A Welcome from UROP

June 2, 2020

Dear UC Irvine Community Members and Guests:

Welcome to the 2020 Undergraduate Research Spotlight, a celebration of the excellence achieved in faculty-mentored undergraduate research and creative activities. The 38 projects presented at this two-day event provide a glimpse into the tremendous breadth and depth of the undergraduate research culture at UC Irvine.

Under normal circumstances, we would have recently held the annual UCI Undergraduate Research Symposium, which would have featured more than 800 presentations from close to 1,400 student presenters. However, due to the COVID-19 pandemic, we decided to postpone the Symposium until this fall. While greatly reduced in scope, this event gives a select group of graduating seniors the opportunity to present their work before they move on to the next stages of their lives.

The student presenters were all nominated by their faculty mentors for the tremendous work they have done. Although they represent many different fields of study, they all share a commitment to, and passion for, achieving excellence in their research endeavors.

Many people have helped make this event possible. We congratulate the student presenters, whose dedication has helped carry them through the challenges of their projects. We express our deepest thanks to their faculty mentors and research collaborators, whose expertise and guidance have made the students' achievements possible. Finally, we wish to recognize the Office of the Vice Provost for Teaching and Learning whose contributions and support have helped to make these two days a success.

The Undergraduate Research Opportunities Program (UROP) assists UC Irvine's students by facilitating and supporting their involvement in faculty-mentored undergraduate research and creative activities. As the organizer of this event, UROP has provided research assistance, recognition and funding to many of today's presenters. UROP also advises undergraduate students about on- and off-campus research opportunities, and publishes *The UCI Undergraduate Research Journal*, an annual multidisciplinary publication. In addition, the Summer Undergraduate Research Program (SURP) provides students with the opportunity to immerse themselves into a research project or creative activity under the guidance of UC Irvine faculty members. UROP has also collaborated with other units on campus to sponsor undergraduate research programs emphasizing multidisciplinary design, as well as research in biophotonics, health promotion and disease prevention, information technology, cardiovascular research, chemistry, and micro/nano technologies. UROP has also launched the International Summer Undergraduate Research Fellowship (I-SURF), which encourages sponsored international students to come to the United States to conduct research under the guidance of UC Irvine faculty mentors. As always, UROP has demonstrated success in implementing collaborative and innovative programs to benefit our students, faculty, and the UCI community.

Thank you for joining us at this Undergraduate Research Spotlight. It is an honor to share these students' presentations with you, and we hope that you will be inspired by their passionate pursuit of research excellence.

Sincerely,

Said M. Shokair
Director, Undergraduate Research Opportunities Program

Spotlight Information

The 2020 Undergraduate Research Spotlight will take place in four sessions over two days. Each session will focus on a different area of research, and offer eight to ten presentations. Student presenters are allowed up to 7 minutes, with a short question and answer period.

Each of the Spotlight sessions will be presented live on Zoom. Sessions will also be streamed live on Vimeo. The complete event will also be recorded and we will post links to the recordings as soon as they are available.

This program booklet contains complete information about each of the sessions, including a session schedule and abstracts for each of the presentations. Page numbers for each section are listed below.

Schedule of Presentations: June 2, 10:00 AM

Time	*Student Presenter(s)*	*Project Title*	*Faculty Mentor(s)*
10:00	**Manasi Mangesh Shingane** *Computer Science* *mshingan@uci.edu*	**True Randomness in Quantum Verification Protocol**	**Sandy Irani** *Computer Science*
10:10	**Andriana Inez** *Computer Science* *aibragan@uci.edu*	**Design and Evaluation of an Amazon Alexa Game for Young Children**	**Katie Salen** *Informatics*
10:20	**Myia Dickens** *Mechanical Engineering* *dickensm@uci.edu*	**The Drive Systems of Robot Walkers**	**J. Michael McCarthy** *Mechanical & Aerospace Engineering*
10:30	**Fadi Samaan** *Mechanical Engineering* *fssamaan@uci.edu*	**Spacecraft Thermal Management Systems: Thermal Radiators for Deep Space Missions**	**Khalid Rafique** *Mechanical & Aerospace Engineering*
10:40	**Sebastian Robert Rosiak** *Aerospace Engineering* *srosiak@uci.edu* **Srinath Gopalakrishnan** *Education* *srinatg@uci.edu* **Caitlyn Amanda Copeland** *Aerospace Engineering* *copelanc@uci.edu*	**UCI Rocket Project: Preliminary Test Rocket (PTR)**	**Mark Walter** *Mechanical & Aerospace Engineering*
10:50	**Owen Yang** *Computer Science & Engineering* *oky@apep.uci.edu*	**Assessing the Human Health Benefits of Improved Air Quality in California**	**Scott Samuelsen** *Mechanical & Aerospace Engineering*
11:00	**Chau Tran** *Environmental Engineering* *chaunt@uci.edu*	**Membrane Distillation by Direct Solar Heat Capture**	**Sunny Jiang** *Civil & Environmental Engineering*
11:10	**Murong Cheng** *Physics* *murongc@uci.edu* **Zhiyu Man** *Mathematics* *zman@uci.edu* **Yuming Liao** *Physics* *yuminl4@uci.edu*	**Neutrino Oscillation**	**Mu-Chun Chen** *Physics & Astronomy*
11:20	**Julianna Bordas** *Biomedical Engineering* *jbordas@uci.edu*	**Two Methods for Chronic Imaging of Mice to Monitor Cerebral Blood Flow**	**Bernard Choi** *Biomedical Engineering*
11:30	**Ladan Bigdeli** *Neurobiology* *lbigdeli@uci.edu*	**Assessing Circuit-Level Dysfunction in a Rodent Model of Alzheimer's disease**	**Kevin Beier** *Physiology & Biophysics*

Spotlight Session I Abstracts

True Randomness in Quantum Verification Protocol
Manasi Mangesh Shingane
Mentor: Sandy Irani

Random numbers are used in a variety of areas, ranging from generating encryption keys to simulating and modeling lifelike phenomena. For most applications, pseudo-random numbers, which appear to be random but are generated from a deterministic function, are sufficient. However, for applications such as generating keys for encrypting data, it is important that the numbers generated cannot be reverse engineered, or else private information may be revealed. We can find sources of true randomness in nature, and one of these sources can be extracted through quantum devices. A protocol was given in recent years for a classical device to certify that the bits generated by a quantum device are actually random. The protocol proceeds in a series of rounds. In this work, we utilize min entropy in order to provide an analysis of the entropy generated in a single round of the protocol. Specifically, we aim to show that another component of the verification protocol generates log(n) bits of randomness per round and show that the randomness generated is statistically close to uniform. This is an improvement in the amount of randomness proven to be generated in the protocol, from a single bit, to log(n) bits per round.

Design and Evaluation of an Amazon Alexa Game for Young Children
Andriana Inez, Reniel Ocampo, Juliane Orencia Ignacio
Mentor: Katie Salen

The increased adoption of voice assistants (VA, *e.g.*, Amazon Alexa, Apple Siri) in many households has drastically changed the way children interact with digital media. To date, no studies have addressed children's communicative interaction between VA, especially through structured activities such as voice games. Our research study investigates how children verbally respond to Amazon's voice assistant, Alexa. We designed an Alexa quiz game titled "Animal Actions" that involves children listening to a narrative story and using their speech input to answer questions. To evaluate our game, we recorded and analyzed videos from 18 children aged 3–6 years via a mobile phone app in the home. We found single word responses to be more accurately recognized and processed by Alexa than multi-word responses. We also found that older children answered more questions and produced more consistent and diverse communication repair strategies, whereas younger children frequently experienced issues in response time and produced more semantic and syntactic errors during the game. For our study, we learned to develop a voice game for children using Amazon Alexa and explored design opportunities to support children's language learning and literacy development. We used the data gathered to iteratively develop our game, making informed changes in order to improve user interaction. Our future work will continue to explore whether additional visual displays can enhance children's ability to engage in voice games with VAs, and what the implications are of using voice games to support children with communication disabilities (*e.g.*, autism, stuttering).

The Drive Systems of Robot Walkers
Myia Dickens
Mentor: J. Michael McCarthy

A special class of robot walkers includes walkers with a single motor that can drive all the legs. Examples include Theodore Jansen's Strandbeest and walkers designed by students in the Department of Mechanical and Aerospace Engineering. Our goal in this project was to create a standardized motor and gear drive system to increase the performance of these walkers. The first phase of the project consisted of replacing a belt drive system with a gear train system. Because each walker requires a unique gear train, the gear trains would need to be easily prototyped. Using simple mathematical methods, I was able to design a gear model that allows the user to create their gears rapidly. In terms of manufacturing, the gears were made using PLA and Nylon for 3D printing and laser cut with acrylic and wood. Upon testing, 3D printed gears allow for greater control of thickness and allow for gears and gear connectors to be printed together. Laser-cut gears are easier to prototype, but the gear and gear connectors are created individually. During the second phase of the project, the second part of the drive system, the motor, needs to be tested. A motor needs to be strong enough to move the walker smoothly at 1 foot per second. A mechanism was created to simulate a walker gear train and determine the maximum weight a motor with a gear train can pull by testing its maximum torque. A robot walker that implements this drive system is available for demonstration.

Spacecraft Thermal Management Systems: Thermal Radiators for Deep Space Missions
Fadi Samaan
Mentor: Khalid Rafique

Spacecraft endure severe conditions that require the design of space-grade systems to have great complexity. For instance, CubeSats found in low-Earth orbit experience inconsistent heat fluxes, surges of solar radiation, and poor heat dissipation, all of which make regulating temperature in space a challenge. To solve this problem, space agencies like NASA are turning to variable emissivity devices

(VED). VEDs are passive components that exhibit a color change in response to an applied voltage. As a result, the rate at which radiation is absorbed, emitted, and transmitted changes, and the VED functions like a radiator. This technology is proving to be a more innovative, reliable, and cost-effective solution for missions to Mars and deep space exploration. However, current space-grade VEDs are not economically feasible for most CubeSat projects and impractical to produce on a small scale. To address this, Spacecraft Thermal Management Systems (STMS) is investigating VEDs in the hope of improving their manufacturing cost as well as their performance. Thus far, nickel oxide and tungsten trioxide films and an electrolytic gel have been synthesized to create a VED. The team plans to assess the performance of their VED as well as alternative electrochromic technology by conducting one-dimensional heat transfer analysis while subjecting components to the extreme temperatures and vacuum pressures found in space. Should these tests be successful, VEDs may reduce the cost of spacecrafts and increase the accessibility of orbits and space.

UCI Rocket Project: Preliminary Test Rocket (PTR)
Sebastian Robert Rosiak, Srinath Gopalakrishnan, Caitlyn Amanda Copeland
Mentor: Mark Walter

Demand for launch vehicles has risen in the past two decades due to the increased interest in satellite technologies and human presence in space. This has resulted in a very high demand for rocket scientists and engineers with hands-on, applicable knowledge. The UCI Rocket Project helps students develop the necessary engineering skills needed to pursue a career in the space industry. Our group is developing a liquid bipropellant rocket, powered by liquid methane and liquid oxygen, that is designed to reach a maximum height of 45,000 feet. When we reach that goal our engine will be the most powerful bipropellant engine designed by an undergraduate team. We successfully completed a static test fire of our engine in November of 2019. We recorded a thrust of 750 and had a sustained burn time of 3 seconds. These results are lower than what we expected but we found many ways to increase the performance of the system. For example, we changed the curvature of our nozzle, and completely redesigned our fluid system to reduce the amount of losses, increase overall flow rate, and increase safety. These changes should result in a thrust and burn time much closer to the expected numbers. The experience gained from firing our engine, analyzing the results, and then following through with improvements to our system has been invaluable for our members.

Assessing the Human Health Benefits of Improved Air Quality in California
Owen Yang
Mentor: Scott Samuelsen

The South Coast Air Basin (SoCAB), a region in Southern California that includes Los Angeles, San Bernardino, Riverside, and Orange Counties, experiences some of the poorest air quality in the United States, which results in deleterious health effects for the large population in the region. The adoption of near- and zero-emission technologies and fuels in California energy systems is an essential step in reducing the health consequences of degraded air in the SoCAB. For example, the use of zero-emission hydrogen fuel cell and battery electric equipment at the Ports of Los Angeles and Long Beach represents a potentially high impact pathway for improving environmental impacts of goods movement in the region. Using a suite of modeling tools including an advanced 3-D air quality model and a health impact assessment tool, I quantify and value the human health benefits of emission reductions from alternative technology deployment in major energy sectors to provide insights into the strategies that can best achieve clean air benefits. A particular focus is given to impacts on disadvantaged communities (DACs), as they are unfairly burdened by environmental quality degradation and need improvement the most. The goal of this work is to inform policy that can be adopted to encourage the use of zero-emission technologies in improving environmental quality in the SoCAB.

Membrane Distillation by Direct Solar Heat Capture
Chau Tran
Mentor: Sunny Jiang

This project addresses the urgent scarcity of freshwater and energy resources by developing a solar membrane seawater distillation system. The desalination cell was designed in a counter-current flow mode with a hot saline water feed on one side of the hydrophobic micro-pore membrane while evaporates were collected on the other side. Initial lab experiments indicated permeate flux of 0.98 kg/m^2hr and 1.89 kg/m^2hr at temperature gradients of 20°C and 30°C, respectively, between the feed and permeate sides of desalination cell, with 99.9% of salt rejection rate. In field testing of desalination efficiency, a black carbon fiber was inserted directly above the membrane to capture solar heat *in situ* and a Fresnel lens was used to concentrate the solar energy to 4–5 times. Results showed that direct solar heat capture increased the temperature and desalination efficient by 49%. The system has the potential to develop into a low-cost, small system for individual uses or rapid deployment in events of humanitarian crisis in a sustainable way.

Neutrino Oscillation

Murong Cheng, Zhiyu Man, Yuming Liao
Mentor: Mu-Chun Chen

A neutrino is one of the fundamental particles. Current experiments confirm the existence of three neutrino flavors, electron neutrinos, muon neutrinos, and tau neutrinos. Neutrino particles oscillate between these different flavors while propagating. Through detecting the neutrinos from a nuclear reactor and accelerator, experiments analyze neutrino oscillation patterns corresponding to the distance between detector and reactor, and the energy of neutrino beams. Furthermore, observing these oscillation patterns helps find the oscillation parameters for different flavors, such as mass and mixing angles. Since the experiment data from MiniBooNE and LSND do not fit the expectation of three flavors model, a new neutrino, the so-called sterile neutrino, is needed. To test this hypothesis, the research uses a computer software GLoBES(General Long Baseline Experiment Simulator) to simulate different experiments. Through calculating the possible combinations of the parameters and feeding these combinations to the software, the conditions, which could be used to confirm the existence of the fourth flavor, would be found. Also, the research aims to find how the matter effect influences CP violation and other parameters in the PMNS matrix. KTY method is used to find the expression of the CP phase and Jarlskog Invariant in matter with respect to the CP phase in vacuum and matter potential. After choosing reasonable parameters in the vacuum from previous experiments, we present research result on the effect of CP violation in matter and the appropriate range of variables for further experiments.

Two Methods for Chronic Imaging of Mice to Monitor Cerebral Blood Flow

Julianna Bordas
Mentor: Bernard Choi

Longitudinal monitoring of cerebral blood flow (CBF) in mice allows for an improved understanding of overall neurovascular health. This information is critical when trying to learn about normal brain physiology and the physiological changes that occur when affected by a neurodegenerative disease. This research investigated the development of two improved methods that achieve long-term monitoring of CBF without the need for invasive skull removal. The first method is called the Cranial Window Procedure, which entailed performing a scalp retraction on a mouse and securing a pre-cut glass coverslip onto the exposed skull. After surgical preparation, the mouse was imaged using laser speckle imaging (LSI) to measure CBF. After the images were processed in MATLAB, speckle contrast values were calculated and plotted over the course of several days. The second method is called the Vetbond Procedure. This method also required a scalp retraction. Instead of securing a glass coverslip, a layer of tissue adhesive was spread evenly onto the skull and left to dry. During imaging, saline and a glass coverslip were temporarily placed on the skull, and similar image analysis was performed. These sets of data allowed for the comparison of the two methods, ultimately leading to determining an ideal technique.

Assessing Circuit-Level Dysfunction in a Rodent Model of Alzheimer's disease

Ladan Bigdeli
Mentor: Kevin Beier

Alzheimer's disease (AD) is one of the most common neurodegenerative diseases worldwide. Despite its prevalence, however, the brain circuitry underlying AD pathophysiology is yet to be understood. In particular, circuit changes that occur before the onset of the characteristic cognitive deficits seen in AD patients remain poorly characterized. Moreover, patients inherently exhibit different levels of disease progression, raising the need for personalized treatments. In this study, we employed a rabies viral mapping technique to characterize circuit dysfunction using a 5xFAD mouse model for Alzheimer's disease. First, we assessed if memory and cognitive deficits were present at two months in a cohort of 5xFAD mice. We hypothesized that neural activity changes prior to onset of pathology could be associated to development of AD and that the two-month-old 5xFAD mice should not show any behavioral deficits in comparison to control animals. As expected, the 5xFAD mice showed similar levels of learning in the object location memory and elevated plus maze test; however, the controls in the object recognition memory test did not show sufficient learning. The brains were cleared using the iDISCO protocol and will be imaged with a light-sheet microscope. We are currently correlating the results of the behavioral tests with the RABV labeled neuronal data. In addition, we plan to replicate the same experiment for older mice at four and eight months of age. These data should be a valuable step towards understanding how neuronal circuits change throughout disease progression.

Schedule of Presentations: June 2, 2:00 PM

Time	*Student Presenter(s)*	*Project Title*	*Faculty Mentor(s)*
2:00	**Elizabeth Snyder** *Gender and Sexuality Studies* *emsnyde1@uci.edu*	**What are Queer Fairy Tales?**	**Jonathan Alexander** *English*
2:10	**Arthur Gabriel Tapia** *English* *tapiaag@uci.edu*	**Hope in Intransitivity: Afropessimism in Fanon and Wilderson**	**Radha Radhakrishnan** *English*
2:20	**Meliza Gutierrez** *Drama* *mkgutier@uci.edu* **Molly O'Donnell** *Drama* *mmodonne@uci.edu*	**Valiente**	**Lonnie Alcaraz** **Juliette Carrillo** *Drama*
2:30	**Ingrid Allen** *Film & Media Studies* *iaallen@uci.edu*	**Exploring the Hong Kong Diaspora: "Meet Marie"**	**Fatimah Rony** *Film & Media Studies*
2:40	**Ryan Wang** *Art* *muchew1@uci.edu*	**The Visualization of Human Inner Struggles**	**Bruce Yonemoto** *Studio Art*
2:50	**Madison MacKenzie** *Comparative Literature* *mnmacken@uci.edu*	**Error: Human**	**Jayne Elizabeth Lewis** *English* **Nancy McLoughlin** *History*
3:00	**Wenyu Zhang** *Sociology* *wenyuz5@uci.edu*	**Interaction and Negotiation: A Study on the Strategies Chinese Students use to Navigate through American Colleges**	**Francesca Polletta** *Sociology*
3:10	**Julia Dou** *Public Health Policy* *pdou@uci.edu*	**The Effects of using WeChat for Raising Awareness about Cardiovascular Health among UC Irvine Chinese International Students**	**Victoria Bredow** *Criminology, Law & Society*

Spotlight Session II Abstracts

What are Queer Fairy Tales?
Elizabeth Snyder
Mentor: Jonathan Alexander

Queer fairy tale studies is a small but growing academic field that appears at the intersection of folk, media and Queer studies. It is dedicated to discerning the queer—as in disruptive, resistant—potential of mainstream fairy tales through writing Queer—as in LGBT+—characters in them. The aim of my thesis project is to provide a short survey of the counter-hegemonic work that Queer fairy tales are doing in this historical moment. There is little to no academic work in this area because it is still a new field; all of the works discussed were published in the past three years. These stories do not just work toward inclusion, but interrogate both Queerness and the fairy tale form while resisting hegemonic assumptions about love and community belonging. I conclude that currently, Queer fairy tales tend to respond to three central themes. They make claims about who or what a Queer person is, they question how to handle intersectional ideas with a Queer focus, and they push the boundaries of what is recognizably a fairy tale in the Western sense of the term. I propose that these three themes combine to paint a picture of the Queer fairy tale as a story that uses magic—a privileged way of knowing the world—to mean freedom for Queer communities. Appropriating magic to counter heterosexual hegemony is the epitome of the queering project.

Hope in Intransitivity: Afropessimism in Fanon and Wilderson
Arthur Gabriel Tapia
Mentor: Radha Radhakrishnan

When cross-analyzing Frank B. Wilderson's *Afropessimism* (2020) and Frantz Fanon's *Black Skin, White Masks* (1952), one is met with two very different ways to approach handling structural anti-Black violence. Both understand this violence as a form of unreason that cannot be settled through rationality, and as a force that formatively permeates into the unconscious of both the non-Black and Black subject. Wilderson's psychoanalysis posits that institutionally, philosophically, and psychically what we call civil society and the Human is made conceivable only through the foundation and reification of violence to the Black body, and that these binary structures—Black body/Human, Black "social death"/civil society—generate the fabric of Human reality too deeply to ever be destroyed. Although Fanon founded much of the theoretical hypotheses that make up this Afropessimism, he did not believe in the intransitiveness of structural anti-Blackness, and sought to destroy the binary-machine by way of a radical immanence that takes doubt in the constructs that categorically constitute Humanness. The key difference between both writers is the degree of hope each allows themselves to have hope, though neither backs away from mapping out the mental and bodily trauma that the Black individual is constituted by. The writers' differing conclusions generates an important conversation regarding how the structure of anti-Black violence should be both theorized and lived against, playing out the emotional and physical agony that is too often left unattended to in analyses of that structure.

Valiente
Meliza Gutierrez, Molly O'Donnell
Mentors Lonnie Alcaraz and Juliette Carrillo

Valiente tells the story of a young woman, named Valentina, recalling a difficult time in her life when she struggled to find her purpose and embrace her cultural/racial identity in a country that constantly told her that her kind does not belong. If you could talk to your younger self, help them, warn them, guide them, comfort them, what would you say? Preparing for a theatrical production is a lot like conducting a research project, because by nature, it is about studying human beings and emulating their behavior onstage. Theatre is a way for us to reflect on our actions, and it provokes thought and starts conversations that are difficult to have. *Valiente* was meant to be a fully staged production that evokes conversations about education, deportation, and cultural identity within the Latinx community. We felt it was important to continue this project despite the staged production's being cancelled, because the story still needed to be shared. *Valiente* is about loss, family, identity, and perseverance which are all subjects that people continue to deal with in the current state of the world. Continuing with the online workshopping and rehearsal process has also given our production team and actors the opportunity to continue their artistic and theatrical studies in a way they otherwise would not have been able to. As we enter our last week of rehearsal, our team is reminded that theater has always been meant to provide catharsis and escape but, more importantly, hope.

Exploring the Hong Kong Diaspora: "Meet Marie"
Ingrid Allen
Mentor: Fatimah Rony

Humanity that is often manufactured within the documentary genre calls into question the ethics of "romantic preservation" (Rony, *The Third Eye*, 1996). This project, a documentary film supported by research into the documentary genre and Hong Kong diaspora, examined the historical and social conditions surrounding immigration and *joie de vivre* with a case study focus on the

life of Marie Wong, my great-aunt. Integrating the ideas of Prof. Rony, Pooja Rangan and Calvin Pryluck, I have created a short film that showcases the differing experiences of three generations of Hong Kongese women: my great-aunt, my mother and me. The documentary contains primary sources that explore what brought my relatives and me to our homes in Canada and the U.S. In addition, Wong found ballroom dancing as a hobby later in life, highlighting the depth and resilience often excluded from societal perceptions of elderly women of color. The documentary was filmed with rented film equipment that observed Wong in her home in Canada. By including myself in the film, I chose a self-reflexive framing within the project, drawing attention to my status as a second-generation American. This resulted in an understanding of authentic and specific contexts in which previously abstract racial, social and historical factors influenced the course of my own life and possibly shared by other members of the Hong Kong diaspora. My film may illuminate others to the life stories of Chinese Americans and Chinese Canadians that are often excluded, lost or distorted in film and history.

The Visualization of Human Inner Struggles
Ryan Wang
Mentor: Bruce Yonemoto

Light In The Mist provides a rare glimpse into a place called "Her Farm" run by a couple at the top of Mountain Manhku in rural Nepal. The farm provides a safe haven for struggling women and children to live, work and thrive. The documentary seeks to reveal the inner struggle of trauma and the healing power of community through a variety of cinematic techniques. *Light In The Mist* captures the emotional depth of its subjects by allowing the passage of time to reflect a moving narrative of hardship, courage and hope. A human's inner self is sometimes fragile, and thus needs courage and time to express itself. However, in modern society people are not very good at listening to others. The combination of slow cinema and time-lapse contrasts the fast pace of time. The effect provides viewers opportunities to deeply feel emotions and obtain the visual experience that they cannot normally access in traditional theatrical films.

Error: Human
Madison MacKenzie
Mentors: Jayne Elizabeth Lewis and Nancy McLoughlin

Contemporary science fiction media like *Blade Runner 2049*, HBO's *Westworld*, and the Playstation video game *Detroit: Become Human* pivot on the concept of "malfunction." The Artificial People (androids) in these narratives are all seen to deviate from their programming in moments of violence, passion, or self defense. It is precisely in these moments, which subvert expectations and undermine established norms of behavior, that these characters seem to truly "become human." Yet, the fictive human communities in these media sources respond to android deviance with fear and deliberate and oftentimes cruel acts of boundary-policing. This project adopts the self-aware and conscious android as an analogue for the human suffering from mental ill-health or cognitive disorder. By identifying parallel civil rights infringements and discriminatory legislation in the science fiction media and in the history of mental health treatment, we can generate a critical framework for assessing our harmful tendency to demarcate personhood and exclude the social "other" on the basis of difference.

Interaction and Negotiation: A Study on the Strategies Chinese Students use to Navigate through American Colleges
Wenyu Zhang
Mentor: Francesca Polletta

There was a more than tenfold increase in undergraduate enrollment from China in the United States from 2005 to 2018, and there were almost 150,000 undergraduates from China studying in the American higher education system. However, Chinese international students are facing challenges in adapting to both the cultural and academic environments in the United States, especially in choosing their interactional style with faculty in universities. This study investigates the different strategies Chinese international students adopt in interacting with faculty compared to American students, and the deeply rooted Chinese habitus that affects Chinese international students' choices of the passive interactional style. Semi-structured interviews were held with 25 undergraduates, including 15 Chinese international students and 10 American students. Since American students were exposed to an interactive academic environment in secondary school prior to entering the university, they are proactive in engaging and interacting with their professors. On the contrary, Chinese international students came to the United States carrying the traditional Chinese cultural beliefs and values which exhibit as a way of showing "respect" towards faculty and responding to others' needs, thus keeping them from interacting with faculty. The hierarchical and collectivist culture in Chinese traditional culture that shapes Chinese students' habitus propels them to respect authority and to place others' goals above their personal goals. Through documenting the differences between Chinese international students and American students at UCI, this study contributes to understanding the protective distances Chinese international students make in interacting with faculty and on future strategies used to encourage a more interactive relationship between Chinese international students and their professors.

The Effects of using WeChat for Raising Awareness about Cardiovascular Health among UC Irvine Chinese International Students

Julia Dou
Mentor: Victoria Bredow

Cardiovascular disease (CVD) is the leading cause of death in China and there has been an increase in younger populations (under 45 years of age) being diagnosed with CVD. Given the rise of CVD, it is necessary to improve preventive strategies. WeChat is China's most used social media platform and is a potential tool for health education and disease prevention; however, its effectiveness is uncertain. This mixed-method study aims to determine whether health education on WeChat can make differences in participants' perceptions, attitudes and willingness for behavioral change after the online educational session. The study used WeChat to administer health-related information over a two-week period to Chinese international students and measured perceptions, attitudes, and behavioral changes using pre- and post-surveys delivered via WeChat. Online education and survey questions focused on "healthy eating," "being physically active," and "stress and sleep." Quantitative results show a substantial change, with 90% of participants in the post-survey indicating that online education is helpful to health compared to 55% of participants in the pre-survey. There were also increases across indicators of "healthy eating" and "physical activity"; however, "sleep" remained constant. Qualitative results demonstrate that students acquired more specific knowledge. These results suggest that students learned prevention strategies during this intervention and are willing to make behavioral changes. WeChat may be effective as a tool to promote heart health education with the aim of preventing CVD. WeChat may also help on-campus health professionals to understand the health needs of students and may bring more health services to their needs.

Schedule of Presentations: June 3, 10:00 AM

Time	*Student Presenter(s)*	*Project Title*	*Faculty Mentor(s)*
10:00	**Jade DeBarry** *Public Health Policy* *jdebarry@uci.edu*	**Identifying Barriers to STI Testing among UC Irvine's Sorority and Fraternity Population**	**Theodore Gideonse** *Program in Public Health*
10:10	**Justin Dunkin** *Psychological Science* *dunkinj@uci.edu*	**Does Fidelity Relate to the Impact of a Behavioral Intervention for Young Adults with Testicular Cancer? Examining Self-Regulation Skills**	**Michael Hoyt** *Program in Public Health*
10:20	**Hafsah Umerani** *Biological Sciences* *humerani@uci.edu*	**Assessing Implicit Bias Patterns among Undergraduate Volunteers at a Student-Run Free Health Clinic**	**Dara Sorkin** *Medicine*
10:30	**Vianh Hoang** *Nursing Science* *vianhh@uci.edu*	**Telephone Support for Spouse Dementia Family Caregivers during the COVID-19 "Stay-at-Home" Period**	**Jung-Ah Lee** *Sue and Bill Gross School of Nursing*
10:40	**Andrew Haddad** *Human Biology* *aihaddad@uci.edu*	**Visceral Adipose Tissue Deposition Patterns in a Diverse Population of Young Adults**	**Andrew Odegaard** *Epidemiology*
10:50	**Ujwal Aluru** *Biological Sciences* *ualuru@uci.edu*	**Effects of Minecraft Intervention on Pattern Separation in a Middle-Aged Population**	**Gregory Clemenson** *Neurobiology & Behavior*
11:00	**Crisylle Blanton** *Neurobiology* *blantonc@uci.edu*	**Genetically Modified Rabies Virus-Mediated Tracing of Circuit Connections to the CA3 Region of the Hippocampus**	**Xiangmin Xu** *Anatomy & Neurobiology*
11:10	**Dianna Hidalgo** *Neurobiology* *dchidalg@uci.edu*	**Distribution of α2 Nicotinic Acetylcholine Receptors in Auditory Cortex**	**Raju Metherate** *Neurobiology & Behavior*
11:20	**Manal Usmani** *Biological Sciences* *musmani@uci.edu*	**Investigating the Sex-Specific Difference Post Space Radiation Exposure**	**Vipan Parihar** *Radiation Oncology*
11:30	**Suki Gu** *Chemistry* *yirang4@uci.edu*	**Photodegradation of Secondary Organic Aerosols by Long-Term Exposure to Solar Actinic Radiation**	**Sergey Nizkorodov** *Chemistry*

Spotlight Session III Abstracts

Identifying Barriers to STI Testing among UC Irvine's Sorority and Fraternity Population

Jade DeBarry
Mentor: Theodore Gideonse

The perpetual increase of Sexually Transmitted Infections (STIs), particularly among young adults aged 15–24, is a worldwide public health concern. Specifically, college students who are affiliated with a sorority or fraternity are statistically more likely to engage in high risk sexual behaviors and contract an STI. The aims of this study are to analyze UCI's Sorority and Fraternity Life (SFL) students' sexual behaviors and identify their perceived barriers to being tested. This self-administered, anonymous survey was made available for ten weeks through the Qualtrics online survey program during the Winter 2020 quarter to every SFL member at UCI. The key measurements include percentage of sexually active students who have/have not been tested, most common perceived barriers to testing, sexual health knowledge, and students' attitudes regarding SFL's impact on members' behaviors. In total, 579 of 1,824 students participated in the survey. Analysis shows that only 48% of sexually active SFL students have been tested for an STI, and 33.95% of students have low perceived susceptibility when it comes to their chances of contracting an STI. In addition, 57.27% believe that SFL culture may contribute to high risk sexual behavior. This study demonstrates that a majority of SFL students have misconceptions about STIs, consequently influencing their decisions to be tested and contributing to high risk behavior. Results suggest that it would be beneficial to reform current harm reduction efforts to make a change within SFL culture and students' attitudes regarding STI testing and sexual health.

Does Fidelity Relate to the Impact of a Behavioral Intervention for Young Adults with Testicular Cancer? Examining Self-Regulation Skills

Justin Dunkin
Mentor: Michael Hoyt

Fidelity is defined as how closely an interventionist adheres to the instruction manual governing the deliverance of a behavioral intervention to participants, which helps researchers more thoroughly interpret intervention outcomes. Fidelity is essential for the validity and replication purposes of intervention research. The present study tested the impact of fidelity on treatment outcomes in goal-focused emotion-regulation therapy (GET), which involved young adult testicular cancer survivors. GET consists of six one-on-one sessions focusing on the participant's values, mapping goals, and emotional self-talk. The present studies aimed to determine whether fidelity scores in GET impacted the depression, goal-navigation, and emotion-regulation outcomes of participants. Men ages 18–39 (N=20, M age=27.7, SD=3.99) with a confirmed case of testicular cancer within two years of participating in the study were recruited from urology clinics in the U.S. Fidelity was measured along two dimensions. The first consisted of whether topics were covered on a yes/no basis. The second analyzed the depth to which key session topics were explored. Participants completed baseline (T1) and post-intervention (T2) questionnaire measures of depressive symptoms, goal-navigation skills, and emotion-regulation coping styles. Multiple regression analyses were conducted controlling for education and sexual orientation. When controlling for these covariates, there was no significant relationship between either dimension of fidelity and the T1 and T2 measures of depression, goal-navigation skills, and emotion-regulation coping styles. The small sample size in conjunction with the number of covariates might have flushed out results.

Assessing Implicit Bias Patterns among Undergraduate Volunteers at a Student-Run Free Health Clinic

Hafsah Umerani
Mentor: Dara Sorkin

Implicit bias, defined as negative subconscious associations that an individual holds for those around them, can have dire effects on a patient's wellbeing, as it may impact the quality of care provided by medical staff. While implicit bias has been studied extensively among healthcare professionals, it has not been explored among undergraduate volunteers working to become the next generation of healthcare providers. Student volunteers (n=57) were split randomly into two groups and administered a questionnaire that randomly assigned vignette-style stories, which presented identical patient scenarios, but varied patient ethnicities for each group. These scenarios asked students to provide ratings of patient attitudes toward healthcare (*e.g.*, levels of impatience with clinic staff, likelihood of following treatment plans). Students were then administered the Implicit Association Test (IAT) and an explicit bias assessment. The vignette-style questionnaire indicated that, overall, student perception of patients did not vary significantly based on the patient's ethnicity ($p>0.05$). Data from the IAT indicated that the students overall had a slight preference for Arab-sounding names and lighter-skinned faces, while the explicit bias assessment indicated no significant preference for one race ($p=0.16$). Students who demonstrated strong biases in their IAT results did not have significantly different answers on the vignette-style questionnaire or the explicit bias assessment when

compared with their peers ($p>0.05$). The findings suggest that while student volunteers may have slight biases in favor of certain ethnic groups, these preferences do not interfere with their perception of patients or patient attitudes toward healthcare.

Telephone Support for Spouse Dementia Family Caregivers during the COVID-19 "Stay-at-Home" Period

Vianh Hoang

Mentor: Jung-Ah Lee

In March 2020, California issued the "Stay at Home" order, causing family caregivers of persons with dementia (PWD) to stay home 24/7 caring for their loved ones without public support (*e.g.*, adult daycare services). With the order in place, caregivers are experiencing more hesitance to seek help and an elevation in stress levels related to the COVID-19 pandemic. The purpose of this study is to identify the emotional state and needs of family caregivers of PWD during this COVID-19 crisis and provide emotional support and COVID-19 information. Upon obtaining IRB approval, we contacted caregivers of PWD who completed our previous home visit intervention study by telephone. Eight spouse family caregivers were willing to participate in this telephone support study during the COVID-19 period. Weekly phone logs were documented. Common themes were analyzed. The mean participant's age was 71 (SD=6.5), and five of eight were females. During initial calls, participants expressed fears of the COVID-19, loneliness/isolation, a high degree of stress and caregiver burden. Over the follow-up calls in April, caregivers reported reduced negative experiences and life style adjustment. In May, participants showed slowly increased socialization while following social distance rules, stronger bonds with PWD, and less fear of COVID-19. Participants reported great appreciation of telephone support. The findings show that caregivers benefitted from telephone support study during COVID situation. This is a feasible and beneficial approach to support caregivers suffering from a lack of support and resource needs while caring for their loved ones during the COVID pandemic.

Visceral Adipose Tissue Deposition Patterns in a Diverse Population of Young Adults

Andrew Haddad

Mentor: Andrew Odegaard

The purpose of this study is to quantify the visceral adipose tissue (VAT) deposition patterns in a young adult population to inform knowledge of VAT deposition patterns in relation to sex, race, clinical measures including total body and trunk fat %, BMI, and blood pressure, as well as lifestyle factors including stress, sleep quality, active and sedentary behavior, diet quality, depressive mental health, and food security. A total of 110 participants between the ages of 18 and 25 were scanned using whole-body Duel-energy X-ray absorptiometry (DXA) to measure body composition and filled out questionnaires to assess lifestyle habits. Between sexes, males showed higher levels of VAT deposition despite having a lower total body and trunk fat % and similar BMI than females. Hispanics/Latino and Asians had higher VAT deposition than Whites and Blacks at similar BMI. Hispanics/Latinos had the lowest food security, which supports the hypothesis of food accessibility as a factor contributing to differential body composition between races. With higher VAT deposition levels there was lower diet quality, higher food insecurity, and higher systolic blood pressure. Overall, the factors of sex and race, and the diet-related lifestyle factors have associations with VAT depositions in young adult population that are consistent with findings in studies with older multi-racial populations.

Effects of Minecraft Intervention on Pattern Separation in a Middle-Aged Population

Ujwal Aluru

Mentor: Gregory Clemenson

Neurodegenerative diseases such as Parkinson's Disease are accompanied by a severe decline in hippocampal function. In animal studies, this deterioration of the hippocampus can be mitigated by exposing animals to an enriched environment. The goal of this study was to investigate the use of the video game *Minecraft* as a virtual form of environmental enrichment, to improve hippocampal based memory in a middle-aged population. Previously we showed that playing *Super Mario Brothers 3D World* resulted in significant improvements in hippocampal memory in young adults. We hypothesized that spatial exploration afforded by these large 3D environments was responsible for the improvement in hippocampal memory. Here we use *Minecraft* to enrich hippocampal based memory in a middle aged population and investigate the effects of different aspects of 3D video games (building and exploration). Due to the possibility of early intervention, the middle-aged population was selected as our target demographic. Additionally, there is a lack of literature surrounding middle-aged individuals in environmental enrichment based interventions. Our results indicate that both exploration and building tasks within *Minecraft* led to significant improvements in hippocampal based memory when compared to the active control group and no-contact control group. Further elucidation with fMRI and DTI studies may reveal structural changes in the hippocampus due to the *Minecraft* intervention.

Genetically Modified Rabies Virus-Mediated Tracing of Circuit Connections to the CA3 Region of the Hippocampus

Crisylle Blanton

Mentor: Xiangmin Xu

Traditionally, the hippocampus is regarded as having a unidirectional flow of information through the trisynaptic circuit. There is growing evidence, however, that hippocampal connectivity is more complex. The CA3 of the hippocampus is critical for associative memory and spatial navigation, but the cell-type-specific circuitry of the region and how this contributes to behavior is far less understood. In this study, we apply improved viral technology to trace brain-wide circuit inputs to excitatory neurons of hippocampal CA3 subfields in the mouse. Our research revealed a comprehensive pattern of inputs to the CA3, including those from local hippocampal subregions, and distant structures of the brain, such as the septal nuclei, subiculum, and entorhinal cortex. Our major findings include noncanonical connections from the ventral CA1, subiculum, and the subiculum transition region to the CA3. Revealing the complete CA3 subfield connectivity is fundamental to understanding the functional organization of hippocampus holistically.

Distribution of α2 Nicotinic Acetylcholine Receptors in Auditory Cortex

Dianna Hidalgo

Mentor: Raju Metherate

Nicotinic acetylcholine receptors (nAChRs) are neurotransmitter receptors located throughout the nervous system that contribute to higher-order sensory-cognitive function. Although nAChRs are being studied as potential therapeutic targets for sensory and cognitive disorders, one limitation is that most nAChRs "desensitize" during continuous drug application. However, a subset of nAChRs—α2 nAChRs—exhibits little desensitization, which could be especially useful for therapeutic use. Our study sought to determine the distribution of neurons expressing α2 nAChRs in the mouse auditory cortex (ACx), focusing on laminar position and co-expression with somatostatin (SOM), vasoactive intestinal peptide (VIP), and parvalbumin (PV)—protein markers that identify three major subtypes of cortical inhibitory neurons. Neurons with α2 nAChRs were distributed nonuniformly across layers of ACx, with 77% expressed in deep layers, 17% in upper layers, and 5% in the middle layer. Additionally, 72% of α2 cells expressed either VIP or SOM, and there was no co-expression of α2 and PV. The majority of upper- and middle-layer α2 cells expressed VIP (68%), whereas the majority of deep-layer α2 cells expressed SOM (64%). These results suggest that α2 nAChRs are expressed in at least two major types of inhibitory neurons with distinct physiological roles. Thus, α2 nAChRs likely mediate different functions in upper and deep layers of ACx, a conclusion that should guide therapeutic applications.

Investigating the Sex-Specific Difference Post Space Radiation Exposure

Manal Usmani

Mentor: Vipan Parihar

Space exploration involves exposure to a radically different environment from Earth, consisting of high energy radiation and, most notably, galactic cosmic rays (GCR). The CNS is particularly sensitive to these space radiations, and exposure of the brain to GCR may elicit earlier onset and/or more severe forms of dementia involving a range of degenerative effects. Current and past research from multiple labs has now provided convincing evidence that space relevant fluencies of charged particles differentially affect male and female mice, where females show a neuroprotective response and retain greater brain function. The current study aimed to elucidate further potential sex-dependent differences in behavioral responses and the underlying mechanisms following cosmic radiation exposure. Novel Object Recognition (NOR) test, immunohistochemical assessment of neuroinflammation, and 3D reconstruction of neurons techniques were used to collect the data in this study. Twelve weeks following Helium (^{4}He) ion irradiation, male mice demonstrated significant deficits in novelty exploration (object or spatial exploration) accompanied by an increased expression of pro-inflammatorily marker HMGB1. Additionally, we determined that as opposed to female cohorts, exposure to ^{4}He ions caused a significant decline of dendritic spine density along hippocampal neurons in male mice. These data indicate that fundamental differences in inflammatory cascades between male and female mice may drive CNS radiation responses that differentially impact the structural plasticity of neurons and neurocognitive outcomes following cosmic radiation exposure. Overall, these results are compelling evidence for establishing the fact that males and females exert a divergent response to space-like irradiation.

Photodegradation of Secondary Organic Aerosols by Long-Term Exposure to Solar Actinic Radiation

Suki Gu

Mentor: Sergey Nizkorodov

Atmospheric particulate matter produced in air by oxidation of volatiles organics is known as Secondary Organic Aerosol (SOA). SOA affects human health and the Earth's climate, but its chemistry is complex and presently not well understood. One unresolved question is whether SOA can be degraded by solar radiation through photochemical processes. Previous experiments have suggested such photodegradation is possible but have not quantified the rate of this process. We carried out

experiments that relied on a quartz crystal microbalance (QCM) to quantify the mass loss rates from different types of SOA that are typical for clean and urban atmospheric environments. SOA was found to degrade rapidly (1–5 % fractional mass loss per hour) and slow down to approximately 1% steadily after 24 hours under UV-irradiated conditions. The mass loss rates were observed to increase at higher relative humidity because volatile photoproducts could diffuse out of SOA faster. The underlying chemical composition of photodegradation was further investigated with high-resolution electrospray ionization mass spectrometry. The compounds in the photodegraded sample had, on average, lower molecular weights and higher extent of oxidation than the compounds in the unphotolyzed sample. In conclusion, condensed-phase photochemistry is an important "aging" mechanism for SOA during long-range transport through the atmosphere. These results will change the representation of SOA in climate and air pollution models that have not previously taken photodegradation into account.

Schedule of Presentations: June 3, 2:00 PM

Time	*Student Presenter(s)*	*Project Title*	*Faculty Mentor(s)*
2:00	**Karyssa Courey** *Psychology* *kcourey@uci.edu*	**What's in the Scale? An Examination of Different Evaluation Scales and their Effects on Biases in Ratings of Professors**	**Michael Lee** *Cognitive Sciences*
2:10	**Jacob VanDrunen** *Computer Science* *jvandrun@uci.edu*	**The Effectiveness of Multidimensional Scaling in the Traveling Salesperson Problem**	**Zygmunt Pizlo** *Cognitive Sciences*
2:20	**Madison Ramos** *Psychology* *madisobr@uci.edu*	**Silver Lining of Disinhibition: The Link between Creativity and Inhibitory Control**	**Susanne Jaeggi** *Education*
2:30	**Isabel Soto** *Sociology* *sotoi1@uci.edu* **Diana Pablo-Ramirez** *Education* *dpablora@uci.edu*	**"I chose to design a car for you because you have always been there for me": Incorporating Students' Language and Identities into the Learning of Physics**	**Hosun Kang** *Education*
2:40	**Bahar Pishdadian** *Psychological Science* *bpishdad@uci.edu*	**Predictors of Leadership: An Analysis of Academic Achievement, Emotional Intelligence, and Personality in College Students**	**Susan Charles** *Psychological Science*
2:50	**Isaac Bisla** *Psychological Science* *ibisla@uci.edu*	**The Risk and Protective Factors associated with Recidivism among Juvenile Offenders**	**Elizabeth Cauffman** *Psychological Science*
3:00	**Maria Isabel Ramos Martinez** *Psychology* *miramosm@uci.edu*	**A Psychosociocultural Analysis of Latina Undergraduate Single Mothers' Persistence in Higher Education**	**Jeanett Castellanos** **Belinda Campos** *Social Science*
3:10	**Teresa Ramirez** *Chicano/Latino Studies, Political Science* *tramire2@uci.edu*	**Serving for an Education: The Life of Latino Veterans in Higher Education**	**Glenda Flores** *Chicano/Latino Studies*
3:20	**Spencer JaQuay** *Psychological Science* *sjaquay@uci.edu*	**Social Cohesion and Intellectual Synergy: An Exploratory Analysis of Success within Cross-Disciplinary Research Centers**	**Daniel Stokols** *Psychological Science*
3:30	**An Thien Nguyen** *Political Science* *antn10@uci.edu*	**Southeast Asian Deportations: The Role of Asian American Ethnic Organizations and Community Resilience**	**Long Bui** *International Studies*

Spotlight Session IV Abstracts

What's in the Scale? An Examination of Different Evaluation Scales and their Effects on Biases in Ratings of Professors

Karyssa Courey

Mentor: Michael Lee

Evaluation scales, such as student evaluations of teaching (SETs), are widely used to collect information for hiring, promotion, and tenure decisions. Studies have found evidence supporting biases affecting SETs involving gender, grade leniency, interpersonal qualities of the professor, scale type, and scale characteristics. We examine these concerns among student evaluations of professors at the University of California Irvine (UCI) in a quasi-natural experiment. We analyze data from EEE+ EaterEvals—a collection of quantitative evaluations made available to the UCI community—of undergraduate Biological Sciences, Social Sciences, Psychology, and Sociology courses. We find that students use upper endpoints more often when rating female professors compared to male professors in Biological Sciences, Psychology, and Social Sciences. However, ratings for Sociology are mixed, with students on several questions using upper endpoints more often when evaluating male professors. We also find that students use endpoints more often when using the ten-point four-letter grading scale compared to the seven-point Likert-type scale.

The Effectiveness of Multidimensional Scaling in the Traveling Salesperson Problem

Jacob VanDrunen

Mentor: Zygmunt Pizlo

It is commonly assumed that 2D images are represented as 2D Euclidean planes in the human visual system. This assumption has received support from numerous studies in which human subjects produced near-optimal Traveling Salesperson (TSP) tours. Specifically, the human subjects produced TSP tours in a sequence of coarse-to-fine approximations by using a hierarchical clustering (pyramid) representation of the problem. When obstacles are introduced into a 2D Euclidean TSP, the distances between vertices are no longer Euclidean, but human subjects can still produce near-optimal tours, as long as the obstacles are geometrically simple (line segments, L, and C shapes). In this project, we compare the performance of humans on TSPs with obstacles to the performance of a graph-pyramid algorithm on Euclidean approximations of the problems generated by Multidimensional Scaling (MDS), which is often the method of choice for representing cognitive spaces. Our goal is twofold: to evaluate the usefulness of MDS in visual tasks in which the ground truth of the geometrical distances is known, and to test the hypothesis that the visual system produces intermediate, Euclidean representations when presented with a problem that is not Euclidean. Our preliminary results indicate that this model's performance with 3D (but not 2D) MDS approximations is similar to the performance of the human subjects. This suggests that, if the visual system is producing intermediate representations, it may be making use of higher dimensions in its reconstruction.

Silver Lining of Disinhibition: The Link between Creativity and Inhibitory Control

Madison Ramos

Mentor: Susanne Jaeggi

Current literature suggests that disinhibition, or the lack of ability to inhibit behavior response towards irrelevant content, may benefit creativity. Creativity can be divided into two sub-categories: convergent and divergent thinking. In the presence of a problem, convergent thinking is the ability to integrate information to arrive at a single conclusion. Meanwhile, divergent thinking is conceptualized as the ability to arrive at multiple conclusions. Previous research has implicated the possibility that disinhibition can be simulated in neurotypical adults if they endure difficult inhibitory control tasks for long durations. It was found that individuals with simulated disinhibition tend to do better on creative tasks requiring divergent thinking skills but not on tasks requiring convergent thinking skills. The current study investigates the possibility that simulated disinhibition benefits creative thinking skills. We expect to see simulated disinhibition manifest as slower reaction times and poorer accuracy on difficult inhibitory control tasks. As individuals become more disinhibited, we expect to see an improvement in their performance on divergent thinking tasks, and a decline in their performance on convergent thinking tasks.

"I chose to design a car for you because you have always been there for me": Incorporating Students' Language and Identities into the Learning of Physics

Isabel Soto, Diana Pablo-Ramirez

Mentor: Hosun Kang

In this research-practice partnership, researchers collaborated with high school physics teachers to co-design and implement an inclusive curriculum which leveraged students' interests and identities and provided pathways for meaningful learning. In their momentum unit, students explored how to prevent injury in car crashes by designing cars for their loved ones. Students designed their car and wrote a letter detailing how it would keep their loved one safe. We examined 61 letters to understand how this alternative assessment enabled

students to connect with what mattered to them in relation to science content, and express their identities. Preliminary analyses reveal three patterns. First, students used physics content to communicate safety features of their designed car. Around 90% of students integrated safety features they learned in class into the design of their loved ones' car, and 70% explicitly connected those safety features to physics' content, such as Newton's laws, momentum, and force. Second, students' affection towards their loved one was integrated into their learning experiences, such as describing how the designed car met their loved ones' needs. Finally, students used various forms of communication, including Spanish, sense of humor, and drawing to demonstrate the design and safety features. These findings illustrate a new avenue for students to demonstrate their learning while connecting to their identities and what matters to them. It pushes the learning they experience in their physics classroom to real-world situations and affords them opportunities to "be car engineers" and critically think about how to protect people in case of collisions.

Predictors of Leadership: An Analysis of Academic Achievement, Emotional Intelligence, and Personality in College Students

Bahar Pishdadian

Mentor: Susan Charles

Selecting and hiring effective individuals for leadership positions in businesses and organizations is a critical aspect of organizational success. Although college graduates make up a large portion of applicant pools for companies and organizations, no known studies have examined college student leadership qualities and their potential predictors. Organizations may benefit from having knowledge about the qualities and behaviors related to leadership behaviors among college students so they can better analyze each applicant's potential and career trajectory. The present study examined leadership and academic achievement, personality, and emotional intelligence in a sample of college students to better understand the individual and combined strength of these factors in relation to leader behaviors. UCI undergraduates (N=65) completed several questionnaires assessing leadership practices and behaviors, emotional intelligence and personality. Results revealed higher levels of conscientiousness, extraversion, and openness, each significantly associated with leadership practices. For emotional intelligence, the "Understanding Emotions" branch was observed to be a marginally significant predictor of the "Enable Action" facet of leadership practices. Academic achievement was unrelated to leadership. Findings support the current use of personality questionnaires in the hiring and application process of the current job market.

The Risk and Protective Factors associated with Recidivism among Juvenile Offenders

Isaac Bisla

Mentor: Elizabeth Cauffman

Although prior studies have examined the predictors of recidivism among juvenile offenders, these studies are limited in several ways (*i.e.* lack of attention to potential protective factors; limited follow-up windows; narrow definition of recidivism). Additionally, no prior studies have examined the factors that distinguish the first-time juvenile offenders who eventually re-offend from those who desist completely after their first arrest. The present study overcomes these limitations by examining risk and protective factors for recidivism among male adolescents who were recently arrested for the first time. Specifically, we were interested in identifying the factors that identified which juvenile offenders re-offended within five years of their first arrest and which did not. Data were drawn from a racially/ethnically diverse sample of male adolescents enrolled in the Crossroads study (N=1216). Participants were interviewed immediately after their first arrest ("baseline"), followed by six biannual assessments and two annual assessments. Several risk and protective factors were self-reported at baseline. The outcome, recidivism (self-reported illicit drug use, self-reported offending, official arrest records), was measured at all time-points. The results revealed that youth who re-offended (N=1065; 88%) at least once were younger, more aggressive, had more delinquent peers, and had more extensive criminal backgrounds at baseline. Youth who desisted completely after their first arrest (N=140; 12%) had greater parental monitoring, more positive aspirations for future success, greater future orientation, and greater motivation to succeed**.** Findings highlight a need for family-based interventions that aim to reduce risk factors and promote protective factors as a strategy for preventing recidivism among first-time-juvenile-offenders.

A Psychosociocultural Analysis of Latina Undergraduate Single Mothers' Persistence in Higher Education

Maria Isabel Ramos Martinez

Mentors Jeanett Castellanos and Belinda Campos

Research on Latina undergraduate single mothers in higher education is very scarce. Research on the group showcases the impact of the intersection of identities (*e.g.*, low income, Latinx, female, motherhood) for Latinx mothers pursuing higher education. For the purpose of this qualitative study, the Psychosociocultural Framework was used to examine how psychological, social, and cultural factors influence their persistence in higher education. Nine Latina undergraduate single mothers were interviewed. All participants identified as female, low-income, and first-generation college students. Transcribing

interview data to develop basic themes, 27 themes emerged showcasing unique Latina single mother educational persistence processes. Prominent themes include self-awareness of priorities, sacrifices to meet children's needs, mom guilt, mixed pregnancy reactions creating a push to succeed, and pride of the family. Consistent with previous research, challenges include being the first in the family to attend higher education and parents' having limited social capital. Directives for higher education institutions to further support Latina undergraduate single mothers in higher education are provided and research implications are highlighted.

Serving for an Education: The Life of Latino Veterans in Higher Education

Teresa Ramirez

Mentor: Glenda Flores

In recent years, Latinx enrollment in the military has experienced a significant growth. In 2017 the Hispanic enlistment rose from 25% to 36%. Previous scholarship has focused on the increasing numbers of Latino military enrollment and how economic and social disparities have impacted the growth of enlistment. Despite studying the characteristics that have propelled such growth, little is known about how having served in the military affects the lives of Latino veterans. Drawing on six in-depth interviews, the goal of this study is to create a comprehensive insight into the life experiences of Latino veterans who pursued a higher education post service. Looking at childhood, military service and higher education I found that participants who grew up in low socio-economic communities and had working class parents were more susceptible to enlisting in the military rather than pursuing a college degree. In addition, factors like a hard reintegration process and lack of opportunities are moving factors to pursue higher education.

Social Cohesion and Intellectual Synergy: An Exploratory Analysis of Success within Cross-Disciplinary Research Centers

Spencer JaQuay

Mentor: Daniel Stokols

This study explored the various components that create a successful cross-disciplinary collaborative center, focusing on three key variables: (1) the center mission, (2) criteria of success, and (3) activities that promote both social cohesion and intellectual synergy. Thirteen directors (69% Male, 31% Female) of University of California, Irvine (UCI) interdisciplinary (ID) research centers affiliated with both STEMM and Non-STEMM schools participated in the study. The years of operation for participating centers ranged from 5–37 years, while the types of units included School Centers, Campus Centers, Organized Research Units, Special Research Units and Multi-Campus Research Centers. Using a quota convenience sample, directors were recruited via email invitations. Semi-structured interviews lasted roughly one hour and addressed a broad array of topics. Due to time and resource constraints, a subset of six interview sessions and three key variables are reported in the results. The findings revealed that the success metrics emphasized by the various centers were strongly influenced by the nature of their core missions. Additionally, many novel activities that promote both social cohesion and intellectual synergy were identified. The findings suggest several directions for future research on the organization and success of ID research centers.

Southeast Asian Deportations: The Role of Asian American Ethnic Organizations and Community Resilience

An Thien Nguyen

Mentor: Long Bui

As the largest refugee community ever resettled in the United States, Southeast Asians from Cambodia, Laos, and Vietnam face final orders of deportation due to repatriation reversals. Many Southeast Asian refugees in the U.S. received minimal support to resettle. Despite Southeast Asian refugees' progress, the U.S. deportation system and its recent applications pose profound, institutional, participatory, and integration implications. The current U.S. immigration policies are re-traumatizing Southeast Asian communities by deporting them back into the circumstances and governments that persecuted them in the first place. Utilizing the Theory of Community Resilience, this study examined how Asian American ethnic organizations mobilize and navigate the unpredictable policy environment of deportation that disproportionately impacts Southeast Asian refugees. Qualitative research methods, including in-depth community leader interviews and observations and field notes, revealed how community resilience is fostered to defend Southeast Asian refugees facing deportation conditions. Through analysis of data, including constant comparison analysis, enumeration, themes, model and peer validation, the research revealed the different individual, community, and organizational factors that operate collectively to influence and impact the resiliency of the Southeast Asian community. These findings illustrated a nuanced understanding of how specific variables contributed to the educational knowledge, institutional capacity, community alliances, and integration methods implemented by these ethnic Asian American organizations. Research and practical implications included only the perspectives of key informants and the barriers of soliciting engagement from community actors.