

DU Undergraduate Showcase: Research, Scholarship, and Creative Works

Abstracts

MILITARY MASCULINITIES AND HONORARY MEN: A COMPARATIVE ANALYSIS OF UNITED STATES AND UNITED KINGDOM APPROACHES TO IRAQ SECURITY SECTOR REFORM

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The 2003 Iraq War marked the first time the United States and United Kingdom deployed gender-specific units in support of active combat operations. As manifestations of changing gendered norms within American and British defense institutions, these Team Lioness units became symbolic of defense transitions to a more diverse fighting force for the future. Following the Iraq War, the United States and United Kingdom were authorized as governing entities over the post-conflict Security Sector Reform process. Responsible for reconstructing Iraqi defense institutions, Coalition US-UK forces focused reconstruction efforts on addressing the immediate security needs of the country. To this end, prior feminist literature has criticized the lack of formalized gender-inclusive policies in such post-conflict spheres given the prominence of Team Lioness units during the war itself. Such debates, however, ignore the broader consideration of how gender impacts post-conflict reconstruction. More specifically, there remains the question of how United States and United Kingdom defense institutions perform gender and to what extent such normative cultures impacted Security Sector Reform efforts in post-conflict Iraq. Thus, utilizing a Feminist Institutionalism theoretical perspective, this research will investigate the militarized masculinities of US and UK fighting forces embodied within defense behaviors and policies. Based on a qualitative descriptive analysis of United States and United Kingdom Women, Peace, and Security legislation, alongside interviews with five former gender advisors and servicemembers, this research investigates how gendered normative patterns can help explain American and British approaches to post-conflict reconstruction in Iraq.

LATINX STIGMA, SCULPTURE INFORMED BY STEREOTYPES

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Latinx/Latino stereotypes are a common, casual aspect of contemporary life in the United States. By conducting research into Latino / Latinx stereotypes, local resources in Denver and at DU, this data will be translated as a tangible, large scale sculpture. By engaging with what appears to be welcoming sculpture, a closer look will encourage contemplation about stigma, assumptions and stereotypes.

SPECTROPOLARIMETRIC ANALYSIS OF THE SUPERNOVA M12045

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As a massive star nears the end of its lifetime, its core contracts and heats, producing helium, carbon, oxygen, neon, silicon, and iron through nuclear fusion. Since iron is the heaviest element that can be fused in a star, the force produced by nuclear fusion can no longer act against gravity and the star energetically collapses and explodes, spewing clouds of elements and producing a supernova. These events are particularly exciting and important as supernovae are one of the most dominant sources of elements in our universe and many of the elements in our bodies and on Earth were once supernova remnants. By analyzing spectropolarimetric data, our team is able to extract information about the structure of supernova explosions that are located at an inconceivably substantial distance away from us. Our data comes from the Supernova Spectropolarimetry Project, which is a collaboration between our lab, San Diego State University, and the University of Arizona. The observatory at UArizona collected multiple epochs of spectropolarimetric data for over 100 supernovae shortly after discovery. Throughout the summer of 2022, I utilized Python to analyze a type Ib supernova discovered in 2014 named M12045, which lives over fifty million light years away in the barred spiral galaxy NGC 4080. Supernovae are classified according to their spectral features, and type Ib supernovae are characterized by strong helium lines and no hydrogen lines in their spectra. My analysis is consistent with this classification as the most prominent features in the spectra for M12045 were the helium 5876Å and 7065Å lines. Additionally, we saw the signature of an oxygen doublet at 6300Å and 6363Å emerge in later epochs. Plots of the polarization components with velocity also show an asymmetrical explosion geometry as they are nonlinear. This ongoing research greatly contributes to our understanding of supernova explosion mechanisms.

METHODS IN UNDERGRADUATE COMPUTER ETHICS EDUCATION

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The field of computer ethics examines the applied philosophy of best practices, guidelines, and values in the use of computers. This includes anything that can be done with a computer, like machine learning, language processing, writing algorithms, or how those are applied. The application and use of these programs can have detrimental real-world consequences. Already there have been major concerns raised about the risk new technologies pose by worsening inequality, reinforcing bias, and spreading misinformation. However, these potential ethical consequences are not always obvious or easy to see when complex systems are developed. It is therefore crucial that computer scientists learn early how to recognize and evaluate their work through an ethical lens. Towards this end it is essential to integrate ethics in the computer science curriculum. Computer science students, especially those at the university level, represent the future of computer science work and will undoubtedly help shape the future of the technological world. My work is a review of current methods in undergraduate computer ethics education that investigates best practices of integrating ethics into the computer science curriculum, examines how current students learn computer ethics, explores student perspectives, and suggests practical use cases on how ethics can be integrated within the computer science program at the University of Denver.

INDUCTIVE ANALYSIS OF MEDIA NARRATIVE REGARDING 2020 GEORGE FLOYD PROTESTS IN MINNESOTA

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My project aims to examine how two newspapers in the Twin Cities covered the George Floyd Protests of 2020, and how that coverage changed over time. As a resident of Minnesota, I was at the epicenter of these events, and they had a marked impact on my interests and plans going forward. These protests inspired my choice of major and future field, and I wanted my final project to reflect the impact they've had on me. Given the prevalence of research regarding the origin and outcome of these events, I found a niche that allowed me to examine them from a new angle. My project itself centers around two newspapers, both locally distributed in the Twin Cities, the Minneapolis Star Tribune, and the Twin Cities Pioneer Press. Using these papers, I aimed to determine how the actors present, namely the protesters, the police, and city or state officials, were narratively presented, and how that presentation changed over time or differed between papers. To this end, I read every article containing the words "George Floyd" and "Protest" between two set dates and, using an inductive scheme I created as I read, coded each for the presence of certain words or phrases I deemed to be representative of defined perspective. Collating this data has shown me that both papers marched in rough lockstep through June, where their coverage began to differ. Namely, the Pioneer Press, a more conservative outlet, leaned heavily into covering property crime and portraying the protesters as criminal, while the Star Tribune began to center their coverage on the positive changes brought to the city. Using this research, I hope to advance the larger retrospective on these events by providing a methodology that can be applied to other media outlets, and can be referenced for other cities.

EFFECTS OF RED DRAGON FRUIT (HYLOCEREUS POLYRHIZUS) EXTRACT ON SPINAL MOTOR NEURON SURVIVAL AND GLIOSIS IN THE G93A MUTANT HSOD1 MOUSE MODEL OF ALS

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Amyotrophic lateral sclerosis (ALS) is a fatal disorder characterized by progressive degeneration of motor neurons due to various factors such as inflammation, oxidative stress, and mitochondrial dysfunction. Betacyanins are a type of nutraceutical found in red dragon fruit which have been shown to demonstrate anti-inflammatory, antioxidant, and free-radical scavenging properties. These features of betacyanins indicate that they could be beneficial in slowing disease progression in ALS. This study explored the therapeutic effects of red dragon fruit extract (DFE) on spinal motor neuron survival and gliosis in a transgenic mouse model of ALS (G93A hSOD1). The groups consisted of three sex-matched littermates, two G93A hSOD1 mutant mice, and one wildtype (WT) control mouse. The treated ALS mouse received DFE ad libitum (5% v/v in water), and the other mutant and WT got regular water. All of the mice were euthanized when the untreated mutant reached end-stage of the disease (at approximately 120 days of age), when their hind limbs are paralyzed, and it cannot flip over when put on its back. Lumbar spinal cord tissues were collected and immunostained for astrogliosis, microgliosis, and alpha motor neurons. Each staining method was done to compare how the DFE might have a protective effect on the histopathological symptoms observed in ALS. The stained tissue was imaged using a fluorescent microscope, then quantified to compare the number of alpha motor neurons and gliosis between the treated and untreated ALS mice. The treated G93A hSOD1 mice show less inflammation and a higher number of alpha motor neurons compared to the untreated mutants, indicating that DFE could be a novel therapeutic treatment for ALS.

TRADE WARS, COVID-19, USMCA, AND PROTECTIONISM: EXOGENOUS FACTOR INFLUENCE ON U.S- MEXICO SUPPLY CHAINS IN THE AUTOMOTIVE INDUSTRY

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This research explores the presence of COVID-19, the U.S-China trade war, and the implementation of NAFTA as USMCA, have had on U.S.-Mexico trade relations focusing on the automotive industry. With rising trends of protectionism in international trade, this research focused on the language that Tesla and General Motors company sites in Mexico used from 2021 to March 2023 in their released articles to the public and how frequently the variables of COVID19, the U.S China trade war, USMCA and protectionism were discussed. Articles in both Spanish and English were included in this analysis. It is of particular importance to focus on the automotive industry as it is the largest industry in trade for Mexico with the U.S. In the 2021-2023 period, the Mexico General Motors and Tesla company websites collectively released 97 articles. The sample greatly consisted of articles from General Motors. However, because the presence of General Motors is much more established in Mexico than is Tesla's this is logical. The presence of these exogenous variables of COVID19, USMCA, U.S China Trade War, and rising protectionism caused major impacts in the global economy. Through content analyses of the released media articles from General Motors and Tesla, it was found that these factors which deeply impacted the global economy are being discussed in a smaller level of automotive supply chains.

VICTIMS OF TERRORISM IN THE BASQUE COUNTRY THROUGH TESTIMONY AND MEMORIALIZATION

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The Basque Country, a region of northern Spain home to a unique language and thousands of years of history, has been riddled with an independence movement since the turn of the 20th century. In 1959, ETA (Euskadi Ta Askatasuna, a phrase in the Basque language that stands for Basque Homeland and Freedom), a Basque terrorism organization, emerged. While exercising violent means in the fight for independence, they took the lives of more than 800 individuals, ranging from politicians to children. Since the 2011 cease-fire and the official disbandment of the organization in 2018, the Basque Community has been faced with the issue of how to recover from a state of internal conflict, working to create a historical narrative of what happened throughout the last six decades. In such a context, wherein Basques are fighting against Basques on the grounds of nationalism and independence, the term "victims" deserves an explanation. While the most visible victims of ETA are those that were assassinated or physically wounded, the Basque community as a whole has suffered the consequences of an active terrorism organization — from the families of those murdered to the families of terrorists that were incarcerated in distant prisons, to innocent bystanders caught in the crossfire. Today, streets remain lined with graffiti and posters calling for the liberation of incarcerated terrorists, while family members of those killed by ETA walk the same streets.

EFFECTS OF BIOCHAR ON SHORT TERM GROWTH IN ROCKY MOUNTAIN LODGEPOLE PINE

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Rocky Mountain lodgepole pine (*Pinus contorta* var *latifolia*) is a fire-adapted pine species that has evolved to survive a fire with serotinous cones that open to release seeds at specific temperatures. However, the increased temperature and frequency of modern wildfires has led to decreased germination of lodgepole pines, and a combination of thick stands and recent widespread drought have weakened the immune systems of lodgepole pine, causing increased infestation of mountain pine beetle. As a result, there is a need for improved forest regeneration techniques in lodgepole pine forests. One method of improving revegetation could be through use of a biochar, a carbon-based substance that is produced when woody biomass is burned in a high-temperature environment during a process referred to as pyrolysis. Numerous studies have found that biochar has generally positive impacts on soil health and plant productivity. However, more research is needed on its impact on native plants, especially lodgepole pine and other species with serotinous mechanisms. This study looks to address how different applications of biochar can be utilized in early greenhouse growth of lodgepole pine, the primary step of many revegetation efforts. In the Olin Hall Greenhouse, following a stratification process, we are currently comparing short term (6 months) growth of lodgepole pine seeds sown in potting soil, potting soil incorporated with biochar, and biochar on top of potting soil. Our procedure is based on protocols developed by the Colorado State Forest Service nursery, the Native Plant Network's Propagation Protocol Database, U.S. Forest Service studies, and other academic studies. In our initial observations following germination, soil plots with biochar amendments are more successful in promoting early growth of lodgepole pine. If this holds true throughout the study, there would be valuable implications on revegetation efforts for an ecosystem increasingly challenged by a changing climate.

INVESTIGATION OF SEPTINS IN DROSOPHILA MELANOGASTER

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Septins are relatively under-researched binding proteins that play important roles in the development and physiology of cells in most organisms. Septin proteins are known to support the cytoskeleton of cells, mainly the microtubules and actin filaments, aiding in process such as cell division, cell-cell adhesion, and membrane trafficking. Through my investigation of septins in the common fruit fly, *Drosophila melanogaster*, I aimed to determine and film with a confocal scanning microscope the location of an important septin, Septin 2, and how the lack of another septin, Septin 4, would affect cells. These experiments were performed on the embryos of *Drosophila melanogaster* flies during the process of germ band extension, a period of rapid cell division where the body segments of the fly begins to form. Through my experiment, I was able to determine the location of Septin 2 within the cells, being widely spread throughout the cell, though being particularly focused in the membrane of each cell. I also discovered that cells that lack Septin 4 also have a greatly decreased amount of Rab35 puncta, a grouping of developmental proteins found near the surface of the cell. This has led me to believe that septins play an important role in keeping the structural integrity or the development of Rab35 puncta. This project allowed me to learn important laboratory techniques, deepen my knowledge of the development of cells, and discover what role septins play in that development.

GENETIC INTERACTIONS OF PROTEINS ASSOCIATED WITH FRAGILE X SYNDROME

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Fragile X Syndrome (FXS) is a genetic disorder that causes neurodevelopmental issues in humans and is the most common single gene mutation causing autism. The loss of the expression of Fragile X Mental Retardation protein (FMRP) is a principal cause of FXS but surprisingly little is known about how FMRP functions in cells. One fact that is clear is that FMRP associates with additional RNA binding proteins (RBPs) to function in neurons. The focus of my research is to explore the genetic interactions of FMRP and another RBP, Syncrip in the *Drosophila melanogaster* model organism. Based on unpublished studies in the Barbee lab, it has been identified that Syncrip and FMRP interact at the physical level, meaning they bind to each other directly. Furthermore, a study by McDermott et al. has shown that loss of function of either /or FMRP and Syncrip results in similar phenotypes. Lastly, my previous work in the Barbee lab has proven the colocalization of FMRP and Syncrip in cytoplasmic granules of a neuronal cell line. This evidence strongly suggests the possibility of a genetic interaction between FMRP and Syncrip affecting the same genetic pathways. I hypothesize that Syncrip and FMRP interact genetically to control synaptic development in neurons.

EVALUATING THE PRIVACY AND SECURITY PERSPECTIVE OF OLDER ADULTS TOWARDS ONLINE DATING

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The use of online dating applications has become increasingly popular among younger populations, but older adults aged 65 and above are also engaging in this practice. However, the provision of personally identifiable information (PII) required by these applications raises serious privacy and security concerns, particularly for older adult users who are more vulnerable to online abuse and scams. This research aims to investigate the implications of these challenges in older adults use of online dating applications. The approach involves mixed methods research, including a survey-based crowdsourcing experiment and semi-structured interviews with older adults who have used online dating applications. The survey-based experiment will seek to collect quantitative data on older adults' attitudes towards privacy and security. The semi-structured interviews will explore older adults' experiences and perspectives on privacy and security in greater depth. The expected results will provide insight into the privacy and security challenges faced by older adults, including their attitudes towards sharing PII and experiences with online abuse and scams. This research will also explore potential solutions for mitigating these risks, including the development of tools and interventions to enhance privacy and security in online dating applications. Ultimately, this research can contribute to the development of safer and more secure online dating applications for all users. It should be noted that this research is still in progress, and we are currently working on building out the surveys to be sent out to the participants.

EVALUATING THE VARIOUS FACETS OF ACCOUNT REMEDIATION APPROACHES OF POPULAR USER-CENTERED INTERACTION SERVICES

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This project aims to evaluate the various facets of account remediation approaches of popular user-centered interaction services. The motivation behind this project is the increasing dependence of individuals and businesses on online services for various purposes, making online security and privacy a significant concern. Despite the increasing need for secure online services, there is a lack of research on the effectiveness of account remediation approaches implemented by user-centered interaction services.

REPORTED SCHOOL CLIMATE FOR DIVERSITY AND FEELINGS OF BELONGING FOR LATINE STUDENTS: MODERATION OF FEELINGS OF BELONGING BY PARENT'S ACADEMIC ASPIRATIONS AND EXPECTATIONS

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School belonging, the extent to which students feel accepted, respected, included, and supported by others in school (Goodnow, 1993), has been shown to impact children's social-emotional well-being as early as elementary school (Castro-Kemp et al, 2019). Students with a higher sense of school belonging demonstrate more school engagement, and intrinsic motivation (Byrd & Chavous, 2011). A positive school climate, the emphasis placed on norms and values of race and interracial interaction in the school atmosphere (Green et al., 1988), has been shown to protect Latinx youth's feelings of belonging by buffering the deleterious impacts associated with ethnic discrimination (Heikamp et al., 2020; Roche & Kuperminc, 2012). Additionally, parental aspirations and expectations can act as moderating factors on the student's feelings of belonging (Vang et al., 2022).

The purpose of this study is to examine associations between teachers' perceptions of school climate and 3rd-5th grade Latinx children's school belonging. Previous research investigating Latinx students' feelings of belonging and associations with school climate has focused on adolescent populations, therefore, this study will extend the literature by investigating these associations with children in middle childhood. We hypothesize that Latinx students will report more school belonging when teachers report a positive school climate compared to a negative school climate. Additionally, considering previous research has shown students' parental involvement can protect minoritized students' feelings of belonging, we predict that parental involvement will moderate the association between teachers' perceptions of school climate and Latinx children's school belonging.

WRITING ABOUT LITERATURE AT THE UNIVERSITY OF DENVER, 1997–2002

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In the 1990s, debates over the nature of writing education at the undergraduate level erupted across North America. These discourses ultimately proved foundational to the evolution of the modern writing curriculum, generating novel approaches to the writing course. However, although theoretical conversations concerning writing education at the turn of the century abound, little research into the practical impacts of composition pedagogy during this time period exists. To understand the implications of these debates over composition theory, this research project preserved, investigated, and analyzed the University of Denver's archival material pertaining to first-year writing courses taking place between 1997 and 2002, while examining the interplay of these diverse composition pedagogies in a classroom setting. The project worked to reconcile and recontextualize composition theory with the practices and content of writing education at the University. Ultimately, this research project produced insights into the practices and content utilized in the University of Denver's first-year writing courses in relation to composition theory.

CONTRIBUTION OF THE LOADING-UNLOADING BALANCE MECHANISM WITH VARIOUS FOOT PLACEMENTS

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Balance and motor control are affected in concussed athletes. Despite the use of standing balance tests in concussion diagnosis, the required foot placements are often inadequate for the outcomes to be sensitive to concussion recovery. Winter et al (1996), suggested that the primary motor mechanisms used can be determined from additional foot placements. To our knowledge, these additional foot placements have not been pursued in concussion research or another field. The objective of this research is to examine whether a continuum of balance motor mechanisms exists during various foot positions. We hypothesize that as the difficulty of each stance increases, one's natural reliance on the loading and unloading mechanism of balance will increase. Understanding this information will allow concussion researchers to utilize appropriately difficult stances while also evaluating the overreliance on irregular motor systems. Each participant stood still in various foot positions repeated on the opposite foot with eyes open and closed (side by side (0 deg), 30 deg, 45 deg, 60 deg, and tandem (90 deg)). A force platform under each foot sampled at 1000 Hz, filtered at a 6 Hz cut-off was transformed into the center of pressure (COP). These COP signals were mathematically computed into two mechanisms: 1) coordinated joint control (COPc) and 2) loading and unloading each limb (COPv). The reliance on the load/unload mechanism was assessed using the total range of the COPv. Our initial results demonstrate that the range of COPv gradually increases from 0 to 90 degrees. This finding indicates a systematically increased involvement of the loading/unloading mechanism with increasingly challenging stances. These methods will allow therapists treating concussions to recognize the level of motor compensation present. Restoring the typical motor mechanism of coordinated joint control—instead of loading/unloading—in a patient could be an intervention target for athletes recovering from a concussion.

IDENTIFICATION OF THERAPEUTIC TARGETS FOR PARKINSON'S DISEASE

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Our lab has successfully identified the aggregation-prone amino acid sequence that is important for the aggregation of α -Synuclein protein (aS), which is the process responsible for production of Parkinson's Disease (PD) phenotypes, with symptoms such as impaired motor functions. My goal is to further confirm the role of these sequences in aggregation and identify individual amino acid(s) within that sequence that are important for aS aggregation. This will be accomplished using design of aS variants with point mutations, created by substituting alanine for amino acids within the aggregation-prone sequence. Thioflavin T (Th T) fluorescence assays, transmission electron microscopy (TEM), cellular assays, and confocal microscopy will then be performed on the purified aS variants. This study will further develop understanding of the role of individual amino acid(s) in facilitating aS aggregation. In addition, this will advance identification of potential therapeutic targets for the treatment of PD. With this amino acid sequence identified, synthetic molecules can be synthesized to bind and potentially inhibit aggregation of aS.

DETECTION OF GASEOUS ETHYLENE USING BODIPY ETHYLENE PROBES WITH APPLICATIONS IN PLANT BIOLOGY

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Ethylene is a gaseous plant hormone that plays a large part in plant growth; by monitoring and detecting concentrations of gaseous ethylene, information on fruit ripening or flower growth can be provided and analyzed. This project proposes a gaseous ethylene detection system with applications in various fields, such as plant biology, environmental science, agriculture, and horticulture. Key objectives of the detector are accuracy, stability, speed of data retrieval, ease of operation, and simplicity. The project allows for an understanding of the most optimal detection set up that matches the objectives listed as closely as possible. The Michel Lab has developed several ruthenium based Bodipy Ethylene Probes (BEPs) based on olefin metathesis with varying kinetic and stability profiles, however these have almost exclusively been evaluated in solution to date. Initial evaluations will function similarly to the preliminary tests but will consist of evaluation of different substrates such as silica or variations of alumina, varying the amount of the probe used, adjusting spot sizes of substrate spotted on thin-layer chromatography (TLC) plates, and changing solvents. Thus far, data has been collected on at least 8 variations of probes, 2 solvents, various probes amounts and concentrations, and different substrates ranging from TLC plates to printer paper. The probes tested so far include BEP-4, SIPr-BEP-4, Neo-BEP-4, Phenoxy-BEP-4, 2-Ad-BEP-4, Con-BEP-4, SIPr-Ox-BEP-4, and Ox-NF5-BEP-5.

SELECTION FREQUENCY & AFFECTIVE OUTCOMES OF REAPPRAISAL TACTICS

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Cognitive reappraisal is an effective emotion regulation technique, but there is a lack of research focused on the selection frequency and affective outcomes of specific cognitive reappraisal tactics. The present study evaluated the selection frequency and affective outcomes of three cognitive reappraisal tactics: change current circumstances, change future consequences, and acceptance. Forty-seven participants completed a computerized emotion regulation task in which they reappraised ("decrease" condition) or passively viewed ("look" condition) one hundred-forty-four negative images. Following each image, participants were asked to rate how negative they feel, and to indicate how they changed the meaning of the picture. Results indicate differences in the frequency of tactics used across conditions ($F(1.70, 44) = 128.30, p < .001, \eta p^2 = .75$). For the "decrease" condition, the change current circumstances tactic was selected most frequently, while for the "look" condition, the acceptance tactic was selected most frequently. For affective outcomes, the "decrease" condition resulted in better affective outcomes compared to the "look" condition ($F(1, 5801.80) = 11.70, p < .001$) with the change current circumstances tactic being the most successful at decreasing negative emotions. Knowing which reappraisal tactics are most frequently selected, and their affective outcomes may help us better understand how to improve people's ability to use reappraisal to achieve their emotional goals.

THE ROLE OF EARLY POSTPARTUM DEPRESSION SYMPTOMS ON HEMODYNAMIC RESPONSE TO INFANT CRY AND PARENTAL BEHAVIORS

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Gestational parents experiencing clinical depression during the first postpartum year have demonstrated dampened neural and behavioral responses to infant stimuli. There is limited literature surrounding these trends in subclinical populations during the immediate postpartum period. A total of 58 gestational parents, 2.58 ± 2.53 weeks postpartum on average, reported EPDS ($m = 4.76 \pm 4.27$) and completed a 10-minute interaction with their infant in which behavioral responses were coded using the Emotional Availability scale. Participants completed an additional task using Functional Near-Infrared Spectroscopy that measured hemodynamic response to their own and another infant cry. EPDS was positively correlated with neural activation across channel S3:D4 in the dorsomedial PFC in response to other infant cry ($r(58) = .423, p < .001$) and own infant cry ($r(58) = .261, p = .048$). Higher EPDS score was also associated with increased activation in response to other infant cry across channel S6:D6 ($r(58) = .265, p = .044$) in the dorsomedial PFC and channel S8:D7 ($r(58) = .361, p = .005$) in the dorsolateral PFC. Whereas there was no significant relationship between neural activation and maternal sensitivity, hostile parenting behaviors were positively correlated with neural activation in response to other infant cry across channel S6:D6 ($r(58) = -.327, p = .032$) in the dorsomedial PFC. Results suggest that EPDS can have an effect on hemodynamic response in clinical and subclinical populations, that there is a relationship between neural reactivity and parenting outcomes, and that the relationship between EPDS and parental behaviors may not be capable of measurement in the very early postpartum period. These findings could have important implications for research on the risks of depression symptoms toward the development of parent/child interactions and future work should target early-intervention programs for parents.

FRENCH AS A SUBJECT AND LANGUAGE AT UNITED STATES' UNIVERSITIES

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The United States is continually shaped and influenced by its many comprising cultures and languages. As such, foreign language study has long been an integral component of many primary, secondary, and university level education systems. Both historically and in modern times, one language (other than Spanish) has maintained consistent enrollment rates, particularly at the university level: French. By evaluating different university French departments throughout the United States, this study sought to understand potential distinguishing characteristics that have led to the language's academic success. The study evaluated departmental perspectives through academic research and qualitative staff interviews, as well as student perspectives through a qualitative online survey. These interviews and survey suggest that French as a subject continues to move away from more traditional language study to the study of French's fundamental role in the Francophone world. Both faculty and student perspectives demonstrate an increasing interest in the opportunities that French language makes available. French's increasingly important role in a rapidly globalizing world is a leading catalyst for this shift. Additionally, foreign languages are experiencing significant enrollment decreases at the university level. Many departments hope that this shifting model will attract more students, while it simultaneously embraces the true nature of French's role in the modern world. French's historic prevalence in United States' culture has allowed it to maintain a certain power at many universities, but it still suffers from similar enrollment struggles. Further research is needed to better understand student motivations for enrolling in language courses such as French, as opposed to those that increasingly choose not to. Not only would such research help struggling departments recover enrollments, but it is important for contextualizing cultural and linguistic understandings in an increasingly globalized world.

DO AGE AND DIET INTERACT TO AFFECT FALL WEBWORM PARASITISM?

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Bottom-up (host plant) and top-down (natural enemy) pressures both can affect how insect herbivores select their host plants. Here we investigated which fall webworm (*Hyphantria cunea*, hereafter FW) parasitoids, an important natural enemy for FW, attack FW at different ontogenetic stages in the field on different host plants. To determine whether FW parasitism was dependent on the FW developmental stage, we placed FW early (8-10 days till hatching) and late term (12-13 days till hatching) eggs and 10-day old larvae, and 20-day old larvae at field sites in Boulder, Colorado (USA). We deployed both the eggs and larvae on 4 host plants commonly eaten by FW in Colorado: chokecherry, black willow, narrowleaf cottonwood, and thin-leaf alder. We kept eggs and larvae at the field sites for one week before retrieving these samples. We are currently rearing collected FW eggs and larvae to pupation in the lab and collecting emerging parasitoids. All parasitoids will be identified to the lowest taxon possible. Our results will contribute to understanding the ontogenetic stages that specific parasitoid species attack. Our research will help us to understand the host selection process among parasitoids of a local herbivore.

RACIAL BIASES IN PAIN CARE RECOMMENDATIONS AND THE MODERATING EFFECT OF PROVIDERS' EXPERIENCE WITH DIVERSE COMMUNITIES

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Despite Black Americans reporting greater pain than White Americans (Mechlin et al., 2005; Rahim-Williams et al., 2012), Black Americans' pain is underestimated and undertreated (Mack et al., 2018; Schoenthaler & Williams, 2022). Previous work suggests clinician biases (e.g., implicit prejudice, empathy gaps) may contribute to pain treatment disparities across race (Drwecki et al., 2011; Moskowitz et al., 2012). However, past work has yet to systematically examine pain treatment of multiracial individuals, who may be subject to discrimination documented in monoracial pain care but also may experience unique biases in healthcare settings with implications for equitable care (Chen et al., 2018; Freeman et al., 2016; Kteily et al., 2015). A pilot study conducted with a convenience sample indicated racial bias in pain care recommendations, where Black/White multiracial individuals received the least intensive pain care recommendations. The current work adopts an experimental approach and recruits a sample of pain care providers to investigate clinician biases in pain care for Black, White, and Black/White multiracial hypothetical patients. Pain care providers' experience with diverse communities is examined as a moderator to better understand how diversity exposure may attenuate or exacerbate patterns of racial bias in pain treatment recommendations. In sum, this work investigates patterns of clinician racial biases in pain treatment and potential moderation by experience with diverse patient populations (e.g., Are racial biases in pain care stronger or weaker for healthcare providers serving more diverse communities?). As an aspiring healthcare provider in a sub-field that commonly treats pain (i.e., emergency medicine), it is important to me to better understand and actively contribute to our collective understanding of how racial biases interfere with equitable and just pain care. The goal of this work is to motivate more equitable and higher quality care for all patients.

EVALUATION OF STERIC EFFECTS FOR FASTER BEPS (BODIPY ETHYLENE PROBES)

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Ethylene is a hormone released during key life cycle events in plants and commonly associated with fruit ripening. Recently, the Michel Group has reported fluorescent small molecule probes for the detection of ethylene through a selective reaction-based approach. To improve the sensitivity and selectivity of these probes, it is necessary to synthesize analogues and evaluate how structural changes will influence their photophysical properties such as limit of detection and fluorescence turn-on. A series of advancements upon original BODIPY Ethylene Probes BEP-4 and BEP-5 have provided evidence that faster reaction kinetics results in a probe that is more sensitive to ethylene. To further evaluate this hypothesis, we developed a synthetic route for a target probe BEP-3, with the goal of determining if steric effects would significantly impact ethylene sensitivity. Early photophysical data on BEP-3 demonstrates rapid reaction with ethylene and a turn-on with ethylene similar to previous fast-initiating probes in the Michel Lab. Additional evaluation of the ethylene detection ability of BEP-3 will be presented including limit of detection and kinetic profile data.

MORE THAN A HEADSTONE

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While most American citizens are aware of the overarching history of America's military conflicts, few have salient knowledge about individual veteran's experiences during the periods they served in and the lives they had afterwards. Many more veterans have had their remains sit unclaimed for decades in funerary homes, waiting for honorable burial. Through in-depth research, fact finding and interviews with the local Vietnam Veterans of America Chapter 1071 as well as the surviving family members of veterans buried at Fort Logan National Cemetery, my research with the DU History Department has helped collect these untold veterans' stories and deliver their remains for proper burial. These veteran's experiences have been assembled in More Than a Headstone, a part of the National Cemetery Administration's Veterans Legacy Program. In collaboration with Vietnam Veterans of America Local 1071, the DU History Department has been collecting veterans remains and stories from the Denver Area. (Visit Morethanaheadstone.org)

HUMAN NEURON MODEL OF RETT'S SYNDROME

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Rett Syndrome is a neurodegenerative disorder that affects between 1 in 10,000 and 1 in 15,000 females, and is lethal in males. Symptoms of Rett syndrome include loss of speech, developmental delay, abnormal gait, breathing dysfunction, and seizures. While there is no cure for Rett Syndrome, this disorder is known to be caused by a mutation of the gene that codes for methyl CpG binding protein 2 (MeCP2). Much research has been done on the disorder and the mutated gene, but very little has been in human models. This research utilizes human induced pluripotent stem cells (hiPSCs), which have been modified to contain mutated MeCP2 genes through CRISPR technology, in order to examine the key differences between healthy human excitatory neurons (wild type), and human neurons affected by the mutation that causes Rett syndrome. Although more data is necessary, preliminary results are consistent with the current research, and shows Rett Syndrome neurons are hyperactive in the absence of stimulus compare to wild type neurons, and also influx more calcium than wild type do when exposed to the same stimulus. These findings help confirm pilot findings in human models and add to the growing field of knowledge about the mechanism that causes Rett Syndrome. Further studies that build on this research will hopefully one day lead to a treatment or cure for this disorder.

NATO'S INTERVENTION IN KOSOVO: AN INTERSECTIONAL GENDER ANALYSIS

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In 1999, NATO began a widespread bombing campaign and peacebuilding mission in Kosovo to thwart Milosevic's regime from spreading its violence across Eastern Europe. The intervention was justified after the fact to end the suffering of the tens of thousands of women subjected to sexual and gender-based violence, these women paradoxically faced stigma and marginalization for voicing their experience of the violence they endured. The aim of this project is two-fold. First, to determine whether NATO's intervention in Kosovo considered the disproportionate impact of sexual and gender-based violence on women. Second, is to uncover if violence against women was at all considered by NATO leaders when intervening and subsequently rebuilding the country. United States-led international organizations such as NATO often escape criticism for their policy decisions. This is where the significance of the project lies: the lack of women-centered peacebuilding was a major oversight in the intervention of Kosovo and deserves to be examined by the academic community.

JEWISH BASEBALL PLAYERS AND THEIR IMPACT ON THE LESSENING OF ANTI-SEMITISM IN SPORTS IN THE 1930S – POST WORLD WAR II ERA

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For my project, I needed to further my research for my history capstone thesis on whether Jewish baseball players of the 1930s and 1940s contributed to Jews integrating into American culture. In my thesis, my goal was to explore the role of Jewish baseball players in challenging negative stereotypes of the Jewish community in the 1930s to post-War era. I mainly wanted to investigate whether leisure activities such as watching baseball was able to lessen antisemitism and allow Jews to become perceived as secular figures instead of racially different. Jewish players such as Hank Greenberg became popular figures through their play, so I wanted to see if these players became perceived as secular and helped lessen antisemitism in America.

My approach to the project was to investigate primary sources such as newspaper articles, interviews, and memoirs to learn if there was a change in attitudes towards Jewish Americans and Jewish players from the 1930s to the post-War era. In my findings, I discovered that Jewish players began to become treated as secular and became perceived as American instead of racially different after World War II. While a lot of this can be attributed to Americans understanding the dangers of antisemitism from the rise of Nazi Germany and Jews making a name for themselves through their work in the clothing and garment industries, I also discovered that baseball played a role in antisemitism lessening. This was due to players such as Hank Greenberg becoming popular and secular figures instead of racially different figures whose worth was based on their religion. The proof can be seen in the media slowly ending their racialization of Jewish players. The implication of the project is I was able to exemplify the importance of baseball in lessening antisemitism in America.

THE EFFECTS OF STRESS ON SLEEP AND COPING

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Threatening experiences can cause high levels of stress over long periods of time, which can negatively impact both physical and mental health. Adaptive coping mechanisms are critical to mitigate the negative effects of stress. Research studies have shown that how people perceive their stress will determine how they cope with it (Lazarus and Folman, 1984). The relationship between stress and cope with poor sleep quality as a mediator has not been previously examined. Using a dataset examining self-reported physical health and coping mechanisms in the aftermath of a threatening experience, we will examine relationships between perceived stress, cope, and sleep quality. We predict that the type of coping mechanism that participants employ in response to stress will be influenced by poor sleep quality. This study will contribute to knowledge about the efficacy of different coping mechanisms in reducing stress, and further understanding of the importance of healthy sleep as a way of coping with stress.

CAPRIN1 AND FMRP GENETICALLY INTERACT TO REGULATE THE DEVELOPMENT OF THE LARVAL DROSOPHILA NEUROMUSCULAR JUNCTION

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Fragile X Syndrome (FXS) is the most prevalent inherited neurodevelopmental disorder worldwide and the most common signal gene cause of autism. Lack of FMRP causes the synaptic phenotype associated with FXS. It is known that RNA-binding proteins like FMRP usually do not act alone and have several binding partners. Caprin1 was identified as a possible binding partner that physically interacts with FMRP by an experiment performed in the Barbee laboratory at the University of Denver. The objective of the current project was to determine if Caprin1 and FMRP genetically interact and regulate synaptic development in *Drosophila*, a fruit fly. *Drosophila* is a well-understood model system for studying FXS because the genes for both FMR1 and Caprin1 are homologous to humans. Mutated copies of FMR1 and Caprin1 were crossed into a genetic line, micro-dissected, stained, and imaged by scanning confocal microscopy then statistically compared against control lines. If they interact it was expected to see significant synaptic overgrowth at the neuromuscular junction. The synapses were analogous to the overgrowth seen in the FXS brain. Thus, FMR1 and Caprin1 interact genetically to regulate the synaptic development of the neuromuscular junction in the fruit fly. It is also clear that Caprin1 has a function in synaptogenesis, whether it is pre- or post-synaptic or both would be a direction for future research. There is currently no cure for FXS and limited therapeutics. To develop better therapeutics and a potential cure the underlying mechanisms of the disease must be understood. Thus, the more known about the mechanisms and how the involved proteins function within the cell is beneficial to the scientific and general population altogether. Ultimately, the interaction between FMRP and Caprin1 could provide a possible therapeutic target for investigation and this research has provided insight into the happenings at the cellular level in FXS.

THE ROLE OF MEDIA REPRESENTATIONS OF FEMINICIDES IN INFLUENCING PERSPECTIVES OF FEMINICIDE IN MEXICO

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Femicides are defined as misogynistic killings of women where men kill women simply for being women. Feminist scholars have focused on bringing to light femicide's structural gender-based nature and the state's complicity in the continuance of this misogynistic violence. They have argued that media representations of femicide play a role in influencing citizen perspectives on femicides. However, empirical evidence is missing to support the claim that negative media portrayals of femicides lead to negative perspectives or that ethical and activistic portrayals lead to activistic perspectives. This study will aim to bridge the gap in this claim. My research question is: how do ethical/activistic and negative representations of femicide influence Mexican citizens' perspectives on the issue of femicides? I measure Mexican citizens' perspectives by analyzing Facebook media comments under negative and ethical/activistic portrayals from Mexican news sources to uncover how these differences in portrayal language impact perspectives. It is found that the effects of negative and ethical/activistic portrayals differ between "perfect victim" femicide cases and those that do not fall under this frame. Compared to negative portrayals, comments under ethical/activistic portrayals of "perfect victim" femicide cases show more sympathy for the victim but did not curb victim blaming or perpetrator justification. Comments under ethical/activistic portrayals of femicides that did not fall under the "perfect victim" frame contained significantly less victim blaming and minimally decreased perpetrator justification but did not increase sympathy for the victim. Ethical/activistic portrayals of both femicides had slightly more comments demonstrating a systemic understanding of femicide. These differences support the claim that ethical/activistic portrayals can influence ethical/activistic perspectives, but they also further complicate the claim by revealing they may influence them in different ways depending on the "perfect victim" frame.

ETHYLENE ACTIVATION OF LATENT CATALYSTS AS A DETECTION STRATEGY TO REDUCING FOOD WASTE

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Food waste is a significant issue that occurs at all levels of the food supply chain and depletes natural resources. The processing and commercial sale of fresh produce contributes to 33% of food waste in the U.S. agricultural system due, in part, to premature ripening. The plant hormone ethylene triggers the ripening process of climacteric fruit. However, premature ripening can result in the degradation and waste of harvested fruits and vegetables before sale or consumption. Therefore, it is necessary to be able to detect ethylene at concentrations that can trigger the ripening process (~10 ppm). To address this challenge, the Michel Lab is investigating ethylene detection methods by activating latent catalysts. Preliminary results suggest that ethylene can react with latent catalysts, whereas other substituted alkenes are blocked by steric interactions. Upon exposure to ethylene the catalyst is activated and increases the kinetics of a cyclization reaction which can be analyzed using fluorimetry. I synthesized new versions of the fluorogenic substrates to modulate the difference in reactivity with latent and activated catalysts. Progress on the synthesis and evaluation of these new substrates will be presented.

WHAT DO I MAJOR IN? THE FACTORS THAT INFORM STUDENT'S CHOICE OF COLLEGE MAJOR

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When college students speak about their majors, it's assumed they selected it because it is a topic of interest to them. Which is not wrong, but what other factors do students rely on with and without even knowing? Literature expresses the correlation between high socioeconomic statuses and non-lucrative majors, as well as the significance parental roles play in student's lives. Less understood is detailed accounts of motivations for majors that include student's generation, racial/ethnic identities, and childhood experiences. Drawing on this research project, 27 in-depth interviews of college students at a private western institution spoke about the experiences that led up to them selecting their major(s). It was found that first generation students face the pressures of graduating college and earning a high income to move upward in social mobility. Second generation students have different experiences based on their racial/ethnic identities. In addition, common motivations for major selection were seeking financial security, creating social change, and distinct childhood experiences. With this knowledge, students who have trouble selecting a major can observe why others selected their major(s). These findings can help faculty and staff members better understand why their students decided to join their departments. As found, students rely on their identities and experiences to select their career pathways that includes their major(s) in college.

THE LINK BETWEEN SEBA FRUIT BATS AND STALACTITES

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The motivation of this project was to create a more enriching space in the Denver Zoo temporary enclosures for the Seba short-tailed fruit bat (*Carollia perspicillata*). Previous research suggests *C. perspicillata* tends to roost in caves that contain naturally formed stalactites. Stalactites are often present in bat caves and provide structures for roosting. *Carollia perspicillata* roost in large clusters of over 1,000 individuals, therefore, living with other bats is essential for this species. Our goal was to investigate whether adding environmental complexity changed the clustering behavior of the *C. perspicillata* within their temporary enclosure, which originally lacked environmental complexity. We predicted that if environmental complexity provides bats with more choices of where to roost, then bats may disperse more and congregate in smaller clusters. We manipulated environmental complexity by adding 3-D printed stalactites to the ceilings of the temporary enclosures. This study was based on observational research that used video cameras to record *C. perspicillata* clustering behavior throughout the night and day. Our results show that cluster sized decreased following the addition of stalactites during the day, but this difference was absent at night. Furthermore, video footage and anecdotal observations confirm that the bats huddle between stalactites and hang from these structures. Additional research is needed to determine whether changes in cluster size are associated with physiological variables, such as eustress or distress.

DIFFERENT HOST PLANTS AFFECT IMMUNE RESPONSE IN A GENERALIST CATERPILLAR

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Generalist herbivorous insects are widespread and often occur in a variety of environments. Across their geographic range, herbivorous insects can encounter variable plant traits as they feed on high-quality or low-quality plants. Herbivorous insect larvae experience both bottom-up (host plant) and top-down (parasitoid) factors. Host plant quality can affect larval growth and survival in that larvae feeding on low-quality plants often suffer reduced fitness. However, different host plants are also subject to different levels of parasitism. High-quality plants confer stronger larvae performance (survival, number of offspring), but larvae may also face higher parasitism. In some herbivore systems, diet mediates larvae immune function. The generalist insect herbivore fall webworm (*Hyphantria cunea*, hereafter FW) is a moth found in Colorado, and its larvae have considerable variance in their performance when reared on different host plants. We investigated if the FW immune system is affected by larvae feeding on good and bad quality host plants. We measured immune function by melanization of a nylon filament. We found significant differences in immune response across host plants, meaning diet mediates immune function in fall webworm larvae. Our study helps elucidate the factors that cause variation in immune response in a generalist herbivore.

THE WEIGHT OF CULTURE: INVESTIGATING THE RELATIONSHIP BETWEEN STEREOTYPES AND FOREIGN POLICY THROUGH THE CASE STUDY OF HEIDELBERG, GERMANY 1871-1917

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The frames, stereotypes and myths that together construct visions of “cultures” as unitary and monolithic groups of individuals simultaneously formulate and constrain the range of possible actions that a member of any particular culture can choose from. This paper aims to shed light on this process, by utilizing qualitative case-study analysis to examine dominant stereotypical representations of Germans and Russians between the unification of Germany in 1871 and the October Revolution in 1917, focusing on the city of Heidelberg as a nexus of Russo-German intercultural interactions at the time. Through a constructivist lens, the paper examines private writings by contemporary German and Russian residents of Heidelberg to track and analyze changes in prevailing narratives of what makes a German “German” or a Russian “Russian,” then maps the observed changes to corresponding shifts in German and Russian foreign policy behavior. Ultimately, this research demonstrates that perceptions of culture can have a significant impact on decision-making, particularly in the foreign policy space.

MOTIVATION AND COGNITIVE CONTROL IN CHILDREN WITH AND WITHOUT ADHD

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ADHD is one of the most common childhood disorders. A diverse range of behavioral symptoms characterizes this neurodevelopmental disorder, including constant fidgeting or restlessness, difficulty focusing, deficits in self-control, and emotional difficulties. Differences in executive function may play a key role in ADHD. Executive function encompasses goal-oriented behavior such as planning, mental flexibility, organization, working memory, and inhibitory control. Decreased inhibitory control has been underlined as a core deficit in ADHD, which involves a decreased ability to stop an inappropriate but dominant response. However, motivation impairments or under-responsivity to incentives may be underlying factors in this disorder, consistent with potentially disrupted dopamine in individuals with ADHD. Yet, there has been little research on the motivation-cognitive control interaction in ADHD and how this interaction is affected in children.

The present study is investigating motivation-cognitive control interaction in a sample of children ages 8-16 years with and without ADHD. In this study, participants are completing a reward-incentivized cognitive control task called the AX Continuous Performance Task (AX-CPT). The AX-CPT is a cue-probe task allowing for characterization of the timing of cognitive control – specifically, separating between preparatory or proactive cognitive control, in response to the anticipatory cue, versus reactive control, allocated in response to the later target. Differences in proactive and reactive cognitive control have been previously characterized with age and psychopathology, and in neurotypical individuals, evidence suggests that reward might specifically benefit preparatory or proactive control. Along with AX-CPT performance, we are collecting pupillometry data using an eye-tracker. Changes in pupil dilation are an established measure of cognitive effort with high temporal resolution. We are interested in using both task and pupil measures to investigate whether children with ADHD show similar or different cognitive control timing, as well as increases in proactive control with reward, to neurotypical children or not.

DOES CHILD OPPORTUNITY INDICES (COI) PREDICT BIRTH WEIGHT?

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Socioeconomic disadvantages, even at the neighborhood level can exacerbate health outcomes at all levels of life and contribute to pervasive health disparities. Issues concerning health at and before birth can impact development well into adulthood and lead to chronic health conditions. There are significant external factors at play in the prenatal stages of life. Using Child Opportunity Index (COI) and medical records of pregnant individuals this current study explores how child opportunity indices encompassing, educational, health, environmental, and socioeconomic opportunity during pregnancy associate with birth weight outcomes. Birth weight being an important indicator for many infant health outcomes with long-lasting consequences throughout development and into adulthood. Observing that COI does have an impact on birth weight even when accounting for other factors. Hopefully, this study will enable those in the fields of psychological, health, and public policy research to further this investigation and better understand the systemic effects on health. With the hopes that one day, with increased research and awareness, there will be greater consideration and change in how resources and healthcare are administered and distributed to bridge the gaps in health outcomes due to systemic inequalities.

SIBLING LOSS DURING THROUGHOUT DEVELOPMENT AND DEPRESSION

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Youth who experience a stressful life event, including the death of a sibling, are at increased risk of developing mental health disorders across the lifespan, including depression. Sibling death during development may be a uniquely difficult stressor with wide ranging impacts given the role siblings play in socioemotional development. Less is known about whether the stage of development that sibling death occurs in differentially predicts depressive symptoms in young adulthood. We first aimed to determine whether experiencing sibling death during development increases presence of depressive symptoms. We next aimed to determine if depressive symptoms in young adulthood differed depending on the developmental stage sibling death occurred in. We used data from Wave IV of the National Longitudinal Study of Adolescent and Adult Health (Add Health) Study. We compared bereaved participants (n=1,981) to nonbereaved participant (n=13,691) using an ANCOVA and logistic regression test. We further compared bereaved participants by which developmental stage they were in when they lost a sibling (before birth, early childhood, middle childhood, adolescence, and young adulthood) using an ANCOVA. Results indicated that individuals who lost a sibling had higher depressive symptom levels than individuals who had not lost a sibling. However, there was not a significant difference of depressive symptom levels between individuals who lost a sibling at different stages of development. Data from this study suggests experiencing the loss of a sibling may increase an individual's risk of experiencing elevated depressive symptoms but that an individual's developmental stage at the time of sibling bereavement does not.

DISPARITIES IN CROWD-DIRECTED FORCE BEHAVIORS: EXAMINING THE EFFECTS OF CROWD RACIAL COMPOSITION AND CROWD SIZE ON CROWD-DIRECTED FORCE BEHAVIORS IN A CONTEXTUALLY RICH VR EXPERIMENT

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In response to protests following the murder of George Floyd, long-range acoustic devices were increasingly used to disperse crowds of civilians. The central aim of this work is to examine the effects of crowd composition (i.e., size of a crowd, race ratio of a crowd) on differential crowd-directed force behaviors (i.e., noise burst). In a pilot study participants (N=58) viewed crowds varying in size and racial composition and administered a noise burst they believed would disperse the crowd. Participants also rated how physically sensitive and threatening they perceived the average Black individual to be relative to the average White individual. We found significant effects of crowd size and crowd race ratio on noise burst loudness, such that, as the size of a crowd and the ratio of Black to White individuals in a crowd increased, participants administered louder noise bursts. The effect of race ratio on loudness was strongest among participants who believed Black individuals were less sensitive to physical stimuli and more threatening than White individuals. The current study aims to further investigate the influences of crowd composition on trait inferences and crowd-directed force behaviors in a contextually rich experiment in VR. The computer-based judgment task used in the pilot study lacked mundane realism (i.e., crowds were portrayed as face images on a screen). I seek to address this issue by integrating virtual reality (VR) technology. This current work is both theoretically rich and advances the practical value of behavioral research. This work seeks to advance our understanding of the cognitive mechanisms that may underlie biases in perceptions and behaviors toward crowds. This work would also establish the efficacy of integrating VR technology into social psychological research. The current VR project is currently in a pilot phase as we learn how to integrate the study in VR.

EXPRESSING ALPHA-SYNUCLEIN IN RCSN-3 CELLS TO IMPROVE THE STUDY OF PATHWAYS IN PARKINSON'S DISEASE

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Alpha-synuclein (α S) is a dopamine-regulating protein in the brain that can form aggregates, clusters of misfolded proteins, and cause neurodegeneration in the form of Parkinson's Disease (PD). This ongoing research project explores the furthered development of the RCSN-3 cell line where it can express fluorescently tagged human α S. The development of this in vitro model will necessitate transfection of α S DNA, fluorescence microscopy, and differentiation of the cells into neurons, with the ultimate goal of having a better model to both screen small-molecule drugs that could inhibit α S aggregation and study other related pathways, such as the polyamine pathway. With an efficacious working model of dopaminergic neurons, we can now work to replicate the results of cell viability and aggregation assays accomplished by our lab in past years to show the applicability of the findings to the pathogenesis of PD. We went about furthering the RCSN-3 cell line using DNA plasmid transfection protocols, seeding of preformed α S fibrils into confluent cell culture, and fluorescence microscopy to establish the viability of the cell line as a model. Our next steps involve differentiating the cells into neurons and replicating assays with previously established results to expand on data implicating the polyamine pathway in PD pathogenesis, as well as obtaining samples to send for Proteomics and Metabolomics analysis.

THE ROLE OF COGNITIVE CONTROL IN THE PROCESSES UNDERLYING EASY AND DIFFICULT RISKY MONETARY DECISION-MAKING

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Risky decision-making leverages other cognitive functions as part of the processes underlying valuation and choice, but the direct connections between these domains of cognitive function and risky choice have only recently been examined. A total of 50 participants, age 18-22, completed an online experiment with a two-part task. First participants completed a novel risky decision-making task in which they initially completed an identical static choice set of gamble options, followed by a dynamic choice set tailored to the individual and designed to equate subjective difficulty of choices across participants. Both choice behavior (probability of gambling, choice, output) and reaction time (seconds) were measured. An additional task, a digit span measure, was used to quantify participant working memory capacity, defined as cognitive control capacity. The study concluded with a Need for Cognition Questionnaire and additional demographic questionnaires. Thus far, results suggest an effect of current trial type (i.e., difficulty) on reaction time ($\beta = -0.030$, $SE = 0.00228$, $p < 2 \times 10^{-16}$), but no effect of the previous trial's difficulty ($\beta = 8.27 \times 10^{-4}$, $SE = 2.32 \times 10^3$, $p = 0.723$). However, when looking at a continuous model of choice difficulty, there is a weak effect of previous difficulty on reaction time ($\beta = -0.0195$, $SE = 0.00793$, $p = 0.01418$) and a significant interaction between choice difficulty and capacity (high or low; $\beta = -0.0238$, $SE = 0.00791$, $p = 0.00269$). These results will be further analyzed to better elucidate the relationship between cognitive capacity, choice difficulty, and risky monetary decision making. This work could have important implications for quantifying of a potential relationship between control and risky choice.

INVESTIGATION OF BARIUM AS A TEMPERATURE PROXY IN CORALS

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Trace element concentrations in the aragonite skeletons of massive coral colonies can be measured to reconstruct seasonal- to centennial-scale variability in sea surface temperature (SST). Coral strontium-calcium (Sr/Ca) ratios are commonly used as a proxy for SST. However, barium-calcium (Ba/Ca) ratios, while especially sensitive to temperature in laboratory precipitation experiments, have not been explored as a coral SST proxy because seasonal Ba input from rivers overwhelms the SST signal in the coral skeleton. In this study, we investigated the Ba/Ca-SST relationship in corals from the Red Sea where Ba from river runoff is absent. Ba/Ca and Sr/Ca were measured in three *Porites lutea* coral cores, showing distinct seasonal cycles primarily influenced by SST, with infrequent spikes in Ba/Ca due to Ba deposition during dust storms. After removing the Ba/Ca peaks from dust storms, the resulting Ba/Ca time series show strong and significant correlations to SST, similar to Sr/Ca. Comparing Ba/Ca directly to Sr/Ca for each coral results in strong correlations that agree closely with experimental data. Our findings reveal the quantitative Ba/Ca-SST relationships in corals, and suggest that coral Ba/Ca can be used as a reliable temperature proxy in areas without river runoff.

PRELUDE TO BLEEDING KANSAS – GOVERNOR ANDREW H. REEDER

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In the late 1850s, Kansas underwent a civil war to establish its laws on slavery. “Bleeding Kansas,” to many historians of the subject, was a “dress rehearsal” for the American Civil War less than a decade later. The conflict itself is well studied, but the political maneuvering leading up to Bleeding Kansas itself is often overlooked. In the years prior, Kansas Governor Andrew Reeder worked to establish an antislavery stronghold and territorial capital on the frontier: a town called Pawnee. Mass electoral fraud in the first legislative election led to an overwhelmingly proslavery legislature that assembled in Pawnee for less than a week, clashed with the citizens there, and overrode the Governor’s veto to relocate the capital much closer to the border with proslavery Missouri, setting the stage for the war that followed. To Reeder’s dismay, Pawnee was soon demolished and the inhabitants forcibly relocated by Secretary of War and future president of the Confederate States of America, Jefferson Davis. This project documents Reeder’s motives in creating Pawnee and the backroom struggle that followed, ending with Reeder’s removal from the governorship and flight from Kansas in disguise in 1856. Focus here is on Reeder’s fascinating ideological transition from Stephen Douglas Democrat to forceful abolitionist.

WEALTH INEQUALITY AND DEMOCRATIC LEGITIMACY

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More than just economic jurisprudence predicated on the right to free speech, *Citizens United v. F.E.C.* (2010) has vast impacts on the individual lives of Americans. This specific case has influential ramifications, but it is not the authorization of corporate money to infiltrate politics it was feared to be. Corporate spending has remained relatively unchanged since 2010. However, states, where political expenditure laws were impacted, saw a doubling of the median range of campaign expenditures by individuals not connected to a particular candidate. *Citizens United* is not the first of its kind, but the mere face of a long line of Supreme Court decisions returning power to the wealthy. It is the most salient example of neoliberal jurisprudence redefining democracy as a free market of political goods. The Court deems that *Citizens United* will not cause the public to “lose faith in democracy.” However, “[w]hat matters is not whether or not this is legitimate in terms of law, but what its effects are and whether they are negative.”

Political philosophy has a unique place in a discussion based in economics. Intuitive knowledge can have profound insights into the economic issues of today, “especially about the deep structure of inequality, the way it is justified, and its impact on individual lives.” *Citizens United* is the invisible hand at play, but not in the way Adam Smith imagined it in *Wealth of Nations*. Rather than the hidden forces of individuals’ agency moderating the market, *Citizens United* allows for wealth individuals to tip the scales in their favor. Wealth has undue control over democracy. It is the state giving power to the wealthy under the guise of free speech. Those with disposable income to spend on political expenditures can promote politicians that align with their values or will at the very least protect their interests while in office.

Citizens United blurs the line between wealth and speech, and in doing so, money gains legitimacy as a form of political expression. Economic power is already fungible, but through rulings that enhance the ability of the wealthy to influence politics, economic power becomes political power. Karl Marx outlines wealth’s ability to effect areas outside of economics as “Money... cannot express the magnitude of its value except relatively in other commodities.” Political expenditures are money expressing its value as speech and political capital. All these advancements (or regressions) have been no accident but the result of a much larger transition into neoliberalism. Neoliberalism is the political philosophy based on economic principles of the free market. The majority opinion of the case claims unlimited independent expenditures do not increase real or perceived corruption in politics. *Citizens United* is the mechanization of neoliberal principles into campaign financing. Although the Court posits that unlimited independent expenditures are not *quid pro quo* corruption, it allows for those with access to wealth to have a greater access to politics and by extension our democracy.

PARENTAL EFFECTS OF DIET IN FALL WEBWORM

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The environment or experiences of a parent generation can impact the fitness of the next generation, a phenomenon known as parental effects. Specialists are widely the focus of study of parental effects, and much less is known about whether parental effects are important in generalists. We investigated if the fitness of the offspring of generalist fall webworm (*Hyphantria cunea*, hereafter FW) was dependent on the host plant on which the parental generation was reared. We used four different host plants to rear FW larvae, two of which were high-quality hosts (chokecherry and black willow) and two were low-quality hosts (narrowleaf cottonwood and thin-leaf alder). We mated FW male and female moths that had both been reared on the same host plant as larvae (e.g. chokecherry) and created at least 9 maternal lines per host plant species. The resultant egg clusters were divided into four, so that a portion of each egg cluster was reared on one of the four host plants. Thus, we have larvae from each maternal line that are being reared on the parental host as well as 3 unfamiliar hosts; we are currently rearing them in the lab to pupation. To measure fitness, we will weigh the pupae and compare the data across the host plant groups. This project will help us understand whether parental effects in FW are present and if FW fitness in an environment can become anticipatory if we know the environment of the parental generation.

CARBON SEQUESTRATION IN PEATLANDS: USING ENVIRONMENTAL PROXIES TO UNDERSTAND THE IMPACT OF A CHANGING CLIMATE ON GLOBAL CARBON STORAGE

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Peatlands are a type of terrestrial wetland ecosystem in which consistently water-logged conditions prevent decomposition, allowing for sequestered carbon in plant matter to remain stored in the soil. Because of this, peatlands have great carbon sequestration potential, storing more carbon in the soil than all other vegetation types in the world combined. By inhibiting decomposition, the composition of water-rich peat soil remains representative of the environmental conditions during the period in which the peat was formed. The collected peat samples can then be utilized as environmental proxies to determine historical temperature, moisture, and carbon content, and extrapolated to predict the future capacity of carbon sequestration in the context of a changing climate.

The peat samples in this research were collected during the fall of 2022 in the Echo Lake Fen of Grand Mesa, Colorado and analyzed using humification analysis. This process measures the organic content of the peat, which can then be compared to the known historical climatic conditions during each 10-year period of peat accumulation. Results suggest that warmer climates lower the water table of a peatland and expose plant matter to oxygen, allowing plants to decay and release carbon into the atmosphere. Understanding that carbon, as a greenhouse gas, exacerbates already rising global temperatures and increases the rate of plant decomposition is important to predicting how the loss of peatlands would impact future climate conditions. Peat soils contain more than 600 gigatons of carbon worldwide which represents up to 44% of all soil carbon, making it essential that efforts to preserve and restore peatlands are prioritized in order to minimize the amount of carbon in the atmosphere.

THE EFFECT OF CONTROLLABILITY ON STIGMA TOWARD MENTAL ILLNESS

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90% of US adults with a mental illness report that stigma negatively impacts their lives. Within mental illness stigma, controllability could influence stigma such that neurobiological explanations (low controllability) were associated with greater desire for social distance but not reduced blame. Additionally, the language used to describe a condition could inform stigma of mental illness; identity-first, relative to person-first, language is argued to propagate stigma. The current work investigates the independent and interactive effects of controllability and language on dimensions of stigma toward people with mental illness.

HONEYBEE RESEARCH AND STUDENT PERCEPTIONS OF SCIENCE

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European honey bees (*Apis mellifera*) are critically important because they provide pollination services to support the agricultural industry. Enhancing our understanding of honey bee foraging behavior and how bees choose which plants to visit once they arrive at a resource patch will help us to better understand pollination services. Recently honeybees have become a model system for engaging both the general public and undergraduate university students through community science and Course-Based Undergraduate Research Experiences (CUREs) to help change perceptions and attitudes toward pollinators. Information identifying if bee activity on neighboring flowers impacts the number of bees that visit a focal flower was collected with the help of STEM and non-STEM major students in a previous related study. The students involved in the experiment were also assessed in pre- and post-surveys. Both STEM and non-STEM students showed an improved attitude toward pollination processes and the importance of honey bees. These results provide important insight into how the commonly known honey bee can be an inlet for people to become interested in science.

THE EFFECTS OF RED DRAGON FRUIT BETACYANIN EXTRACT ON THE MOTOR FUNCTION AND HEALTH OF NEUROMUSCULAR JUNCTIONS IN THE G93A MUTANT HSOD1 MOUSE MODEL OF ALS

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Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease characterized by oxidative stress, neuroinflammation, and axonopathy leading to the loss of upper and lower muscular neurons. The G93A hSOD1 ALS mouse model, used in this study, has a point mutation in the SOD1 gene causing an overexpression of superoxide dismutase. This animal model experiences skeletal muscular atrophy, muscle weakness and weight loss beginning at the onset of the disease (~90 days old) until they reach end stage (~120 days old). This is due in part to the deterioration of neuromuscular junctions, which are synaptic connections between the terminal end of the motor nerve and the muscle. Betacyanin, a nutraceutical compound found in red dragon fruit (DFE), has been shown to have powerful antioxidant and anti-inflammatory properties, making it a potential therapeutic treatment for ALS. This study tested the effect of betacyanin on motor function and the neuromuscular junctions in the gastrocnemii muscles of the G93A mutant hSOD1 ALS mouse model. In this study, G93A hSOD1 mutant mice were treated orally with 5% (v/v) DFE in drinking water ad libitum from disease onset until end-stage. In each group, (consisting of three littermates: one wild type, one untreated mutant and one treated mutant), the progression of the disease was monitored by measuring the body weight and conducting grip strength and rotarod tests. Then histopathological analyses were performed to determine the effect of DFE on the neuromuscular junctions in the gastrocnemii muscles. Overall, the treated mutants have shown reduced deterioration of neuromuscular junctions in the gastrocnemius muscle, delayed wet weight loss of the gastrocnemius muscle and improved motor function compared to the untreated control ALS littermate. These findings indicate that DFE slowed the progression of ALS and shows potential as a therapeutic treatment for patients with ALS.

IN VIVO SCREENING OF THERAPEUTIC SMALL MOLECULES AGAINST PARKINSON'S DISEASE IN C. ELEGANS MODELS

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We have developed small therapeutic molecules *in vitro* to identify potential cure for α -Synuclein (α S) aggregation—a process central to Parkinson's disease (PD) in *Caenorhabditis elegans* (*C. elegans*). The goal of the project is to test the therapeutic molecules *in vivo*. The *C. elegans* will go through paralysis assay for 13 days and Confocal Imaging to support if the therapeutic molecule is a sufficient cure for PD. The pathological hallmark of PD is the abnormal aggregation and accumulation of neuronal proteins α S. These proteins assemble into plaques in PD brains. Once the protein adopts plaque conformation, it becomes toxic, and it can damage or deplete dopaminergic neurons. Dopaminergic neuronal death causes the onset of PD symptoms. Our lab has designed α S inhibitors as potential therapeutics which was tested on *C. elegans*. *C. elegans* are the perfect model organisms for this project as they mimic 60% of the human genome. Our findings showed that some therapeutics molecules decreased α S aggregation.

COMPUTER-ASSISTED TOTAL KNEE ARTHROPLASTY ACCURACY INFLUENCED BY ANATOMIC LANDMARK IDENTIFICATION

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Nearly 1 million knee replacement surgeries are performed in the United States of America yearly. Robotic systems designed for knee arthroplasty have demonstrated comparable accuracy to conventional methodologies lacking computer-assisted technology. Robot-surgical systems can be image-free or image-based. The two types yield similar surgical outcomes; however, image-based systems need potentially expensive medical imaging. Image-free robotic systems perform resections in a coordinate system formed by surgeon-probed anatomical landmarks across the femur and tibia. Resection accuracy is essential for improving the fitting of a replacement knee, which can yield greater patient satisfaction and implant longevity. This study aimed to quantify the influence of anatomical landmark identification on a robot's ability to define the coordinate system in which bone resections are executed. For the study, total knee arthroplasty was performed on a cohort of 40 cadaveric specimens using an image-free surgical robot. Data collected during the surgeries included the positions of anatomical landmarks necessary for defining a coordinate system. The difference between the landmark positions recorded by the surgical system and the ground truth positions was computed for each specimen. The standard deviation of the data was then determined, and error was randomly applied to each ground truth landmark through a Monte Carlo simulation. New coordinate systems were defined using the simulated data and overlaid with the ground truth coordinate system to quantify alignment error. Coordinate system error was then plotted against landmark error. Different landmarks influenced different axes of a robot's coordinate system. However, two landmarks on the bottom part of the femur induced the most error (greater than one degree) in the coordinate system per mm of landmark position error. The study's results can help develop novel surgeon training techniques and probing tools to improve the accuracy of image-free robotic surgical systems used in knee replacement surgery.

FRAME THEORY AND ITS APPLICATIONS

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Since its introduction in the early 1950's, Hilbert space frame theory has become an active area of research due to its applications in engineering and physics, including in speech recognition, optical imaging, and X-ray crystallography. Frames, like orthonormal bases, give a continuous, linear, and stable reconstruction formula for vectors in a Hilbert space. However, frames allow for redundancy, and this makes frames much more adaptable for theory and applications. Phase retrieval is one of the applications of frame theory in which only the intensity of each linear measurement of a signal is available and the phase information is lost. In 2006, Balan, Casazza, and Edidin introduced a more powerful notion of phase retrieval using the magnitude of frame coefficients. Closely related to the subject of phase retrieval is weak phase retrieval. Weakening the conditions of phase retrieval, in which we have fewer measurements, still satisfies most of the properties of phase retrieval. In other words it is not "weak" at all. In this talk, we give an overview of phase retrieval and weak phase retrieval. In addition, a review of current phase retrieval algorithms will be discussed; however, an algorithm for weak phase retrieval has yet to be established.

CONCUSSION ASSOCIATED BIOMARKERS

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One common symptom of concussions is depression that follows impact. Since serotonin is related to depression, this study looks at the precursor of serotonin, tryptophan. The purpose of this study is to be able to identify concussion associated blood biomarkers, specifically the role of tryptophan in concussions. Blood samples from DU's Athletes will be used, specifically their plasma from before, during and after concussions. The data processing uses the plasma from the athlete's blood. In brief, the sample is filtered, and large molecules (proteins) eliminated. Next, Fluorescein Isothiocyanate (FITC) is added to the filtered plasma (for 24 hours in the dark) to label the free amine groups (from the amino acids, including tryptophan) Then samples are run through the Capillary Zone Electrophoresis System (CZE) and the signal (peaks, corresponding the amino acids, specifically tryptophan). Tryptophan will be identified by spiking the samples with a standard solution of tryptophan (at a known concentration). This allows tryptophan to be easily identified. After the correct peak has been identified as tryptophan the concentration is then found by finding the area under the peak. This process is repeated with plasma samples from before, during and after concussion to determine if tryptophan has decreased. The expected results are that there will be an elevation in the tryptophan curve, biggest after the 24-hour mark, then still slightly elevated at the post-concussion point as well. This project could have implications to be able to help explain why depression occurs after concussions, as well as help explore possible treatments to deal with that depression.

THE MINDANAO PLAN: A STRUGGLE FOR RESCUE AND LIBERATION IN THE PHILIPPINES, 1938-1941

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In July 1938, a conference was convened to address the ongoing and ever increasing Jewish refugee crisis that would later be dubbed the Evian Conference. This conference would fail in its goals to address the ever increasingly stateless Jews. Not long after the conference's failure an island archipelago, and a United States colony no less, did what the other "democracies" of the world would not and raised their hand to welcome Jewish refugees. The proposal would later be dubbed The Mindanao Plan. This plan had many official and unofficial iterations. At its heart it was a plan to resettle 30,000 Jewish refugees to the Philippine Island of Mindanao. This plan shows points of contact that demonstrate the colonial dance between the United States and the Philippines. This work argues that the structures imposed under United States colonialization were instrumental to the attempt and failure of the Mindanao Plan in the Philippines. This dance had several results. It engaged in a reframing of Jewish refugees as the "good" kind of immigrant deserving salvation in the Philippines through an intersection of the understanding of race and class in the United States and the Philippines respectively. As the dance continued, the Philippines saw accepting Jewish refugees as an opportunity to use them in their realpolitik to prove their worthiness for independence to their colonial masters, whereas the United States sought to use Jews as pawns in their evolving neo-imperial ambitions after the Philippines' independence. The final measure was a dance of death, as the United States' xenophobic anxieties and the obstruction manifesting from them ran out the clock on the Mindanao Plan, thus, condemning it to history's "what-ifs."

CELLO: EXTENDING THE LIMITATIONS

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The goal of this project is to explore new horizons of classical, contemporary music composition and the live performance of said horizons. While the instrument, "violoncello", most commonly referred to as "cello", is dominantly associated with traditional, acoustic classical music repertoire, this project aims to define that the cello is an instrument capable of performing all styles of music despite any preconceived limitations.

As acoustic guitar has its relative, the electric guitar, the cello also has its alternative relative. Sketches of the electric cello were first conceived in the 1930s with the intentions of making the instrument itself more adaptable, more competitive with the sound and volume of instruments like the electric guitar, and more affordable, to name a few inspirations. Despite how much success electric and/or hybrid instruments may have had making the cello more adaptable in numerous scenarios, the contemporary classical music scene hasn't seen much progression in the integration of electric cello with contemporary composition and performance. The primary purpose of this project is to create a new piece of music for solo electric cello and live electronics, with the intentions of breaking the boundaries between genres of music, expanding the repertoire for this instrumentation, and discovering what new compositional techniques and devices can be employed to make the piece accessible to different audiences and performers alike. This project strives to answer the questions: What limit can a cello and its pairing with electronics be taken to; What new compositional devices and techniques can one employ or create to make this piece efficient and logical; How can one take this piece to the concert stage, or another venue, to give a successful and meaningful performance.

ASSESSING RACIALIZED MENTAL REPRESENTATIONS OF CRACK AND POWDER COCAINE USERS

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During the crack epidemic, targeted laws and media representation sent messaging that those addicted to crack were Black criminals (Alexander, 2020). In contrast, the growing prevalence of powder cocaine generated productive responses (e.g., emphasizing treatment; Hansen, & Netherland, 2016), which may be because powder cocaine being associated with Whiteness. The current work examines whether racialized mental representations (MRs) of individuals experiencing addiction to crack or powder cocaine predicts bias in recommended punishments.

In Phase 1, 120 participants completed reverse correlation tasks (see Brown-Iannuzzi, 2017 for detailed methodology) envisioning individuals experiencing addiction to crack and powder cocaine. In Phase 2, in three subphases with slightly varying procedures, separate samples of participants viewed composite MRs of each target group and rated them on a variety of social characteristics, notably Afrocentricity and Eurocentricity. Evaluators then rendered punishment judgments (fines, prison time, community service).

Paired samples t-tests were conducted to compare evaluations of MRs by phase 2 evaluators. The crack, relative to powder, cocaine MR was judged as significantly more Afrocentric and less Eurocentric in all three subphases.

The crack cocaine MR was recommended significantly harsher punishment judgments in phase 2a. The powder MR was recommended significantly harsher punishment judgments in phase 2b. There were no significant punishment judgment differences in phase 2c.

This work suggests that people hold distinct and racialized mental representations of people who use different drugs, and which may influence punishment expectations/judgments. Despite crack and powder cocaine having no pharmacological differences, federal crime penalties punish crack much more harshly than powder cocaine (Lynch, 2021). The findings of this study provide some insight in the creation, preservation, and consequences of disparities in drug laws and their enforcement.

COPULATION DURATION IN A PROMISCUOUS LEAF BEETLE

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Hybrid zones provide an excellent system to study the evolution of reproductive barriers, as they allow for the close observation of species interactions. An understudied aspect of sexual interactions in hybrid zones is the effect of heterospecific mating on copulation duration. In this study, I looked at the outcomes of heterospecific mating frequency on copulation duration and female lifespan of the beetle *Chrysochus cobaltinus*, which forms a hybrid zone with the closely related *C. auratus* in south-central Washington State. I found that heterospecific matings had a significantly longer copulation duration than conspecific matings and that conspecific matings preceded by heterospecific matings were significantly longer than conspecific matings preceded by other conspecific matings. The overall frequency of heterospecific matings, number of matings, total time mated, and the identity of the males, had no significant effects on the female's lifespan. These findings invite further research on male-female interactions in hybrid zones, as they suggest that male preference could possibly be a significant factor in copulation duration in these beetles.

EDITOR'S NOTES

These abstracts have not been peer-reviewed.