Cell sorting was used to isolate the APC and ATM populations. qPCR was used to measure the expression of miR-690 in APC. ATM depletion and HFD feeding decreased the APC population and its miR-690 expression. Additionally, HFD also caused an increase in the pro-inflammatory CD9+ ATM population. DS decreased CD9+ ATM and increased APC population and miR-690 compared to HFD. ATM is a major source of miR-690 and is essential in maintaining APC. In obesity, the crosstalk between ATMs and APC is disrupted. However, DS was able to reverse the effects of HFD feeding. miR-690-mediated APC maintenance contributes to hyperplasia and can potentially prevent metabolic diseases.

Kalie Quon-Adams

International Studies, ERC
Mentored by Giordano DeGuglielmo

Longitudinal assessment of the effects of cannabidiol over the different stages of addiction in rat models of alcohol-use disorders

We used a multidisciplinary approach (behavioral models, immunohistochemistry, and electrophysiology) to evaluate the effects of chronic CBD treatment (60 mg/kg/day) on several alcohol-related behaviors and the alcohol-induced neurodegeneration in alcohol-dependent rats.

Katrina Ramirez

Literatures in English, ERC
Mentored by Ameeth Vijay

Looking Backward at 19th Century Perceptions of the Value of Human Life

The nineteenth century in the United States is most recognized for the Industrial Revolution which drastically transformed American society and economy. This transformation included a shift from an agrarian lifestyle to industrial manufacturing in which the emergence of the labor class worked outside of the home, usually in factories. Although there had already existed a division of social classes, the development of a capitalist industrial society established a more distinct border between the upper and working classes. This issue was recognized by many nineteenth-century scholars and writers including Edward Bellamy in his novel Looking Backward. In this novel, the upper-class protagonist Julien West undergoes a hundred-year-long slumber and awakens in the twenty-first world in which social inequality is seemingly nonexistent. This then begs the question, how does Julien West's surprise and confusion about social equality in the twenty-first century reveal and criticize the lack of social equality in the nineteenth century? To add on, what does the lack of social equality in the nineteenth century reveal about their perceptions of human value? Edward Bellamy's novel, Looking Backward, reveals that nineteenth-century perceptions of human value are based on social status which is further broken down into categories including economic status, race, and gender. This can be seen through the novel's critique of the lack of social equality and the fear of mechanization of the working class. That being said, Bellamy's novel also confirms its own assertion of social inequality via Bellamy's exclusion of other oppressed groups in his critique.

Katya Sumwalt

Physics, Revelle
Mentored by Katharine Ricke

Pattern Scaling Global Stratospheric Aerosol Injection To Regional Temperature Change

Coupled, integrated assessment models are used to simulate interactions between the physical climate system and human activity. These models often lack spatial granularity, assume optimal policy implementation rather than allowing for complex responses to environmental change, and do not include geoengineering or other forms of potential climate intervention. This research seeks to better quantify climate-human interactions by creating a statistical model with: (i) an accurate but computationally cheap physical climate model, (ii) better quantified climate-human interactions on a regional scale to account for economic and resource disparities, and (iii) a geoengineering knob to represent various levels of climate intervention. As part of this model development, this project defines the relationship between global stratospheric aerosol injection (SAI), and regional temperature change. SAI is a form of geoengineering that introduces reflective aerosol particles into the upper atmosphere to reduce the net solar radiation entering the earth system. This short term strategy can be used to stabilize global temperatures, while seeking a permanent solution to global warming. This research emulates the results of climate models including SAI by employing a method known as pattern scaling, which represents local temperature change by simplifying existing climate model output to a set of linear regressions. The result is a map of regression slopes at each grid cell defining a relationship between the rate of stratospheric aerosol injection and the resulting regional temperature change. This map of relationships will be used to quantify a geoengineering knob in the larger, coupled model with resolution on the regional scale.

Kelly Wang

Molecular and Cell Biology, Seventh
Mentored by Dr. Christopher Coyne

Infectious Disease and Supportive Care Outcomes for Non-Neutropenic Adult Oncology Patients

Adult oncology patients are often immunosuppressed due to the disease and the cytotoxic therapies used to treat cancer. Additionally, many patients require the use of central venous catheters (CVCs) to receive therapy, which increases the risk of infection. As a part of the inflammatory response, fever is often the presenting sign of a potential bacterial bloodstream infection (BSI). While there are well established management guidelines for febrile adult oncology patients presenting with severe neutropenia (absolute neutrophil count [ANC] $\leq$ 500 uL), there are no established guidelines for the management of adult patients with cancer who present with an [ANC] $\geq$ 500 uL. While febrile and non-neutropenic oncology patients are commonly treated with empirical antibiotics, the need for them has been unclear. To address these limitations, it is important that a risk prediction model be developed to predict bloodstream infection likelihood in this population. Therefore, the objective of this retrospective cohort study of 450 febrile and non-neutropenic adult oncology patients is to validate and develop a clinical risk prediction model using clinical and laboratory measurements obtainable at fever presentation that will effectively classify patients according to their predicted risk for BSI.

Kevin Bian

Data Science, Cognitive Science, Marshall
Mentored by Sean Trott

Embodied Simulation in Multimodal Models Using Affordance Stimulus: A Probing Study

Building on theories by Glenberg & Robertson (2000), which posited that language comprehension is partly rooted in embodied experience, and subsequent findings by Jones et al. (2022) that Large Language Models (LLMs) can partially grasp object affordances without direct worldly experience, our study extends these inquiries to the capabilities of Multimodal Large Language Models (MLLMs) to discern object affordances. We present state-of-the-art MLLMs with 36 scenarios (18 scenarios with 1 from each synthetic and natural data set that we created) adapted from previous work featuring Afforded, Non-Afforded, and Canonical objects, and examine whether MLLMs assign higher probabilities to images which represent objects that are afforded or not in the context of their associated scenario. Results indicate that GPT-4 Vision can effectively differentiate between objects that are contextually appropriate for a given task and those that are not, suggesting an emergent ability to understand the world's affordances. Conversely, ImageBind displays a limited response to these distinctions, showing reduced sensitivity in recognizing affordances, particularly within the dataset reflecting real-world imagery and only marginal sensitivity in the dataset composed of artificially generated images. This suggests that even without any physical experiences, MLLMs can acquire implicit knowledge about the world. However, this capability is not inherent to all models, underscoring that the mere integration of multimodal data does not universally afford models more advanced cognitive abilities.

Kyle Grimes

Anthropology w/Spec in Archaeology,
Mentored by Paul Goldstein

Exploring Viru State Expansion: New Architectural Insights from Puerto Malabrigo, Peru

Due to proprietary information this abstract has been redacted.

Levis Waiyaki

Neurobiology,
Mentored by Isabella Maita

Measuring Effects of Neurobiologically-based Metacognitive Tutorials on Procrastination

Due to proprietary information this abstract has been redacted.

Lily McCalmont

Biology w/Spec in Bioinformatics, ERC
Mentored by Edward Castillo PhD, MPH

Using Electronic Medical Records Data to replace the ISAR in Emergency Room Geriatric Risk Assessment

The goal is to use existing data in EPIC that will replace the use of the identification of seniors at risk (ISAR) screen to identify high risk patients. If the patient's screen is positive, and if they have a triage acuity score of 3 and they are 65+, a GENIE order will be initiated. This GENIE is a scarce resource, thus since ISAR has been difficult to implement in ED's workflows. The goal is to replace the 6 questions asked during ISAR with tangible EMR data that can correlate with a positive ISAR result or be a better predictor of the need for geriatric services. This is a retrospective matched case–control study at a 2 level 1 geriatric ED (GED) with a total yearly census of 80,000 from January 1, 2017-December 2023 with follow 31, 2024. The factors used where falls as a chief complaint, CCS (Charlson comorbidity software) > 6, and prior inpatient discharge within 90 days. Frequencies, percentages, p-values, and chi-squared values were used to assess the correlation between the contributing factors and the rate of positive ISAR results. The EMR factors resulted in a similar number of patients being flagged for GED services as when the ISAR was used. The EMR population had more admissions at index, ED revisits and admissions at ED revisits. The factors used appear to be an effective method of using EMR data to replace the ISAR and should be considered to replace the ISAR.

Lucas Sutorus

NanoEngineering, Warren
Mentored by Nicole F. Steinmetz

Molecular Farming for Cancer Immunotherapy

Cowpea mosaic virus (CPMV) is a virus nanoparticle and highly potent immunotherapy that induces prolonged survival in mouse tumor models and canine cancer patients. To produce CPMV, my lab uses a process called molecular farming. Molecular farming uses plants as biofactories to produce proteins, in this case plant viruses, in mass quantities. It offers a low-cost, sustainable, and scalable method for large-scale protein synthesis and holds potential for the mass production of viral vectors that have been shown to have high therapeutic potential in the past few decades. Here, I show the process of molecular farming to produce CPMV and the characterization of CPMV through several techniques that verify particle presence and integrity.

Luis Salazar

Marine Biology,
Mentored by Octavio Aburto-Oropeza

Exploring the spatial relationship between marine protected areas and hotels.

Due to proprietary information this abstract has been redacted.

Mads Kelly

Marine Biology,
Mentored by David Holway

Bee Body Sizes and their relation to Rainfall in Southern California

Due to proprietary information this abstract has been redacted.

Mak Gonzales

Communication, Warren
Mentored by Keith McCleary

Creating community through Fanfiction

The project explores how the website Archive of Our Own (Ao3) fosters a sense of community among its users. Ao3 is a popular non profit fan fiction website that relies on volunteers to maintain and categorize user uploaded works. This website allows for users to upload their content anonymously and with little censorship. Unlike conventional fiction, the comment system enables real-time interaction, allowing for discussions as stories unfold and fans forming meaningful connections. This system provides authors with a personal avenue to share insights and connect with readers on a deeper level, often resulting in the formation of genuine friendships, as evidenced by survey responses indicating offline meetups among online acquaintances. Ao3's commitment to free content, devoid of advertisements and censorship, underscores its dedication to fostering a community built on shared interests and uninhibited expression. By analyzing these features, the project illuminates how community formation on Ao3 is driven by the convergence of niche interests, unrestricted self-expression, and a platform built with user interest at the center. Additionally, the tag system on this website works so that authors can tag important categories their work fits into. This system not only serves to organize content but also acts as a tool for community building, allowing for the creation of inside jokes and provides readers with the ability to curate their reading experience based on their preferences. This highly praised tagging system highlights the potential for improvement of other social media platforms and databases, demonstrating the efficiency of facilitating user-driven content discovery.

Manjot Kaur

Psychology, Warren
Mentored by Erin Sundermann

Grip Strength and Cognitive Decline in Older Women at Risk for Alzheimer's Disease

Due to proprietary information this abstract has been redacted.

Maxwell Zhou

General Biology, ERC
Mentored by Dr. Komiyama, Takaki

History encoding and Value Based Decision Making in Cortical Neurons

Animals make decisions on a daily basis, and the decisions based on values are often influenced by past outcomes, shaped by an animal's subjective strategies developed through environmental feedback. In rapidly changing environments, animals rely on recent experiences, while in slower ones, they benefit from integrating a longer history of experiences. The neural mechanisms behind this flexible integration of past experiences remain largely unknown. To explore this dynamics behind, we created two similar foraging tasks for mice that mimic fast and slow-changing environments. Mice adjusted their strategies accordingly, using short-term history in fast-changing environments and longer history in slow ones. We then studied the neural activity underlying these adaptive adjustments. Craniotomy and two photon calcium imaging are used to visualize the neuronal activity and changes. Our previous research showed that certain cortical neurons encode history with different time constants, where larger ones encode longer history. In this study, we found that mice have the ability to adapt their strategies for integrating past experiences depending on their task environment. Furthermore, the retrosplenial cortex (RSC) showed significant changes across strategies, suggesting that it may play a key role in mediating adaptive behavioral changes through dynamic shifts in history integration windows.

Maya Adenihun

World Literature & Culture, Muir
Mentored by Bright Gyamfi

Black Speculation in Literature

African and African American folklore has been used by white academics to justify anti-black rhetoric and devalue African American literature. By tracing black folklore to black speculative fiction with theories of hidden and public transcript by James C. Scott, there is a critique of Western aesthetics that places black cultural practices as aesthetic theory

while questioning the process of evaluation in aesthetics. This black literary aesthetic is exemplified by Beloved by Toni Morrison and Dark Matter by Sheree R. Thomas.

Megan Estanol

Molecular and Cell Biology, ERC
Mentored by Pradipta Ghosh

Role of macrophage non-canonical-G-protein signaling in Atherosclerosis

Due to proprietary information this abstract has been redacted.

Micah San Andres

Cognitive Science w/Spec Machine Learning and Neural Computation, Marshall
Mentored by Luz Chung

Comparing Perspectives of the Effectiveness of Educational Technologies through LLMs and User Studies

This research explores the potential use of ChatGPT as a user experience (UX) research tool for greater efficiency–specifically within education. Despite the widespread application of ChatGPT among different domains, ChatGPT has yet to be fully integrated within the educational field due to concerns related to preserving the "humanistic touch" of education. Thereby, this study investigates ChatGPT's ability to answer a pre-set list of interview questions from the perspective of educators–where the ChatGPT's responses would be compared to the actual teacher interviews from the San Diego Unified District (SDUD). Applying a UX Double Diamond Framework, there were a total of 10 interviews conducted with 10 SDUD teachers. These teachers were asked questions focusing on their perspective towards the effectiveness of current educational technologies–where these teacher responses would be compared with ChatGPT's responses to measure overlap. The results highlight a 67% overlap between ChatGPT and teacher's responses–where ChatGPT was 67% accurate in representing the teachers' responses to the pre-set interview questions. Notably, the main differences was how ChatGPT failed to take into consideration the students' perspective and needs within the classroom as well the need for integration across different platforms. ChatGPT failed to take into account the "empathetic" aspect of teachers' perspective–who also considered the needs and perspective of students within their responses. Future exploration with bigger sample size and improved question wording would serve for improved statistical evidence. Ultimately, through this study, it highlights the potential of ChatGPT to be heavily applied within the UX research process for greater efficiency.

Mishka Jethwani

Computer Science and Engineering, Muir
Mentored by Jishen Zhao

CS Education Theory to improve LLMs

Large language models (LLMs) have shown impressive capabilities in code generation, but there is still significant room for improvement. This research aims to enhance the programming abilities of LLMs by applying techniques from computer science education through strategic prompting, prompt tuning, and fine-tuning. Work includes exploring prompt engineering various LLMs like CodGen, GPT-3.5, Gemini, and CodeLlama to observe code generation improvements on benchmarks. Promising results were obtained by guiding models through education techniques like reverse teaching, and peer learning where models explain programming concepts. However, prompt engineering alone has limitations. This project proposes a two-phase approach. The first phase involves intensive prompt tuning on smaller LLMs by iteratively refining prompts without changing model parameters and then using Larger LLMs as agents for the smaller ones. Patterns identified from initial prompt engineering experiments will guide this tuning process across datasets.The second phase applies Fine-tuning to further adapt these models by continuing training on new data annotated with constructive educational prompts. Exposing LLMs to targeted coding problems guided by these prompts during training allows permanently learning beneficial programming patterns. Integrating insights from computer science education, such as curriculum learning, reverse teaching, and peer learning is hypothesized to significantly improve LLMs' code generation skills when strategically applied through prompting and fine-tuning.

Myra Ashraf

Bioengineering w/Spec Biotechnology,
Mentored by Dr. Jeff Hasty

Adaptive Laboratory Evolution in the Development of Biosensors

Due to proprietary information this abstract has been redacted.

Nam Nguyen

Biology, Warren
Mentored by Stanley Lo

Advancing Justice and Equity in Undergraduate Biology by Exploring Instructor Actions

When it comes to research on justice and equity and implementing these approaches in classrooms, biology education can gain insights from various perspectives from other STEM education and social sciences. We conducted a systematic literature review and gathered recommendations for realizing justice- and equity-oriented frameworks in biology education, using inductive codes from qualitative analysis to encompass patterns

across student characteristics, instructor characteristics, and instructor actions. A key finding is that instructors play a role in hindering the implementation of justice- and equity-oriented frameworks because of their beliefs, such as a deficit attitude towards student maturity in handling such themes in the undergraduate biology classroom. Our findings may be relevant for different stakeholders in the biology curriculum.

Natalie Fong

History, Film Studies, ERC
Mentored by Alain Cohen

The Making of a Cult Classic Teen Film

I am examining the creative direction and cultural context behind 3 “cult classic” teen films, from the 80s, 90s, and 00s, The Breakfast Club (1989), and 10 Things I Hate About You (1999), and Mean Girls (2004) respectively. Despite widely differing views about the teen experience each is considered to be a classic in the teen film genre and is widely watched by many different age groups and generations. Many films receive positive reviews upon release every year, and each of these films is no exception, but yet they have managed to transcend the initial time period they were released and have become staple representations of the time period and “aesthetic” that they embody. Each of the films couldn’t be more different in style or personality of characters, Mean Girls is Y2K and glitzy, Breakfast Club is muted and real, and 10 Things I Hate About You is youthful and romantic. And although they are so different, they have found long-lasting popularity and are often referenced in other modern teen media (Breakfast Club confession scene in Sex Education for example), solidifying their timeless status. Through my examination of these films (time period history, fashion, plot/themes, music, and cinematography), I want to explore why these films came to be synonymous with their particular decade and are so beloved by such a large group of people.

Natalie Kaplanyan

Public Health, Seventh
Mentored by Dr. Louise Laurent

Characterization of Extracellular Vesicles in BeWo – Identifying Biomarkers in an Epithelial Placental Cancer Cell Line

The BeWo cell line was derived from a choriocarcinoma, which is a tumor of placental origin, and serves as a model for placental trophoblast cells. Extracellular vesicles (EVs) are small lipid bilayer membrane-enclosed particles produced by cells with surface markers that reflect their cell of origin's plasma membrane and cytoplasm, making them useful for studying cell function. BeWo cells were cultured in Ham’s F-12K complete media and EV-depleted FBS, and conditioned media (CCM) containing EVs was collected. Concentrated CCM (2x, 5x, 10x, 15x, 60x) was obtained using Amicon filters with 100,000 molecular weight cut-off, and 60x CCM was fractionated by size exclusion

chromatography (SEC) using a 35nm qEV Izon column. Vesicle flow cytometry (vFC) using antibodies raised against canonical EV markers (CD9, CD81, CD63) and a trophoblast-specific marker (PLAP) was performed to quantify the concentrated and fractionated BeWo EVs. CD9 was the predominant EV surface marker (21.4%), followed by CD81 (5.9%), CD63 (3.5%), and PLAP (1.2%). Multiplex vFC suggested that CD9, CD81, and CD63 mark the same population of EVs (with larger EVs displaying multiple markers), while PLAP marked a distinct population. Amicon concentration showed highest yield at 5x, but all concentrations above 2x had lower than expected yields and larger EV sizes. Amicon concentrated CCM, when fractionated by SEC, showed similar marker results by vFC compared to neat CCM. Amicon concentration leads to EV loss and increased size of EVs, advising against its use in future studies.

Nico Macchione

Mentored by Dr. Gary Vilke

Dizziness-Related Returns to the Emergency Department

Due to proprietary information this abstract has been redacted.

Nida Firdaws

Data Science,
Mentored by Tom Corringham

"California Climate Policy: Extracting Contextual Data Across Jurisdictions"

Due to proprietary information this abstract has been redacted.

Nimrit Kaur

Biology, Sixth
Mentored by Dr. Louise Laurent

Bioinformatics Applications: Validation Dataset of Extracellular miRNA Biomarkers for Prognostic Assessment of Pre-eclampsia in Asymptomatic Women

Due to proprietary information this abstract has been redacted.

Oliver Heaton

Anthropology, Marshall
Mentored by Paul Goldstein

Down Goes Aguerre: Colonial De-commemoration in Modern-day Chile

How modern people interact with motifs of colonial pasts is a topic more relevant than ever. Increasingly, examples of colonial ‘de-commemoration’ have dominated global headlines; from toppling statues to renaming landmarks and changing curricula, the narrative on who we are and who we revere is under consistent review. But how do we document ‘de-commemoration’? Can we record the “why?” behind our decision to raise characters from history before so publicly turning on them? Statues represent a particularly material and public symbol, the imposition of one character or history in a public space is justifying for some and traumatic for others. Statues are public, pedagogic and exceedingly relative in their reception, and to tear one down means just as much as to erect it in the first place. Targeting statues is nothing new, and historic examples range from slave traders in South Africa to Junipero Serra across California and Lenin in Ukraine. Removing a statue can both represent, and influence the zeitgeist - a phenomenon that requires documentation. While academic attempts to synthesise destruction events are being made, most remain recorded only by local news sources and social media posts. This poster represents an attempt to counter this: a microcosm of a larger project collecting numerous instances of motif destruction in the Hispanic world to prompt further study. Bringing forward the case study of Francisco de Aguirre’s symbolic abasement, Chilean examples of ‘de-commemoration’ will take centre stage in a global issue, as we ask the “why?” and “by whom?” of statue destruction.

Patricia Estaris

Urban Studies and Planning, Seventh
Mentored by Dr. Georgia Sadler

GIS Mapping: Sociodemographic Analysis of Master Gardener Grants in San Diego County, California

Every county in California has a Master Gardener Program where volunteers are equipped with the necessary training and resources to receive UC gardening certifications. Annually, the San Diego Master Gardener Association distributes School Garden Grants to maintain and establish community gardens. My research team and I were invited by the Committee of the San Diego Master Gardener Program to engage in a community-campus partnership to analyze how equitable Master Gardener grants are distributed. Using ArcGIS we created a mapping visualization of grant sites to capture any missing opportunities the Master Gardener committee could use. These maps can help us understand which communities are being served by grants and which communities can benefit from more interaction. This mapping analysis highlights that the Grant Committee is currently successful in awarding densely populated urban areas, mostly clustered along the coast of San Diego County. It also magnifies areas where there is a significant lack of support reaching communities in the county's North Inland and Eastern regions. This is an area of concern as these regions are the most deprived– experiencing lower median household incomes, mostly rural, and where Native American Reservations are concentrated. This highlights missed opportunities to engage in diverse interactions with tribal organizations and the local community to exchange ecological knowledge. The lack of grant sites in these deprived areas can also have implications in

limiting the accessibility of nutritious food as there isn't a well-established presence of community garden outreach.

Pazinah Bhadha

Biochemistry, ERC
Mentored by Vicki Grassian

Application of Attenuated Total Reflectance–Fourier Transform Infrared Spectroscopy to observe interactions between iron oxides and organics in wildfire smoke

Wildfires are becoming more prevalent with climate change and smoke from wildfires can travel long distances impacting surrounding communities. This smoke has negative health effects making research on its chemical composition and atmospheric processing critical to developing mitigation strategies and understanding its adverse health impacts. To provide further insight into the chemical properties of wildfire smoke, also called biomass-burning aerosol, we investigated the interactions between iron oxides and aromatic compounds as well as dicarboxylic acids. Iron oxides including the phases maghemite and magnetite have been detected in ground ash from wildfire events. Aromatic compounds, such as syringol and catechol, are combustion products of lignin, a component of biomass. Dicarboxylic acids can be directly emitted during a wildfire event and produced during atmospheric aging. All of these components can be lofted into the atmosphere resulting in interactions of the pyrolysis products emitted from the burning of organic matter and the iron oxides. Using Attenuated Total Reflectance–Fourier Transform Infrared Spectroscopy, a widely used instrument for acquiring data on surface chemistry between certain compounds, we were able to observe the adsorption and desorption behavior of aromatics and dicarboxylic acids. Examining the surface interactions between wildfire-relevant iron oxide phases and organics sheds light upon how these components interact and react in the atmosphere which can greatly benefit the understanding of its negative health effects.

Qirui Zheng

Data Science, Cognitive Science, Seventh
Mentored by Justin Eldridge

Pattern Analysis on EEG for Enhanced Depression Diagnosis

Depression is a significant mental health concern that affects many individuals globally. The current diagnostic methods, primarily relying on questionnaires, have limitations in providing an objective measure of depression. The subjective nature of self-report scales and the difficulty in interpreting discrete rating scales can contribute to inaccuracies in diagnosing depression. Motivated by this issue, the aims are to explore a quantitative measure for diagnosing depression by utilizing unsupervised learning to uncover patterns and hidden structures within the EEG data that are associated with depression.

Rachel Bevis

Sociology,
Mentored by Dr. Richard Pitt

Black students don't choose selective California State Schools

Due to proprietary information this abstract has been redacted.

Rachel Li

General Biology, Revelle
Mentored by Marsida Kallupi, Giordano de Guglielmo

Neuromodulation of Nucleus Accumbens Shell via Deep Brain Stimulation: Impacts on Nicotine Vapor Withdrawal Symptoms in Rats

Tobacco smoking remains a leading preventable cause of morbidity and premature mortality globally. Despite the widespread prevalence of nicotine vapor use, a significant proportion of the population continues to smoke tobacco. Neuromodulation through deep brain stimulation (DBS) has emerged as a promising alternative approach to alleviate substance use disorder's negative effects, with encouraging preliminary results.

Risha Sharma

Mentored by Dr. Maripat Corr

Sex Differences in a Murine Arthritis Model

Due to proprietary information this abstract has been redacted.

Rubini Mohanaraj

Biochemistry, Revelle
Mentored by Ulrich Muller

Determination of the Guanosine Binding site in a GTP synthase Ribozyme using UV cross-linking

The RNA World hypothesis proposes that RNA, rather than proteins and DNA, played a crucial role in the early evolution of life on Earth, acting as both genetic material and catalysts for prebiotic reactions. Many research has been dedicated to uncovering ribozymes capable of uncovering ribozymes which catalyze reactions for origins of life. One such ribozyme, guanosine triphosphate synthase ribozyme (GTR1), synthesize guanosine triphosphate, a likely chemical for building block during early life. However, GTR1's low turnover number of 2 GTP molecules doesn’t support its ability to mediate

nucleotide metabolism, which likely requires at least 100 turnovers. In this project we aim to identify mutations near guanosine binding sites, and then proceed to the final goal to create mutations to make GTR1 variants with higher turnover number. The project currently is in its initial phase, focusing on optimizing techniques such as UV cross-linking, reverse transcription, and gel electrophoresis to identify guanosine binding sites in GTR1. Successful identification of these sites will pave the way for targeted mutations to enhance GTR1's catalytic efficiency, contributing valuable insights into the early stages of life's chemical evolution.

Ryan Phan

Mentored by Dr. Corr

Type I Interferon Receptor Signaling Governs Arthritis Symptoms in Mice

Due to proprietary information this abstract has been redacted.

Sahana Kashyap

Molecular and Cell Biology, Muir
Mentored by Dr. Bing Ren

Optimizing the delivery of nucleic acids to human induced pluripotent stem cells

Due to proprietary information this abstract has been redacted.

Sahiti Yenumula

Human Biology, Revelle
Mentored by Dr. David Vera

Assessing Pineal Gland as a Biomarker for Neuroinflammation through Tilmanocept Labeling following Blast-induced Traumatic Brain Injury

Due to proprietary information this abstract has been redacted.

Saisha Nandamuri

Public Health, Warren
Mentored by Victoria Ojeda

Developing a Service Learning Protocol for Medical Students in UCSD Clean Slate Free Tattoo Removal Clinic

Since the 1990s, there has been a growing recognition of the value of service learning in the domain of public health undergraduate education. In 2018, France made service-

learning mandatory for health students. Moreover, in the US, a review of 32 medical education related service-learning publications from 1998 – 2012 revealed significant heterogeneity in the approaches of service learning programs, highlighting the need for a well-defined framework for this pedagogy to develop further.(Levaillant, Stewart). However, as of 2024, there have been no significant dermatology service learning projects for medical students.Traditionally, dermatology has been perceived as having limited opportunities for service learning because of its perception that skin conditions may not be as urgent or prevalent in underserved populations. Structured service learning programs incorporated into medical school curriculums can accelerate research and interventions in dermatology. A service learning program involves partnership with community-based organizations, outreach to target populations, investigation into social determinants of health, and ensuring continuity within medical education. (Sabo) This approach aligns with the broader philosophy that "Service, combined with learning, adds value to each and transforms both." (Honnet & Poulsen, 1989). Service learning can be direct, indirect, or advocacy-based, and includes investigation, preparation, action, reflection, demonstration. Clean Slate provides free tattoo removal for individuals who were formerly incarcerated or imprisoned. Tattoo regret can stem from maturation, distortion over time, desire to break away from prior affiliations, and protecting oneself from violence. Tattoos can also impact social reintegration and create barriers to employment. (Ojeda) Moreover, laser treatments can be expensive, prohibiting access to those who most need this important service. The aim of Clean Slate is to develop a comprehensive clinic-based training program for medical students, focusing on providing them with hands-on opportunities to engage with patients. This initiative aims to serve multiple purposes, including offering students the chance to participate in community service within fields they may be interested in particularly in laser medicine and dermatology, while also exposing them to the health and social needs of those in their community.

Saleha Ahmedi

Cognitive Science w/Spec in Design and Interaction,
Mentored by Dr. Imani Munyaka

Race & Gender Bias in Facial Recognition Algorithms

Due to proprietary information this abstract has been redacted.

Samantha Dyer

General Biology, Sixth
Mentored by Dr. Alexandra J. Dickinson

Itaconate Treatment for Native Plants of California to Mitigate the Effect of Climate Change

Environmental stress caused by climate change endangers native plant species in California. In conjunction with the San Diego Botanic Garden, the Dickinson lab investigates the effect of itaconate treatment for stress resistance in native species of Phacelia distans, Phacelia campanularia, Antirrhinum nuttallianum, Camissioniopsis bistora, and Eschscholzia californica. Itaconate is a metabolite commonly associated with the growth and regeneration of mammalian species. Itaconate treatment in plants has been identified as a "chemical-free" and non-GMO method for increasing stress resistance across subsequent generations of plants. The project's overarching objective is to establish itaconate treatment as a potentially critical tool for the conservation of plants. To do this, the cross-generational effect of itaconate during stress is measured and optimized in California native plants and several ecosystems of Arabidopsis thaliana. This work will reveal more information about how itaconate affects epigenetic mechanisms in plants and its implications for protecting native ecosystems against climate change.

Samvel Gaboyan

Human Biology, ERC
Mentored by Laura E. Crotty Alexander

Inflammatory and Anti-Inflammatory Effects of E-cigarette Aerosol Inhalation on Allergic Inflammatory Airways Disease in Murine Models

Fourth generation e-cigarettes continue to be marketed as a safer alternative to traditional tobacco products. Asthma is a disease characterized by airway inflammation, mucus secretion, and bronchoconstriction, and can be triggered by various environmental stimulants. We used a T2-high mouse model of asthma, combined with daily e-cigarette exposures, to assess the impact of these inhalants on recruitment of inflammatory cells into the airways and lung parenchyma during allergic inflammatory airways disease (AIAD) pathogenesis. Adolescent-aged, BALB/c mice underwent whole-body exposure to room air; flavored e-cigarette aerosols (JUUL Virginia Tobacco) containing 12mg/mL nicotine; non-flavored e-cigarette aerosols containing 12mg/mL nicotinic salts; or non-flavored, nicotine-free e-cigarette aerosols for 60 minutes per day, 5 days per week, for 8 weeks. Four weeks into exposure, all e-cigarette exposed mice and 50% of air mice were challenged with ovalbumin to induce AIAD. Exposure to flavored and non-flavored, nicotine-containing e-cigarette aerosols before and during AIAD induction was associated with reduced inflammatory cell recruitment to the lungs. However, exposure to non-flavored, nicotine-free e-cigarette aerosols was associated with increased inflammatory cell recruitment to the lungs. Different chemical components within e-cigarette aerosols have differing effects on the inflammatory state of the lung, leading to altered immunopathology in our mouse model of asthma. These data suggest that while daily inhalation of the base chemicals within e-cigarette aerosols have pro-inflammatory effects, nicotinic salts and some flavorants (JUUL Virginia Tobacco in this case) have immunosuppressive and anti-inflammatory effects. This supports the need for rigorous studies to define the safety of each flavored e-cigarette.

Sarah Flores

Bioengineering, Bioinformatics, Warren
Mentored by Dr. Kay Tye

Investigating the Role of Shared Trauma on Fear-Related Behaviors

When faced with a perceived threat, rodents, among other animals, can exhibit behaviors such as flight, urination, or freezing, which signals distress and enact defense behaviors for group survival. Research in mice has modeled fear-related behavior through different mechanisms such as social buffering, which is thought as a mechanism that can mitigate the perception and reaction to adverse experiences through the presence of a conspecific. However, there is a lack of research studying traumatic experiences in a social context, and how the social context of trauma affects future behavior. To investigate this, we will measure the difference in fear-related behavior, such as freezing, before and after experiencing stress administered through 15 uncued, unconditioned footshocks. Mice will be randomly paired within cages to experience footshock for the social aspect of the shared trauma. This investigation will take place over three days, with each day being respectively, a baseline day of fear-related behaviors, adverse footshock stimulus, and a post-measurement of fear-related behaviors. Future work will investigate the role of brain regions, such as the anterior cingulate cortex, in mediating social affiliation after shared trauma.

Sarah Hasheem

Psychology, Sixth
Mentored by Dr. Katia Harle

Investigating the Role of Positive Affect in Response Inhibition in the Affective Go/No-Go tasks among Adults with Anxiety and Anhedonia

Errors of omission have been linked to a lack of engagement or motivation in anhedonia, indicating reduced reward sensitivity. Additionally, anxiety significantly impairs cognitive function, particularly affective response inhibition. However, the interaction between positive affect and anxiety in modulating affective inhibition deficits remains unclear. Ninety individuals with anhedonia (60.2% Female; aged 18-65) completed an affective go/no-go task (AGN). Participants responded to images with either negative or positive valence, pressing a button upon seeing a "target" valence. Anxiety levels were categorized based on the State-Trait Anxiety Inventory (STAI), and positive affect levels were assessed using the Positive Affect Negative Affect Scale (PANAS). Generalized Linear Mixed Effects Models (GLMMs) were employed to analyze the influence of target type, trait anxiety, and positive affect on omission errors, a measure of response inhibition performance. The three-way interaction among target type, Positive PANAS score, and STAI group membership was statistically significant ($OR=1.17$, $z=4.81$, $p<0.001$). Among participants with moderate trait anxiety and high positive affect (low anhedonia), omission errors decreased significantly for positive valence targets

(OR=0.81, z=-2.67, Bonferroni corrected p=0.030). High-anxiety individuals with high anhedonia demonstrated decreased omission errors for positive compared to negative targets (OR=0.72, z=-5.87, Bonferroni corrected p<0.001). Conversely, individuals with high trait anxiety and high anhedonia showed reversed valence-congruent effects, with more omission errors for negative cues. These findings highlight diverse affective profiles necessitating distinct cognitive training approaches to enhance affective processing in anhedonic individuals.

Sarina Ghadiali

Oceanic & Atmospheric Sciences, Seventh
Mentored by Kate Ricke

Impacts of Solar Geoengineering on India

Solar Geoengineering refers to the manipulation of environmental processes that alter the earth's radiation balance in order to counteract the effects of global warming. We studied two types of geoengineering that aim to increase the reflection of incoming radiation: Stratospheric Aerosol Injection (SAI) and Marine Cloud Brightening (MCB), and how the implementation of these would impact the temperature and precipitation over India. To do this, the Community Earth System Model Version 2 (CESM2) was used, comparing historical data and different geoengineering scenarios (ARISE SAI, G6 Sulfur SAI, and 50% Ocean MCB) to various control scenarios (moderate warming SSP2-4.5 and extreme warming SSP5-8.5). We found that all geoengineering scenarios decrease global temperature when compared to the "control" warming scenarios. Over the India region specifically, the geoengineering scenarios showed varying decreases in temperature with ARISE being the most moderate, followed by G6 Sulfur, and 50% Ocean MCB with the largest decrease in temperature. Monsoon precipitation over India is more varied, with a moderate wetting for ARISE, variable wetting/drying for G6 Sulfur, and a much larger wetting for 50% Ocean MCB. When comparing historical data with the two "control" warming scenarios, we found the expected increase in temperature but with variable wetting/drying over India, each being more extreme in the SSP5-8.5 scenario vs the SSP2-4.5. These results alleviate concerns that solar geoengineering would cause significant drying over India, and will be used in a briefing document for the Solar Geoengineering Scenarios Development Workshop in India.

Shivani Sharma

Human Developmental Sciences, ERC
Mentored by Dr. Cheryl Anderson

Diabetes Risk Perceptions for South Asian College Students

In the United States, South Asian communities have a significantly higher prevalence rate of Type 2 diabetes compared to other populations. In a previous study, South Asian age-adjusted diabetes prevalence was 23% compared to whites (6%), African Americans

(18%), Latinos (17%), and Chinese Americans (13%). The objective of this research is to explore perceptions and health behaviors related to diabetes among South Asian young adults. An online survey was developed and 193 South Asian students at UC San Diego were recruited through social media over 12 days. Descriptive analysis was performed to describe variables related to diabetes health behaviors and perceptions. In this sample, 80% reported moderate knowledge of risk factors and 72% of protective factors. Sixty-seven percent (67%) reported exercising over 3 days/week. Among those who don't exercise, 38% reported a high likelihood of developing diabetes. Over 70% don't frequently check carbohydrate or fat contents; about 50% don't frequently check sugar contents. Additionally, 68% have at least one diabetic grandparent, and 31% with a diabetic extended family member. Furthermore, 71% believe that South Asians are more likely to develop diabetes than other races. Most students who reported unhealthier exercise and dietary habits showed a stronger perceived likelihood of developing diabetes, suggesting that culturally appropriate strategies are needed to educate South Asians. Since exercise, diet, and family history are important factors for diabetes risk, this study brings attention to the increased need for awareness to prevent the early onset of Type 2 diabetes.

Siena Quinn

Chemistry, Muir
Mentored by Vicki Grassian

Ice Nucleation Efficiency of Marine Relevant Sugars

Clouds are formed with the help of aerosols which have a great influence on earth's radiative budget through direct and indirect effects. Mixed-phase clouds, clouds containing both supercooled liquid droplets and ice crystals, have an uncertain impact on said budget. Thus, understanding cloud formation and ice nucleation is important when discussing radiative forcing and climate impacts that can occur as a result. Ice nucleating particles (INPs) serve as a catalyst for the freezing of water droplets by acting as heterogeneous ice nuclei, promoting the formation of ice crystals and influencing the development of clouds and precipitation. These particles can originate from various atmospheric aerosol sources, and the identity and physical properties of the INP can affect the temperature at which droplets of water freeze within clouds. The homogenous freezing of water, nucleation of a supercooled water droplet without the assistance of an INP, occurs at approximately 235K and is often used as a benchmark when discussing INP efficiency. Using a confocal Raman spectrometer with an environmental cell, we were able to determine the ice nucleation temperatures of various sugars found in sea spray aerosols (SSAs). In addition, we aim to investigate the relationship between the solubility of these sugars in water and their ability to nucleate ice.

Smrithi Suresh

NanoEngineering, ERC
Mentored by Darren Lipomi

Force to Function: Unveiling Novel Ion Channels through High-Throughput Cellular Stress Application

Due to proprietary information this abstract has been redacted.

Sofia Jaber

Human Biology, Seventh
Mentored by Giordano de Guglielmo

Exploring Genetic Influences on Alcohol Use Disorder

Most adults in the United States drink alcohol, with about 15% developing an Alcohol Use Disorder (AUD). Heterogeneous stock (HS) rats are genetically and phenotypically diverse and used to investigate genetic differences related to compulsive behaviors, like investigating individual differences in alcohol addiction-like behaviors and response to treatment medications. HS rats self-administered oral ethanol (10% v/v) for 9 sessions and then we measured addiction-related behaviors (e.g., ethanol preference, motivation, compulsivity). We induced dependance using chronic intermittent ethanol vapor exposure (14 hours/day, achieving blood ethanol levels of 150-250 mg/dl). Behavioral experiments were conducted during acute withdrawal (6-9 hours after vapor ended). Escalation of ethanol intake, motivation to obtain ethanol, and compulsivity (quinine-adulterated ethanol intake level) were evaluated. Sensitivity/tolerance to alcohol (loss of righting reflex), and withdrawal-induced hyperalgesia (von Frey test) were measured. Cluster analysis was used to identify resistant, intermediate, and vulnerable populations. We observed sex differences, where females showed more severe AUD-related behaviors. Similarly, vulnerable rats showed more severe AUD-related behaviors, including having greater levels of alcohol intake, showing more motivation, and demonstrating higher compulsivity. Further analysis of the vulnerable population suggests the drinking behavior of some rats may be driven by negative-affect, and others by compulsive-like behavior. In all, the robust individual differences suggest heterogeneous stock rats exhibit diverse AUD-related phenotypes that are likely related to genetic factors influencing the development of AUD. These findings highlight the importance of pharmacogenetic studies, and suggest potential implementation of precision medicine when treating AUD.

Sriram Selvakumaran

Department of Biological Science, Revelle
Mentored by Dr Chengbiao Wu

Mitochondrial Dysfunction in the PSAPP Mouse Model and Human brain sample of Alzheimer's Disease

Alzheimer's disease (AD) is a neurodegenerative condition characterized by cognitive decline. Its pathology encompasses brain atrophy, alongside the buildup of

hyperphosphorylated tau and amyloid plaques. Mitochondria is an organelle involved with many cell processes, with mitochondrial dysfunction associated with AD. Nevertheless, earlier studies yield inconclusive findings concerning alterations in mitochondrial function during the early stages of AD. Therefore, the aim is to investigate alterations in mitochondrial function in early AD, specifically variations in mitochondrial protein concentration and alterations in Mitochondrial Membrane Potential (MMP). These changes are associated with diminished ATP production and neuronal apoptosis. The study will utilize PSAPP mice, double transgenic mice that develop extensive Aβ deposits in the cerebral cortex and hippocampus around six months of age, characteristic of AD. Fluorescent microscopy and immunoblotting was done in 18 days old embryonic hippocampal neurons to quantify mitochondrial functional changes. It was revealed in early stages of AD, there is a decline in mitochondrial membrane potential and increased levels of amyloid precursor protein (APP). This increase in APP could potentially impact mitochondrial membrane potential by accumulating within mitochondrial translocases.

Stephanie Calhoun

Anthropology w/Spec in Archaeology,
Mentored by Paul Goldstein

The Viru (ca. 200 B.C. - A.D. 700) Presence and the Significance of Peanuts at the Site of Puerto Malabrigo, Chicama Valley, Peru

Due to proprietary information this abstract has been redacted.

Stephanie Hernandez

Clinical Psychology, Muir
Mentored by Yesenia Mejia

Acculturation and Caregiver Knowledge and Treatment Expectancies During Mental Health Services for Autism

In the past decade the prevalence of Autism Spectrum Disorder has increased to every 1 in 36 children. Many racially/ethnically minoritized families, including Latino families, experience service disparities due to ingrained discriminatory systemic practices that often result in cultural barriers (i.e., lack of resources/information, lack of trust) (Magaña et al., 2012). Acculturation, defined as the maintenance of one's original culture and the development of the relation with the new culture (Berry, 2006), has been identified as a significant factor that may influence the way families navigate autism services, their expectations of treatment, and their knowledge on autism. By examining the effect acculturation has in influencing Latino caregivers' autism knowledge and their treatment expectancies, suitable adaptations can be implemented to help improve service outcomes. The current study includes 188 caregivers of children with an autism diagnosis aged 5-13 years old receiving an An Individualized Mental Health Intervention for Autism (AIM HI; Chlebowski et al., 2020). This study examined the relationship between acculturation,

caregiver-reported autism knowledge and parent expectations of treatment both at the start of treatment and after AIM HI. Results showed that acculturation to U.S. culture and use of English language were significantly positively associated with autism knowledge, while identity with U.S. culture was significantly positively associated with treatment expectancies at the start of treatment. Results also showed that treatment expectancies at the start of treatment moderated the association between acculturation, specifically, identification with U.S. culture, and autism knowledge after 6 months of treatment.

Sze Sze Chan

Human Biology, ERC
Mentored by Chengbiao Wu

Investigating the impact of MEM and ASO on synaptic signaling in Alzheimer's Disease

Alzheimer's disease is characterized by cognitive impairment from neuronal dysfunction and degeneration. This study investigates the impact of AD on synaptic excitability using a multielectrode array (MEA) machine to measure synaptic function in neurons. Using P18 mouse models, we compare synaptic signaling in diseased neurons (PSAPP transgenic and wild-type cortical neurons) against healthy E18 cortical mice neurons. The study aims to quantify synaptic hypoactivity and hyperactivity, particularly focusing on the role of β-amyloid (Aβ) in synaptic dysfunction. Memantine, a treatment for moderate to severe AD, and antisense oligonucleotides (ASO) are evaluated for their potential to modulate synaptic activity. Findings reveal that PSAPP E18 hippocampal neurons exhibit hyperexcitability on MEA, indicating early synaptic deficits before behavioral manifestations. This contrasts with the high synchrony observed in wild-type neurons. The introduction of ASO treatment in DIV 12 neurons demonstrates variable impacts on excitability, suggesting a potential therapeutic effect in alleviating synaptic hypoactivity associated with AD. Synaptic dysfunction precedes behavioral deficits in AD models, highlighting the importance of early intervention. Future research will explore the contribution of glial cells and microglia to synaptic health, potentially elucidating their dual role in synaptic preservation and degeneration. This study underscores synaptic loss as a critical correlate of AD pathology and further research for therapeutic strategies targeting early synaptic dysfunction.

Tina Nguyen

Pharmacological Chemistry, Marshall
Mentored by Conor Caffrey

Drug Discovery for Sleeping Sickness: High-Throughput Screening of Compounds

Human African Trypanosomiasis (HAT) or Sleeping Sickness is an episodic disease in sub-Saharan Africa that is caused by the Trypanosoma brucei protozoan parasite. Current drug therapy of HAT presents significant challenges due to drug resistance, toxicity and accessibility. In the search for new drugs, we investigated a library of 57 thio-, seleno-

semicarbazones and their cyclic counterparts (thio- and selenazoles) that was synthesized to inhibit the validated therapeutic drug target, TbrCATL, a proteolytic enzyme that is essential to the survival and pathogenicity of the parasite. Thirty-one of the new molecules inhibited TbrCATL >85% at 10μM. Against the parasite in culture, compounds at 10 μM that inhibited parasite growth by ≥70% were selected for concentration response analysis to measure the concentration at which growth of the parasite is inhibited by 50% (EC 50 value). Assays were performed in biological and technical replicates using pentamidine and DMSO, as positive and negative controls, respectively. Data were expressed using a sigmoidal four-parameter logistic curve in the GraphPad Prism. Eight compounds showed moderate activity against the parasite with EC 50 values ranging from 4.6 ± 0.8 to 10.0 ± 0.3 μM. Cytotoxicity assessment and further molecular optimization of these chalcogen derivatives may offer starting points for alternative treatments for HAT.

Tyann Reneau

Education Sciences, Ethnic Studies, Muir
Mentored by Monika Gosin

Educational Success: A Focus on Haitian Refugee Students

The integrity of the educational system in America has become an important factor in immigrant student success. For newcomers such as Haitian refugee students, the adaptation to the current structures in American education and acculturation in the classroom can be daunting. As these students are often introduced to new ways of learning and understanding curriculum, the demand for a safe and supportive learning environment is critical for their success. The disparity amongst English language learners' academic performance in San Diego secondary schools has brought more attention to the marginalized population of Haitian refugee students who especially have inadequate representation in academic achievement data. This study examines the underrepresented nature of Haitian refugee students' experiences in San Diego to urge educators in creating effective pathways of cultural relevant pedagogy within English language development classes. With limited literacy in English and posed difficulties of fleeing from the humanitarian crisis in Haiti, this population of students have been dependent on their educational opportunities for success and social mobility. This qualitative research draws upon interviews, observations, and document analyses to explore the implications of Haitian student learning and perceived academic success affected by relationship dynamics in school as they transition into new scholastic realms.

Tyler Diep

Human Biology, Ethnic Studies, Sixth
Mentored by Binhai Zheng

Assessing the Impact of DLK/LZK Deletion in Injured Corticospinal Tract Neurons

Corticospinal tract (CST) neurons, like most central nervous system (CNS) neurons, do not spontaneously regenerate following injury. Various signaling pathways play key roles in both injury signaling and pro-death or pro-regeneration post-injury responses. Dual Leucine Zipper Kinase (DLK) and Leucine Zipper Kinase (LZK) are MAP3Ks known to regulate diverse outcomes in injured neurons, including axonal growth and neuronal apoptosis. Additionally, the deletion of phosphatase and tensin homolog (PTEN) is known to promote the regeneration of CNS neurons. Our lab previously showed that DLK and LZK are required for PTEN-deletion-induced regeneration of CST neurons. Here we use DLK/LZK-, DLK-, and LZK- deleted mice, injured with a subcortical lesion to induce apoptosis, to assess whether DLK and LZK play a role in regulating the apoptosis of injured CST neurons. Since the differences between wild-type and DLK/LZK cKO mice are sustained between nuclear and somatic sizes, nuclear shrinkage, also known as pyknosis, is the primary measure of declining neuronal health. At 14 days post-injury (dpi), both WT and DLK/LZK cKO show further pyknosis compared to 7-dpi, suggesting that the rescue by DLK/LZK deletion may be temporary. DLK alone significantly contributes to the neurodegeneration of injured CST neurons at a 14-day post-injury time point, while LZK alone is not sufficient. However, DLK and LZK together have a more significant impact on regulating neurodegeneration compared to DLK alone. These findings help us further understand the mechanisms through which DLK and LZK act to regulate diverse post-injury outcomes.

Veronica Hernandez

Clinical Psychology, Muir
Mentored by Dr. Lisa Eyler

Impact of COVID-19 Related Anxiety in Adults With Schizophrenia

The COVID-19 pandemic has led to disruptions in daily life and heightened anxiety in many segments of society. Due to symptoms of asociality and physical comorbidities commonly associated with people with schizophrenia (PwS), PwS might be at heightened vulnerability to these pandemic-induced disruptions and anxiety; even so, relatively few studies have assessed its impact and associated anxiety in PwS. Using data collected in 2021 and 2022 from a longitudinal study of PwS and non-psychiatric comparison participants (NC), we examined levels of COVID-19 related anxiety and impact on PwS and NC. Specifically, we did this by analyzing results from participants' responses on two questionnaires: the COVID-19 Impact Scale (CIS) and COVID-19 Anxiety Scale (CAS). Both questionnaires were completed by 120 participants (56 PwS, 64 NC). In ongoing analyses, using data from the same participants that completed the COVID-19 Exposure Questionnaire, we will compare the degree of COVID-19 exposure and vaccination between PwS and NC, and explore the interrelationships of anxiety, impact, exposure, and vaccination. We hypothesized that PwS would have higher COVID-19 related anxiety and report greater impact than the NC participants. We also hypothesized that PwS would have lower rates of exposure and vaccination than NC. Our analyses to date have shown that PwS does not have significantly higher COVID-19 related impact based on the responses collected on the CIS; however, analyses of responses collected on the

CAS showed that PwS have significantly higher COVID-19 anxiety than NC. Results of ongoing analyses on exposure and vaccination will be presented.

Yao Bi

General Biology, Sixth
Mentored by Dr. Geoffrey Chang

Discovering NaCT-Specific Nanobodies

The sodium-dependent citrate transporter NaCT (SLC13A5) is a mediator of cellular uptake of citrate, an important metabolite of the citric acid cycle. NaCT and subsequent protein defects have been shown to result in severe developmental disease. Loss-of-function (LOF) mutations in the NaCT gene lead to NaCT-mediated or SLC13A5 Epilepsy, which is a rare disease currently without a cure. The goal of this project is to discover single domain antibodies (nanobodies) that can serve as binders to NaCT, which are useful as research probes to better understand the disease and can also be used to potentially modify the function of transporters to overcome SLC13A5 Epilepsy. Through the use of techniques in the Chang Lab regarding membrane protein expression and purification as well as leveraging a powerful nanobody discovery platform, we have over-expressed NaCT using viral infection of Sf9 cells in cell culture and extracted NaCT proteins using mild detergents from these cell pellets. These proteins were subsequently purified using affinity chromatography. Our nanobody discovery platform features Fluorescence-Activated Cell Sorting (FACS) for selection, flow cytometry for validation of nanobody binders selective for NaCT, and random mutagenesis to improve the affinity and specificity of nanobodies from initial rounds of screening. Our binders demonstrate potential for downstream applications in the understanding and treatment of SLC13A5 Epilepsy.

Yida Zhang

General Biology, Sixth
Mentored by Neil Chi

Cell linage of M3EB in cardiac development

Due to proprietary information this abstract has been redacted.