DU Undergraduate Showcase: Research, Scholarship, and Creative Works

Abstracts

STORYTELLING IN REAPPRAISAL: HOW NARRATIVES CAN CHANGE AFFECT

Kabe Aberle[1], Nadia Kako[2], Kateria McRae[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

The question of this project was to understand how narratives can be used as short-term interventions to repair mood after a stressor. This research has implications for clinical applications and everyday emotion regulation practices. We designed a correlative study with participants recruited online collecting a variety of qualitative and quantitative data. We found that there was a relationship for some participants between higher quality narrative production and better emotional outcomes. There were also a variety of other factors that influenced emotional outcomes and semantic characteristics that differentiated reappraisal from stressor narratives.

CONNECTED IN CARE: MINORITIZED HEALTH MATTERS

Brooke Agulnek[1], Sky Palmon[1], Yasmine Ramirez[1], Francisca Aguirre Beltran[1], Ashley Juarez[1], Bridget Kim[1]
[1]Student Contributor, University of Denver

How can we best support and connect Denver communities that are working towards combatting healthcare inequities? We first researched our issue and met with various community members. We then developed a plan to address these issues and implemented it. Students and community members now have better access to resources that will help them succeed.

DO NOVEL MALE CRICKET MORPHS MOVE DIFFERENTLY THAN ANCESTRAL MALES IN THE WILD AND THE LAB?

Tessa Appel[1], Sterling Kerr[2], Spencer Ingley[2], Gabe Meyer[2], Robin Tinghitella[3], Dale Broder[3]
[1]Student Contributor, University of Denver
[2]Collaborator, Faculty of Sciences, Brigham Young University Hawaii
[3]Advisor, Department of Biological Sciences, University of Denver

A challenge in animal behavior is that scientists often study animals in captivity and rely on the assumption that measures of traits in the laboratory reflect their expression in nature. Pacific field crickets encounter an acoustically hunting lethal parasitoid fly in Hawaii, which has facilitated the rise of novel male morphs, like purring, that sing attenuated songs and are protected from the fly but still able to reproduce. It is possible that quieter purring males use an alternative mating tactic like increased locomotory behavior to increase their chance of encountering mates. We asked if ancestral and purring males differ in their locomotory behavior in the wild, whether this result is maintained in the lab, and whether behavior depends on test substrate (natural grass or artificial foam). Using a population that contains both purring and typical males, we conducted focal follow experiments in the wild and parallel experiments in the lab on natural and artificial substrates. In the wild, we found that the two male morphs did not differ in the time spent walking on the grass, but purring males spent more time stationary while typical males spent more time under the grass. In the lab, we similarly found that the two morphs spent the same amount of time moving, however they traveled significantly further and faster on the artificial substrate compared to the grass. Unlike in the field, morphs did not differ in movement under the grass, which is interesting since crickets are subject to parasitism in the field and may be protected under the grass.

READ ALL ABOUT IT: USING OBITUARIES TO INVESTIGATE HOW CO-VICTIMS OF MINORITIZED MURDER VICTIMS MEMORIALIZE THEIR LOST LOVED ONES

Lily Baeza[1]
[1]Student Contributor, University of Denver

The news media tends to neglect everyday homicide stories in favor of sensational murders and members of the police tend to divide murder victims into "good" versus "bad" victims. These practices are exclusionary to those who do not fit this standard and can render the vast majority of those most likely to be affected by urban violence as "unworthy victims." The Philadelphia Obituary Project (POP), an innovative non-profit, seeks to create an opening to allow co-victims to offer a counter-narrative and discuss their loved ones as complex people whose lives should be remembered more than their deaths. A team of researchers and I conducted a content analysis of nearly 300 POP obituaries to determine what minoritized co-victims of murder want us to know about their lost loved ones. Importantly, because the literature has almost solely focused on mothers' perspectives, this study adds in the perspectives of non-mothers and assesses whether there are any differences in portrayals between the two.The results show that mothers and non-mothers were not substantially different in their portrayals of their murdered family members. Both primarily highlighted positive characteristics (e.g., "he was a family man and protector). As a subset of non-mothers, spouses and partners appeared to paint the most nuanced pictures (e.g., suggesting that their spouses had troubles, but were overall good people). In conclusion, this study situates these co-victim perspectives within a larger hierarchical understanding of "ideal victim" framing and argues that all murder victims deserve respect and justice, not just the ones we deem worthy.

THE CASE FOR SOCIAL EMOTIONAL LEARNING

Chloe Beers[1], Julia Coakley[1], Whitney Kelsey[1], Sydney Gainforth[1], Gabi Wing[1], Audrey Martin[1]
[1]Student Contributor, University of Denver

Our project asked: How can Social Emotional Learning (SEL) be effectively integrated into public school environments to support student well-being and success? This question is important because SEL fosters critical life skills—such as emotional regulation, empathy, and relationship-building—that are essential for both academic achievement and personal development. To explore how SEL is implemented in schools, we partnered with an innovative public school in Colorado: Compass Academy. We conducted on-site visits, observed classrooms and community spaces, and spoke directly with students and staff. We also reviewed research on the benefits of SEL and gathered quotes and reflections from school community members to better understand the real-world impact of these practices. Our observations at Compass Academy showed that intentionally incorporating Social Emotional Learning (SEL) into the school day led to stronger relationships between students and teachers, improved emotional well-being, and increased student engagement. Students shared that SEL activities helped them feel seen, heard, and better able to manage stress, while teachers noticed more positive classroom behavior and deeper connections with their students. These real-life examples, combined with our research, helped us create a proposal with practical recommendations for integrating SEL into other Denver public schools.

COLOR OF WATER IN COMMERCE CITY

Aaliyah Amore Berry[1], Brooke Watley[1], Kiruthika Venkatesan[1]
[1]Student Contributor, University of Denver

This project investigates the intersection of environmental justice and public health by examining water quality violations in Commerce City and Northeast Denver, Colorado, from 1980 to 2025, with a focus on the Latinx/e community. We employed a mixed-methods approach, integrating qualitative and quantitative analysis to identify patterns of environmental harm and systemic inequity. Archival newspaper articles were reviewed using targeted keyword searches (e.g., "water quality," "environmental racism," "EPA"), and findings were cross-referenced with publicly available violation data from the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA). To visualize spatial trends, we manually mapped violations. Our mapped data was further verified through county-specific data visualization of violations across Denver. While this phase of research does not isolate specific contaminants, Commerce City and Northeast Denver are frequently exposed to pollutants such as 1,4-Dioxane, various trihalomethanes, chromium (hexavalent), and PFAS. Together, these sources are being used to develop qualitative memos that align specific violations with corresponding news coverage, allowing us to assess how water contamination issues are recorded, represented, and addressed over time, particularly in minority-centered areas. Our findings indicate a disproportionate concentration of water quality violations in Commerce City compared to surrounding regions, a pattern further verified through county-specific mapping. These results highlight the need for deeper scrutiny of regulatory enforcement, media visibility, and the long-term health impacts of environmental and water injustice in Colorado's Latinx/e communities.

TRANSITIONAL JUSTICE UNDERSTANDING THE IMPACT OF VARIOUS INITIATIVES IN BOSNIA-HERZEGOVINA AND GUATEMALA

Rachel Bienstock[1]
[1]Student Contributor, University of Denver

This thesis examines the impact of transitional justice initiatives on reconciliation and healing in regions that have experienced mass atrocities, with a focus on Guatemala and Bosnia and Herzegovina (BiH). While transitional justice processes aim to address the legacies of human rights violations and foster sustainable peace, their impact varies significantly depending on the context and the mechanisms employed. By analyzing existing scholarship and using a case study methodology to gather in-depth data about each instance, this research explores how different approaches to transitional justice can serve a diverse group of communities and how different factors contribute to their success. It is often not the fully funded international commissions that serve the needs of victim populations, but rather locally-focused, bottom-up strategies. Ultimately, this thesis seeks to contribute to a nuanced understanding of transitional justice, emphasizing the importance of integrating local perspectives and practices in the pursuit of justice and healing.

OPTIMIZING LMS FOR ADHD STUDENTS IN HIGHER EDUCATION

Annabella Brotherston[1]
[1]Student Contributor, University of Denver

You might not guess that aesthetics could change your grade—but for students with ADHD, it might. This literature review explores how the design of learning management systems (LMS) can affect cognitive load and learning outcomes for neurodivergent students, particularly those with ADHD. Proposed evaluation methods include self-reports of task complexity and mental effort, eye tracking to measure fixation and scanning patterns, and time-on-task analysis. One study found that enhancing the aesthetics of an e-assessment environment led to reduced mental effort, increased user satisfaction, improved task performance, and more time spent on self-assessment. Another study noted that in online learning environments, students with ADHD faced greater challenges due to extraneous cognitive load and felt overwhelmed by unclear instructions and the volume of scattered resources. These findings underscore the need for accessible, thoughtfully designed digital learning platforms.

EXPLOITING VULNERABILITY: HUMAN TRAFFICKING AS A TOOL OF GENOCIDE

Madison Bryant[1]
[1]Student Contributor, University of Denver
This thesis examines the relationship between human trafficking and genocide, arguing that when trafficking is used with the intent to destroy a targeted group, it should be understood and prosecuted as an act of genocide. While international law traditionally treats genocide and human trafficking as distinct crimes, historical and contemporary evidence reveals significant overlap in their mechanisms, motivations, and outcomes. Through a thematic analysis of three case studies, this research demonstrates how trafficking has been systematically employed to further genocidal objectives, including displacement, exploitation, cultural erasure, and the destruction of communities. The case studies are the genocide of Indigenous peoples in North America during the colonization and founding of America; the genocide of Bosniaks in Bosnia and Herzegovina during the Bosnian War; and the ongoing Russian invasion of Ukraine. This thesis concludes with a call to action to expand the legal interpretation of genocide to include human trafficking when used as a mechanism of group destruction.

LINE V.S. CONTINUUM POLARIZATION: A POLARIZATION STUDY OF STAR SYSTEM WR42

Mia Burgener[1], Emma P. Lieb[2], Rachel A. Johnson[2], Jennifer L. Hoffman[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Physics & Astronomy, University of Denver
This research aims to find how much mass is transferring between the stars and how much, if any, is being carried out of the system by the stellar winds. Analyzing polarization data will provide information on the location of the mass, which will also help form a better picture of the system's structure. I used Python coding to plot graphs of the observed polarized spectra and the polarization of different spectral regions as a function of orbital phase (position of the stars in their orbit).According to the polarization data as a function of orbital phase, the emission line and continuum polarizations behave differently. This tells us about the system's colliding winds, and further analysis will give an improved understanding of the wind collision region's geometry and ionization structure.

KEYSTONE REBIRTHS: PENNSYLVANIA'S WHITE NATIONALIST MOVEMENTS IN THE LATE 20TH CENTURY NEWSLETTERS

Kania Campbell[1]
[1]Student Contributor, University of Denver
How have white nationalist movements evolved recruitment, communication, and political mobilization strategies in Pennsylvania during the late 20th century? What recurring motivations and goals are shared between different nationalist groups in the state? I answered these questions by conducting a close reading and qualitative analysis of documents held in archives at Duke University and the University of Pittsburgh. The criteria in my selection process were for my sources to be newsletters written and published by white nationalist groups during the 1980s-2000s. Throughout hundreds of pages in these newsletters, there is a consistency in intense paranoia concerning the spread of immorality, particularly behaviors and identities that challenge traditional foundations in American institutions of Christian religion. White nationalists across Pennsylvania were radicalized into strong far-right nationalist political groups, with many becoming incarcerated, finding solace through these newsletters.

ANTHROPOGENIC PARTICLES AND FLUVIAL SEDIMENT TRACING

Kiena Campbell[1]
[1]Student Contributor, University of Denver

Understanding the sources of suspended sediments in rivers and reservoirs is an important step in developing mitigation strategies to improve water quality and reduce sedimentation. How can elemental analysis be used in the process of determining sources of suspended sediments? I completed elemental analysis of samples collected by the University of Kansas using inductively coupled plasma mass spectrometry (ICP-MS), then interpreted the normalized data. The results showed certain patterns in the concentrations of characteristic elements (like tungsten, lead, and strontium) can be used to infer whether the source of a suspended sediment sample is anthropogenic (ex: road runoff or construction runoff). This information is useful in identifying mitigation strategies and best management practices for urbanizing areas and construction sites to reduce suspended sediment loading of water bodies.

PREVENTION POSSE: YOUTH SUICIDE PREVENTION COMMUNITY CHANGE INITIATIVE PROJECT

Courtney Cassidy[1], Sage Krzyzkowski[1], Maddox Jones[1], Skylar Abookire[1], Luke Hawkins[1], Sunnah Yoon[1]
[1]Student Contributor, University of Denver

How can youth identify signs of mental health decline, support friends in need, and properly address the topic of suicide within their community? We met with a variety of stakeholders in the Denver area (such as Wellpower, the Second Wind Fund, Thrive, and more) to gain a better understanding of community needs surrounding this topic. Then we became trained in the American Foundation for Suicide Prevention's "It's Real" curriculum and are planning on presenting this curriculum to students at high schools in and around Denver to better equip them to deal with topics of mental health and suicide. Once our presentations are complete, we hope to make lasting change within the schools we present at through education about stress management, suicidal thoughts, and other mental health related topics. Our goal is to foster an environment where youth understand how to properly address mental health issues and know where to locate resources for both themselves and their peers.

ENHANCING THE SENSITIVITY OF RZNP1 FOR INTRACELLULAR ZINC MONITORING

Andrea Chu[1], Yan Qin[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

Zinc is an important nutrient in cells, and its imbalance can lead to cell dysfunction and neurodegeneration. Current sensors aren't sensitive enough to track its dynamics, which is why optimizing the RZnP1 sensor could help researchers study new treatment targets or learn new information about Zinc. I created different versions of the zinc sensor by carefully changing specific parts of its structure, then tested about 96 bacterial samples at a time to find which versions glowed brighter and responded better to zinc changes. To do this, I compared how the sensors reacted when zinc was removed versus when extra zinc was added. I've found 5 modified versions of the zinc sensor that appear to work better than the original. Currently, I'm testing these in cells to verify how much stronger their zinc-detecting signals are.

EXPLORING EMOTIONAL WELL-BEING AMONG GROUP FITNESS INSTRUCTORS

Nyah Cubbinson[1], Brian Gearity[2], Daniel McIntosh[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

What are group fitness instructors' perceptions of emotional experiences in regard to their work? This study uses 15 qualitative interviews to explore group fitness instructors' emotional experiences. Interviews were 30-60 minutes long and conducted via Zoom. The study's findings revealed that group fitness instructors' job demands fall into three main categories: Instructing, which includes experiences during class instruction; Group Fitness Instructor Occupation, which encompasses job-related experiences outside of actual teaching time; and Life, which covers personal life experiences influenced by their profession. Emotional experiences within each category were further classified as having either a positive or negative tone based on interview interpretations, highlighting the complex interplay between work and personal life in shaping instructors' well-being.

THE ROLE OF GENDER AND RACE/ETHNICITY IN THE FREQUENCY AND CORRELATION OF DEPRESSION, HOPELESSNESS, ANXIETY, AND EXHAUSTION IN FIRST-GENERATION COLLEGE STUDENTS

Mariely Cruz[1], Edward Garrido[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

The study examines the mental health of first-generation college students at Santa Clara University, with a focus on depression, hopelessness, anxiety, and exhaustion. This analysis is based on secondary data derived from a previous survey conducted by Santa Clara University. Of the 1,681 total respondents, 1,036 participants ages 17-69 were included in this study based on relevant inclusion criteria. Findings indicate that first-generation female students report higher frequencies and a stronger correlation between depression and hopelessness compared to male students. While female participants also show a higher correlation between anxiety and exhaustion, the relationship remains weak, and both genders report similar frequencies of anxiety. Racial and ethnic comparisons reveal that African American/Black, Latino/Hispanic/Spanish, and Asian students exhibit a stronger correlation between depression and hopelessness than Caucasian/White students, despite reporting similar frequencies of depressive symptoms. Regarding anxiety and exhaustion, African American/Black students show a stronger correlation than other groups, who demonstrate weaker associations. Additionally, Caucasian/White, African American/Black, and Latino/Hispanic/Spanish students report higher anxiety frequencies compared to Asian students. These results emphasize the varied mental health challenges that first-generation students face across different genders and racial/ethnic groups. Furthermore, the results highlight the importance of inclusive mental health services that reflect the diverse experiences of first-generation students and point to an opportunity to strengthen mental health support by considering the unique needs of different student populations.

SUPPORTING THE LOCAL MUSIC COMMUNITY THROUGH RECORDING SMALL UNDERREPRESENTED ARTISTS

Grady Dionne[1]
[1]Student Contributor, University of Denver

How can we make professional recordings accessible to artists who do not have the time, money, or pre-existing platforms to make that possible? Over the course of 11 weeks, I recorded 9 bands in the New Hampshire seacoast music scene. I set up all audio and video recording equipment for each group, with each video taking about 4-5 hours total. Post production involved mixing and mastering all the audio using Pro Tools, and editing the videos using Premiere Pro. The project was overall extremely successful. The recordings, which were made available on YouTube now total over 1000 streams. The outreach to people who had never heard this music was incredible to see, and most importantly the bands were happy with the product. One of the most important things in modern times is to have music that is easily shareable, and this project made that process incredibly easy.

MOTHERING SICKLE CELL DISEASE: NEW FRAMEWORKS FOR THE CAREGIVING ROLE

Nicole Doris[1]
[1]Student Contributor, University of Denver

Sickle Cell Disease (SCD) is a chronic, hereditary blood disorder that disproportionately affects individuals of African descent. While existing research primarily focuses on the medical aspects of SCD and the experiences of those diagnosed, this study highlights the often overlooked burden placed on caregivers—particularly mothers. Using a combination of SocioFeminist Health and Womanist Disability approaches, this paper explores how the intersections of race, gender, and systemic neglect shape the caregiving experience. Mothers of children with SCD navigate a healthcare system rife with racial bias, inadequate provider knowledge, and stigmatization, all while shouldering immense emotional and physical labor. By centering caregiver narratives and proposing novel theoretical approaches, this paper advocates for a shift in healthcare and research priorities that recognize caregiving as both a public responsibility and a site of systemic inequity. Addressing these gaps is essential for improving health outcomes for both individuals with SCD and their caregivers.

INVESTIGATING THE EFFECTS OF PATIENT-DERIVED EXOSOMES ON NUCLEAR RELOCALIZATION OF TAU IN NEURONS

Nicole Doris[1], Lyndsie Salvagio[2], Yan Qin[2], Ann-Charlotte Granholm-Bentley[3]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver
[3]Advisor, Department of Neurosurgery, University of Colorado Anschutz

Alzheimer's Disease (AD) is a devastating neurodegenerative disorder characterized by the presence of amyloid beta plaques, tau tangles, and disrupted autophagy. Current research has found a strong correlation between the cytoplasmic to nuclear relocalization of tau and AD pathology. We explored the use of patient-derived exosomes to analyze AD pathology within primary neuron cultures. Patient plasma and CSF can be analyzed for AD biomarkers such as Aβ plaques or tau antibodies and used for early disease detection. Furthermore, new findings have shown the appearance of tau in exosomes, suggesting that exosomes might be involved in the spread of hyperphosphorylated tau between neurons. To test this, we examined the subcellular localization of tau in both primary hippocampal and cortical neurons and fibroblast-like COS-7 cells using exosomes isolated from patient brain tissue. Our results showed that AD patient-derived exosomes from cerebral tissue significantly enhanced the nuclear localization of tau in both cell types. Our results not only established a primary neuron model to study the pathological mechanisms of AD, but also provided strong evidence that exosomes carry cargoes that can transform normal neurons, thereby affecting neuronal functions.

N TERMINAL TAGGING OF YEAST INTERMEMBRANE PROTEINS

Anna Dymov[1]
[1]Student Contributor, University of Denver

We aimed to improve the current technique used to N-terminally tag genes by providing a novel protocol. We went through PCR to gene edit, plate on various selection plates, and genotyping and imaging for confirmation. We have a way to now easily N-terminally tag any gene of our interest quickly and easily for future use.

WHO'S YOUR DADDY?: A STUDY MEASURING FITNESS IN THE WILD

Hannah Eckert[1], Gabrielle Welsh[2], Robin Tinghitella[2], and Erica Larson[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

The question addressed by this project is how natural and sexual selection interact as conflicting forces to influence the evolution of novel signals in response to environmental pressures. Exploring this interaction enhances our understanding of the dynamics of evolutionary trade-offs and adaptive behavior in changing environments. To answer the question, I utilized a mesocosm experiment in which equal numbers of purring and ancestral male crickets were released into enclosures with females, where all crickets were exposed to parasitoid flies and females could mate with any of the available males. I then used genetic parentage analysis to assess the reproductive success of each male morph by genotyping both adults and nymphs to determine the paternity of the offspring. My findings show that females produce more offspring with the ancestral cricket morph than with the purring cricket morph, but that the ancestral cricket also experienced much higher rates of parasitism. This indicates that while certain traits—such as the cricket's song—may enhance reproductive success, they can simultaneously increase risks to survival.

NEIGHBORHOOD OPPORTUNITY AND SLEEP HEALTH: UNEXPECTED PATTERNS IN FAMILIES FACING ADVERSITY

Charlie Ernst[1], Anna Zhou[2], Sarah Watamura[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver
[3]Advisor, Department of Neurosurgery, University of Colorado Anschutz

This research explored links between neighborhood opportunity and child and parent sleep in families experiencing significant adversity. Understanding these links can inform policies and interventions to promote health and well-being in families experiencing low income, as sleep is often linked with physical and mental health outcomes. I analyzed previously collected data from families experiencing significant adversity, including geocoded census tract data to evaluate neighborhood opportunity and questionnaire data assessing parents' perceptions of both their own and their children's sleep quality. To examine the hypothesis that lower neighborhood opportunity correlates with poorer sleep quality, I conducted linear regression analyses using SPSS. Increased neighborhood opportunity was not associated with maternal sleep quality, but was significantly associated with poorer child sleep quality (β = -.31, p<.001); poorer sleep quality was associated with more internalizing (β = -.20, p=.03) and externalizing symptoms (β = -.30, p<.001). For families facing significant adversity, there may be increased stress and social pressures in the context of living in higher opportunity neighborhoods, which in turn may negatively impact child sleep.

AN ANALYSIS OF THE ROLE OF MOTHERHOOD IN SOCIETY OVER THE LAST 100 YEARS – A COMPARISON OF GERMANY AND AMERICA

Larissa Fedorovich-Klein[1]
[1]Student Contributor, University of Denver

How society expects women to handle motherhood and the reality of motherhood often do not cooperate. This is reflected historically in Nazi Germany and currently in the United States, specifically in the restriction of reproductive healthcare towards women and mothers. I looked at the political climate of modern-day America as well as Nazi Germany to conclude the effects of restricting reproductive health care as both societies became more extreme. As societies become more right-leaning and conservative, there is a change in access to reproductive health care for women, as their role in society is changed to that of the mother and homemaker once again.

THE PAWS PORTRAIT PROJECT

Georgie Fields[1], Kimberly A. Guevara[1], Aven McCall[1], Ben Peltier[1], Feruz Yahia[1]
[1]Student Contributor, University of Denver

Our project addresses how to support animal shelters facing overpopulation, with a focus on the Denver Animal Shelter—the only open intake shelter in the city. We explore how media and community engagement strategies can alleviate strain on the shelter by increasing adoptions and public awareness. We interviewed staff and volunteers at the Denver Animal Shelter, analyzed their social media presence, and researched successful outreach strategies from other cities to design a targeted plan for boosting adoptions. We also photographed adoptable and stray dogs and cats to feature them in engaging social media posts that increase visibility and connect with potential adopters. We conducted interviews before and after the photo updates, asking our stakeholder if they observed improvements in shelter operations or higher adoption rates for dogs featured in the new photos. The project is still ongoing, so final results are yet to be determined.

ILLUMINATING MITOCHONDRIAL ZN^{2+} DYNAMICS VIA TRPML1 USING A FLUORESCENT ZN^{2+} SENSOR MITOGZNP4S

Patrick Flores[1]
[1]Student Contributor, University of Denver

Can a sensor be developed with a high enough affinity to detect Zn^{2+} transport into the mitochondria from other intracellular compartments that may containZn^{2+}? We introduced mutations into a genetically encoded Zn^{2+} sensor to enhance its sensitivity and selectivity for Zn^{2+} and targeted it to the mitochondria, and characterized it in vitro. Then, we overexpressed this sensor, along with TRPML1, in HeLa cells and activated TRPML1 with its agonist and measured Zn^{2+} uptake into the mitochondria over time. We successfully created a high affinity mitochondrial Zn^{2+} sensor that is selective for Zn^{2+} and used this sensor to show that Zn^{2+} is transported from lysosomes to mitochondria via TRPML1. Our data suggests that Zn^{2+} ions can be transported between organelles, which may be relevant to MLIV disease, which is caused by mutations in TRPML1.

THE SHIELD OF FEMININITY: WOMEN'S ROLES IN NAZI GENOCIDE AND THEIR ESCAPE FROM ACCOUNTABILITY

Jadyn Floyd[1]
[1]Student Contributor, University of Denver

This research investigates societal perceptions of female perpetrators of the Holocaust in postwar Germany and examines how these perceptions led to the denial and minimization of their involvement in Nazi crimes. By analyzing gendered narratives of violence, I argue that the widespread belief in women's inherent nonviolence led to the obstruction of both social and judicial accountability. Through case studies such as Irma Grese and Leni Riefenstahl, alongside a range of primary and secondary historical sources, my research demonstrates how gendered assumptions influenced legal proceedings and shaped collective memory in the aftermath of World War II in Germany. My project calls for a critical reassessment of women's roles in the Holocaust and challenges dominant historical narratives that have long undermined women's participation in Nazi atrocities.

HOW TRYING FEELS: INTEROCEPTION'S ROLE IN THE EXPERIENCE OF EFFORT DURING DECISION MAKING

Sophia Forcier[1], J. Von R. Monteza[2], Peter Sokol-Hessner[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

When faced with mentally demanding tasks such as decision making, how does awareness of bodily sensations (interoception) influence the deployment of cognitive effort? This study explores whether individuals who are more attuned to their internal bodily signals experience cognitive effort more intensely, shaping how and when they exert effort during decision making. In a two day in-person study, on the first day we quantitatively estimated participants' risk preferences, and then used those estimates to create individually-tailored choice sets with choices that were easy and difficult for that person. Effort was indexed by decision times. In the second session, participants completed a heartbeat detection task in which they judged whether sequences of tones were in-sync with or delayed from their heartbeat across 160 trials, enabling the robust calculation of their accuracy in that judgment. Hierarchical linear regressions found that interoceptive ability shapes effort exertion as indexed by decision time globally and on a per-trial basis. Globally, good interoceptors decided more quickly on average than poor interoceptors, consistent with an overall reduction in effort perhaps due to increased sensitivity to effort's affective consequences. Good interoceptors' effort was additionally more tightly calibrated to current choice difficulty and less calibrated to recent choice difficulty, indicating that effort was somewhat more precisely exerted by these individuals. These results indicate that individual differences in interoception may shape effort exertion during decision making at multiple levels, including globally over the entire task, and moment-to-moment in response to fluctuating task demands.

JANTHINOBACTERIUM LIVIDUM AS A POTENTIAL INFECTION MODEL FOR STUDYING IMMUNE DEFENSE IN THE FRESHWATER SPONGE EPHYDATIA MUELLERI

Gwendolyn Geiger[1], Scott Nichols[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

Sponges are aquatic invertebrates that feed by phagocytosing bacterial prey, a feeding strategy with a high risk of infection by intracellular pathogens. Although they clearly distinguish between prey, parasitic, and beneficial microbes, the cellular and molecular mechanisms underlying this discrimination remain unknown. A major barrier to mechanistic studies of sponge immunity is the absence of experimentally tractable systems that reliably induce authentic immune responses. To overcome this, we are seeking natural bacterial pathogens capable of eliciting reproducible and physiologically relevant host responses. A Gram-negative Janthinobacterium species (strain SLB01) was recently identified in Lake Baikal, Russia, as a natural pathogen of freshwater sponges. However, this isolate is currently inaccessible for laboratory study. Notably, unlike many pathogenic bacteria that rely on a type III secretion system (T3SS) to infect host cells, SLB01 encodes a type VI secretion system (T6SS), suggesting a distinct virulence mechanism. To experimentally model this interaction, I screened three commercially available strains of Janthinobacterium lividum: two encoding T6SSs and one encoding a T3SS. For each strain, I conducted growth assays to correlate optical density with colony-forming unit (CFU) counts and used these data to standardize inoculum concentrations for experimental infections in the model sponge Ephydatia muelleri Infection dynamics were monitored over time using eubacterial fluorescent in situ hybridization (FISH) combined with DNA and actin counterstains and confocal microscopy. Preliminary results indicate that J. lividum can bypass the canonical phagolysosomal feeding pathway and enter the sponge body cavity—behavior consistent with either pathogenic or mutualistic strategies. I am currently characterizing host responses to the T3SS- versus T6SS-encoding strains, with the expectation that T6SS-bearing strains may more accurately recapitulate the infection strategy of SLB01. This system may ultimately provide a tractable and ecologically relevant model for studying innate immunity in sponge-microbe interactions.

EXPLORING THE MARTIAN PALEOCLIMATE THROUGH RIVER-VALLEY NETWORK PATTERNS

Camryn Gunter[1]
[1]Student Contributor, University of Denver

This project explores what ancient Martian river patterns can tell us about the climate that formed them. It aims to expand the knowledge of extraterrestrial river-network analysis and the climate history of Mars. By evolving the river-valley network backwards in time, we collected climate information about the entire history of its growth and calculated a growth exponent. This growth exponent will inform us about the climate of Mars during the time of formation, a value of less than one indicates an arid climate and more than one indicates a humid climate. With our analysis, we found that one Martian network likely formed in an arid climate.

NAVIGATING EDUCATION: A RESOURCE GUIDE FOR PARENTS AND FAMILIES

Kendal Hengst[1], Charlie Bednarz[1], Issy Garside[1], Addison Baker[1], Rachel Mina[1]
[1]Student Contributor, University of Denver

Our project addresses the ongoing issue of education inequity in Colorado by focusing on one of the most vital, yet often overlooked, stakeholders in the system: parents. Through conversations with teachers, administrators, and education advocates, we identified a need for accessible, family-centered tools that support parents as they navigate their children's education. In partnership with the Bueno Center, we developed a bilingual parent guidebook that provides practical resources, answers to common questions, and guidance on how to build stronger relationships with schools. Rather than offering one-size-fits-all solutions, the guide is designed to be adaptable—giving families the tools to advocate for their own needs and empowering schools to meet families where they are.

HOW DOES ANIMAL PERSONALITY RELATE TO EVOLUTIONARY CHANGE

Brooke Hermanson[1], Amanda Klingler[2], Robin Tinghitella[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

Do personalities differ between newly evolved cricket morphs with different evolutionary histories? We analyzed previously developed assays of behavioral trials for crickets. We then created our own to develop assays specifically measuring exploration, neophobia, and predation. Our results were the types of assays developed. We had to wait to test them in the field, and began trials in the summer for lab crickets.

NARRATING THE NEW COLD WAR: INVESTIGATING CHINESE CYBER PROPAGANDA AND SINO-AMERICAN TENSIONS ON BILIBILI

William Highfill[1]
[1]Student Contributor, University of Denver

How does Bilibili, as a digital platform targeting international and diasporic Chinese audiences, construct and disseminate New Cold War narratives that critique Western systems and promote China as a stable alternative, what ways do these narratives draw from or diverge from historical Cold War propaganda, and what implications do they have for understanding the evolving role of digital platforms in shaping global geopolitics? Through a qualitative digital ethnography, I immersed myself in the platform's algorithmic environment, analyzing politically charged content, remix culture, bullet comment threads, and patterns of engagement surrounding reuploaded Western media. My research demonstrates that Bilibili does not function as a top-down propaganda machine, but rather as a hybrid ideological space where users co-produce nationalist narratives through symbolic reinterpretation, emotional discourse, and selective critique of Western institutions. Drawing on comparisons with Cold War-era propaganda, I argue that Bilibili exemplifies a new model of participatory digital nationalism; where nationalism is reinforced not just through direct government messaging, but through user participation. This makes it more resilient than traditional state-controlled media, as users feel that they are actively shaping the discourse, rather than being passively indoctrinated.

EXOSOME ISOLATION FROM BRAIN TISSUE OF THE 3XTGAD MOUSE MODEL FOR ALZHEIMER'S DISEASE

Sydney Jaques[1]
[1]Student Contributor, University of Denver

Alzheimer's disease is a neurodegenerative disease that occurs with the accumulation of amyloid-beta plaques and tau protein in the brain. Exosomes, small, cargo-carrying vesicles released by cells, have been thought to be possible contributors to the spread of these pathogenic proteins throughout the brain. This study begins to explore the role of exosomes in the neuropathology of Alzheimer's disease by establishing a protocol for exosome isolation from 3xTgAD mice brain tissue. Four immunoaffinity-based isolation techniques were used, followed by transmission electron microscopy (TEM), dot blotting, nanoparticle tracking analysis (NTA), and Western blotting to validate the isolated extracellular vesicles (EVs) as exosomes. Out of the four methods explored, sequentially isolating astrocyte-derived exosomes (ADEs) using streptavidin-bound magnetic beads and biotinylated GLAST antibody from Invitrogen yielded the comparatively purest and most populated sample of isolated exosomes. Deriving exosomes directly from brain tissue allows for close study of their role in the spread of pathogenic amyloid-beta and tau proteins through the brain. This protocol opens the door for downstream biomarker analysis of exosomes, particularly with biomarkers indicative of neurodegeneration and neuroinflammation, and extends the applicability of known exosome isolation techniques from biological fluids to brain tissue. Furthermore, the capacity to directly isolate exosomes from brain tissue is highly relevant to understanding how these vesicles contribute not just to Alzheimer's disease, but also to other types of neurodegenerative diseases with neurologically localized pathologies.

METABOLOMICS ANALYSIS OF ASTROCYTE ACTIVATION IN NEUROLOGICAL LONG-COVID AND MILD TRAUMATIC BRAIN INJURY

Kerstin Lewey[1], Allison Grossery [2], Daniel Linseman[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

The neuroinflammatory responses in COVID-19 infection are similar to those observed in mild traumatic brain injuries (mTBIs), including activation of glial cells in the brain and the release of pro-inflammatory cytokines; however, the complete mechanisms of these neuroinflammatory responses are not fully understood. The purpose of this study was to explore the metabolic changes associated with glial activation in vitro caused by exposure of primary human astrocytes to astrocyte-derived exosomes (ADEs) from patients with a history of COVID-19 and mTBI using metabolomics. Following recruitment of participants with histories of COVID-19 infection only, mTBI only, both COVID-19 infection and mTBI, or neither COVID-19 infection nor mTBI, ADEs were isolated from patient plasma samples. Primary human astrocytes were incubated with pooled ADEs from each group, and UHPLC-MS metabolomics was performed on the astrocyte lysates. The LC-MS data were analyzed to identify significant differences in metabolite levels between groups using an online metabolomic analysis platform, MetaboAnalyst. Fold change analysis revealed differences in metabolite levels in astrocytes exposed to ADEs from patients with a combined history of COVID-19 and mTBI compared to control patients, including metabolites related to oxidative stress, glycolysis, and fatty acid oxidation. Pathway analysis of the metabolites identified by UHPLC-MS revealed several significantly represented pathways, including glutathione metabolism, purine metabolism, amino acid metabolism, and energy production pathways. These results offer a unique metabolic perspective of astrocyte activation due to neuroinflammatory conditions and support further investigations into the underlying mechanisms of these metabolic changes.

DESIGNING APP FOR MATLAB REAL-TIME APPLICATION

Ethan Lim[1]
[1]Student Contributor, University of Denver

How can software be applied to a real-time system to improve the functionality and user control of a robotic system during operation? Designing a Real-Time app that can control motor functions and display data through graphs can make controlling and understanding a robotic system easier. Provides users with data that's constantly being updated and allows to control machine functions while operating. Designing an app for a real-time application with a Speedgoat Target Machine is relatively new because there are limited number of resources available. It is important to research and study the functions that support Simulink Real-Time to build a functioning app.

PLP - LEAD THE WAY CCI PROJECT PRESENTATION

Jagger Livengood[1], Owen Mantelli[1], Gabby Pappas[1], Abby McDonald[1], Madeleine Dierking[1], Eve Miller[1]
[1]Student Contributor, University of Denver

Our project addressed lacking leadership and soft-skill education in local high schools. We became involved in school systems, teaching courses on leadership and soft skills weekly. We educated around 30 students on these tactics and hosted an event at DU where students interacted with leadership professionals and activities.

TENSIONS IN THE ARCTIC: AVOIDING CONFLICT AMIDST CLIMATE CHANGE AND MILITARIZATION

Emma Loeber[1]
[1]Student Contributor, University of Denver

My project sought to find a way for the Arctic states to increase their collaboration and transparency in order to prevent a conflict from happening over resource competition, insecurity, and militarization. I analyzed the published Arctic Strategy documents of the Arctic states and China in order to determine each state's goals for the region and how those could be fulfilled while also taking action to reduce political tensions. My analysis resulted in the two recommendations: that the Northeast and Northwest Passages be declared international straits under the governance of Russia and Canada respectively and that the Arctic Council expand its mandate to include military security issues so that the states can better communicate. I believe that these recommendations would be acceptable to all of the relevant states and successfully reduce the likelihood of a conflict in the region.

EXAMINING THE IMPACTS OF THE MT. ST. HELEN'S ERUPTION ON TREE GROWTH

Anna Marlow[1], Michael Kerwin[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Geography, University of Denver

Following the eruption of Mt. St. Helens, there were large amounts of ash distributed across the United States. Tree core samples were collected from forests near Enumclaw, Washington – roughly 100 miles from the eruption site – that were analyzed using the tree rings to examine how different tree species grew year to year. Charts were created in order to show the changes in growth following the eruption in 1980. The project determined that the nutrients in the ash promoted growth within the trees. The tree rings became complacent following the eruption, indicating that the nutrients allowed for the trees to thrive even in dry years.

VISUALIZING OZONE POLLUTION IN THE DENVER METRO AREA USING A BIOINDICATOR GARDEN

Ella Mathews[1], Hillary Hamann[2], Erica Larson[3]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Geography & the Environment
[3]Advisor, Department of Biological Sciences

Since the industrial revolution, widespread fossil fuel combustion has significantly increased atmospheric pollution. The combustion of fossil fuels releases nitrogen oxides (NOx) and volatile organic compounds (VOCs), which form tropospheric (ground-level) ozone when exposed to sunlight. Ozone directly harms plants by disrupting their ability to absorb carbon dioxide, release oxygen, and carry out photosynthesis. Bioindicator species are plants that have visible responses to environmental conditions, such as ozone, and can act as "canaries in the coal mine," indicating the health of their environment. In this study, I use a garden of ozone bioindicator species (ozone garden) as a cost-effective tool for monitoring and visualizing the effects of anthropogenic ozone pollution. My goal was to understand the damage tropospheric ozone has on plants in Denver using two varieties of beans: a common ozone-sensitive variety and a modified ozone-tolerant variety as a control. For a full growing season, I monitored the temperature, ozone concentration, and leaves for ozone damage. I found that the ozone-sensitive cultivar exhibited significantly more foliar injury compared to the tolerant cultivar (p<0.05) in response to tropospheric ozone. I also found evidence that ozone-sensitive snap beans experience a latency period in their response to foliar injury. All foliar injury data were added to a nationwide database of ozone gardens to contribute to understanding the relationship between ozone concentration and damage severity across different locations.

DEVELOPING RESEARCH METHODS FOR MEASURING AND IMPROVING USER ENGAGEMENT WITH LARGE LANGUAGE MODELS

Khadija Mohamed[1]
[1]Student Contributor, University of Denver

This project focuses on developing a framework for studying how users engage with content generated by large language models (LLMs). It aims to guide future research on how elements like tone, personalization, and structure may influence trust and perception. The project will begin with a review of existing literature on user engagement and LLMs to identify current research approaches. From there, I will organize key themes into categories and subcategories to help build a flexible framework that future researchers can use to study how users interact with LLM-generated content. While the research is ongoing, the goal is to create a foundational framework that can be used and adapted by future researchers. As LLMs continue to evolve, this work can help guide more effective and consistent methods for studying user engagement with these emerging technologies.

EXPANDING AWARENESS AND SUPPORT FOR NEURODEGENERATIVE DISEASES IN THE VIETNAMESE REFUGEE COMMUNITY

Vivian Nguyen[1], Sarah Watamura[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

After conducting a thorough literature review, we identified systematic barriers that hinder the understanding and diagnosis of neurodegenerative diseases. To better support Vietnamese communities—especially immigrants and victims of the Vietnam War—we plan to provide easily accessible and comprehensible materials to address cultural and linguistic gaps. Our goal is to create a culturally sensitive brochure that informs Vietnamese individuals and families about symptoms, available resources, and support options. This tool is designed to bridge communication gaps and raise awareness within the community.

DATA-INFORMED DECISIONS: CONCORDANCE OF APPRAISAL FROM MULTI-INFORMANT REPORTS ON LIVING SITUATIONS (LS) OF OUT-OF-HOME-CARE (OOHC)

Gabri Notov[1]
[1]Student Contributor, University of Denver

In 2022, the Adoption and Foster Care Analysis and Reporting System (AFCARS) estimated that there were 369,000 children in foster care as of the Federal Fiscal year (FY) with 187,000 of those children having just entered that year (U.S. Department of Health & Human Services, 2024). Given the importance of utilizing multi-informant forms for surveys about placement and abuse (Ren et. al., 2024; The Center for Human Services et. al., 2008; Fang et. al., 2023), I used this subsection of the Living Histories Project for my micro credential in data-informed decisions in order to investigate the moderating effect of attachment on concordance and discrepancies across multi-informant forms. Data was acquired from the original R01 longitudinal study conducted by Fostering Healthy Futures (FHF), a mentorship intervention for preteens and teens in out-of-home-care (OOHC) (Taussig et. al., 2012). The primary goal of the micro-credential was to use a variety of statistical software— R, SPSS, REDCap, and Excel— to establish the main association between concordance of living situation (LS) appraisal at timepoint 1 (T1) and the number of subsequent living situations at T2. Concordance was measured at 2 levels using Pearson's R and 3 levels using a one-way ANOVA. Results came out marginally significant for the Pearson's R, $t(251) = 0.78$, $p = .089$, and the one-way ANOVA, $t(251) = 0.78$, $p = .089$. A sensitivity power analysis at 80% power was conducted based on the sample n =160, resulting in a small effect size, $f^2 = 0.039$. Thus, while there is a possible inverse relationship between concordance and placement stability, there was not enough power to rule out alternative explanations for these results. We plan to further investigate this using the other waves of data from FHF to increase power and analyze the child's attachment to their caregiver.

CULTURING, BLEACHING, AND EXOSOME EXTRACTION FROM CAENORHABDITIS ELEGANS MODELS FOR PARKINSON'S DISEASE

Ifunayachi Ogbonna-Ukuku[1], Sunil Kumar[2], Charles Baysah[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Chemistry & Biochemistry, University of Denver

My project addresses how exosomes derived from Caenorhabditis elegans contribute to the spread of α-synuclein aggregation, a hallmark of Parkinson's disease. Understanding this mechanism is important for identifying potential therapeutic targets that could interrupt the progression of neurodegeneration. To investigate exosome-mediated α-synuclein aggregation, I cultured transgenic C. elegans expressing human α-synuclein, performed synchronized bleaching to obtain age-matched populations, and extracted exosomes using ultracentrifugation and filtration techniques. These vesicles were then analyzed to assess their role in protein aggregation and intercellular signaling. Through culturing, bleaching, and exosome extraction from Caenorhabditis elegans models of Parkinson's disease, I successfully isolated exosomes containing α-synuclein aggregates. Confocal imaging revealed the localization and progression of these aggregates, particularly in the head region of the worms. These findings suggest that exosomes may play a role in the propagation of neurodegenerative pathology, offering insights into potential therapeutic targets for Parkinson's disease.

POLLEN ANALYSIS FROM A LOW-ELEVATION FEN IN COLORADO'S FRONT RANGE AND IMPLICATIONS REGARDING CLIMATE CHANGE

Sarah Olson[1], Don Sullivan[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Geography & the Environment, University of Denver

Peatlands serve as valuable paleoecological archives through preserving long-term records of climate and vegetation change. While most studies in Colorado have focused on high-elevation fens and lakes, little is known about the paleoecology of lower montane systems, despite their sensitivity to environmental changes. This thesis presents a fossil pollen analysis from Todd Gulch fen, located at approximately 8,460 feet in Colorado's Front Range – making it one of the lowest elevation fens in the region. Through microscopic identification of stratified pollen preserved in a sediment core, this study reconstructs vegetation dynamics over the last 10,000 years, offering insights into Holocene climate variability and vegetation dynamics. Results indicate distinct shifts in pollen composition corresponding to known Holocene climatic phases, including early Holocene warming, mid-Holocene aridity, and Neoglacial cooling. These findings not only contribute a new paleoecological record for a spatially underrepresented zone, but also emphasize the ecological sensitivity of montane fens to climatic and hydrological fluctuations. Understanding these long-term patterns provides critical context for anticipating future ecosystem responses under projected climate change in the Southern Rocky Mountains.

VULNERABLE POPULATIONS AND COASTAL HAZARDS

Anna Paradiso[1]
[1]Student Contributor, University of Denver

This project aimed to determine what demographics in Gulf Coast cities are most at risk of coastal flooding hazards and what locations would require the most support in an emergency flooding situation. Using data from the US Census Bureau and the Federal Emergency Management Agency for the Houston, New Orleans, and Tampa regions, I created a database in PostgreSQL and a geodatabase in ArcGIS. I then used PostgreSQL to run queries to determine the most vulnerable locations based on demographic factors and used ArcGIS Pro to display these areas alongside flood risk areas. Cross-referencing this data with case studies, I determined that there are several areas where elderly populations are concentrated along the coast and in high coastal flood risk areas. Elderly populations in particular can have increased difficulty evacuating in emergency situations and often require more assistance. I produced several maps displaying these case studies, showing where vulnerable populations are most exposed.

INVESTIGATING THE REGENERATION OF ZEBRAFISH SWIM BLADDERS

Jay Parrish[1], Mira Pronobis[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

The zebrafish swim bladder is an air-filled organ that plays a critical role in buoyancy control and is developmentally and evolutionarily related to the human lung. Both organs originate from the foregut endoderm and share structural and functional similarities, including the presence of epithelial cell layers, gas exchange functions, and signaling pathways. Given this homology, the zebrafish swim bladder offers a unique and accessible model to study processes relevant to lung biology and disease. Understanding whether the swim bladder can regenerate after injury is important because it could reveal fundamental mechanisms of epithelial repair, fibrosis, and functional recovery—processes that are directly relevant to human lung diseases such as asthma, pneumonia, bronchitis, and chronic obstructive pulmonary disease (COPD). Despite the swim bladder's potential, its regenerative capacity remains largely unexplored.

To investigate this, we developed a mechanical injury model in adult zebrafish by puncturing the swim bladder through the body wall with a 30-gauge needle. We collected swim bladder tissues at various time points post-injury and analyzed them using immunofluorescence microscopy and Western blotting to assess cell proliferation and remodeling responses. Immunofluorescent staining revealed a transient increase in proliferating cells between 3 and 7 days post-injury, as indicated by PCNA expression, but this was not sustained over time. Fibronectin, a marker of tissue remodeling and fibrosis, remained consistently expressed at the injury site through 60 days post-injury. Western blotting supported these observations, suggesting that while a limited proliferative response occurs, the swim bladder does not fully regenerate. Instead, the tissue exhibits signs of chronic remodeling and scar formation. Notably, swimming behavior returned to normal within 24 hours of injury, despite the persistent structural damage to the swim bladder. These findings highlight a disconnect between functional recovery and true tissue regeneration and suggest that the swim bladder may undergo a fibrotic, rather than regenerative, healing response. Further studies are needed to understand the molecular signals that limit regeneration in this organ and to explore how these mechanisms may relate to human lung repair and disease.

PREDICTING PREECLAMPSIA TO REDUCE BLACK MATERNAL MORTALITY USING MACHINE LEARNING AND COMMUNITY-CENTERED DATA APPROACHES

Alisha Pravasi[1], Kerstin Haring[2]
[1]Student Contributor, University of Denver
[1]Advisor, Department of Computer Science, University of Denver
[2]Advisor, University of Denver

Black maternal mortality in the United States remains a public health crisis, with Black pregnant individuals facing rates of death and complications that far exceed those of their White counterparts. A major contributor to this disparity is preeclampsia, a life-threatening hypertensive disorder that disproportionately impacts Black women, often earlier and more severely in pregnancy. This research explores how machine learning can support earlier identification of preeclampsia risk to improve outcomes. Drawing on publicly available maternal health datasets, I built and evaluated a proof-of-concept predictive model in Python, adapting techniques involving Naive Bayes classifiers. My preeclampsia model, trained on features like blood pressure, age, and urine protein levels, was assessed not only for accuracy but also for fairness across racial groups. Findings revealed the model's predictive potential while highlighting deep limitations in data representation for Black patients. These results underscore the need for equitable, community-centered data collection practices and ethical safeguards in health AI. This work contributes to ongoing conversations at the intersection of data science, health equity, and systemic bias in clinical outcomes.

COMPARING PATH PLANNER COMBINATIONS FOR AUTONOMOUS ROBOTS

Diego Ramirez[1], Christopher Reardon[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Computer Science, University of Denver

To determine an optimal combination of local and global path planners for a specific robot to optimize navigation. Using the robot's LiDAR sensor and mapping capabilities to create a map of a space and testing different combinations of implemented path planning algorithms to determine which ones are most effective for different situations. The results of my data analysis were inconclusive, as I ran into compatibility issues with certain algorithms and only determined working algorithms toward the end of my time researching.

ENSURING ACCESS TOGETHER: INCREASING SNAP CAPACITY AT COLORADO FARMER'S MARKETS

Juliana Ramirez[1], Casey Doherty[1], Ella Kestner[1], Teagan Weindel[1], Cate Billings[1], Pablo Torre-Walter[1]
[1]Student Contributor, University of Denver

How can we fill the gap between farmers seeking to accept SNAP at farmers' markets and ensure they have both the necessary training and sufficient devices to accept SNAP payments? We reconstruct the curriculum to train farmers on SNAP certification and usage, a host workshop, and use our grant funding to supply transaction devices and do onboarding days. While also using feedback from farmers and partners to guide our process and improve future training. Success will be measured by the number of farmers trained, SNAP certifications obtained, increased transactions, and participant feedback on the new curriculum guide, adoption numbers and market impacts, however we have yet to fully complete the project as out timeline is set to complete in may.

IMPROVING ACCURACY OF SUPER RESOLUTION IMAGING: FINDING CENTER OF LASER BEAM

Lucy Rand[1], Samantha Reynolds[2], Mark Siemens[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Physics & Astronomy, University of Denver

The purpose of this project is to use super-resolution imaging in deep tissue, specifically the brain, which is important because it can be applied to study the structure-function of neurons regarding the process of learning. Resolution of deep tissue imaging is limited by how well the vortex is centered, and this project focuses on refining the imaging technique by using a different method for centering the beam on the vortex than the one used in the original demonstration of this imaging technique. To find the center of the beam, this project will use an interferometric technique that allows for the measurement of phase and intensity. In the previous demonstration of this imaging technique, intensity fitting was used to center the beam, which only relies on intensity. When both phase and intensity are used to determine the center of the beam, instead of just intensity, it is predicted this will output a more accurate reading. This project was not completed fully, but the results so far have shown aspects of the program that codes the vortex that are crucial for stability and resolution of the hologram, and can be used when continuing this project to optimize the future result.

LETS TALK IMMIGRATION: FACILITATING EMPATHETIC CONVERSATIONS BETWEEN FIRST-GENERATION AND HIGH SCHOOL STUDENTS

Khadeeja Rashid[1], Laine Satterlee[1], Piper Heilbronner[1], Lily Pound[1], Ben Whitehurst[1]
[1]Student Contributor, University of Denver

This project focuses on fostering psychologically safe, collaborative dialogue surrounding the topic of immigration. Given the current political climate, these types of verbal and written exchanges are becoming increasingly dangerous and stigmatized, yet these very challenges underscore the urgency and necessity of creating spaces where open and authentic conversations can thrive. This project employed a combination of quantitative/qualitative surveys and reflective in-person and virtual discussions to understand the student perspective on immigration and how to best address the needs of those involved. While the trajectory of this project shifted from discussion-based facilitated workshops to a holistic guide for future implementation due to the safety concerns of the current political climate, we strongly believe this project is a step towards a more empathetic community through a continued partnership with the Ambassador Foundation and the students that make it possible.

DSFYA: YOUTH TACKLE CAPITOL LOBBYING

Anna Respet[1], Lizzie Lesoing[1], Sydney Hertel[1], Aya Saad-Masri[1], Brooke Ballenger[1], Max Proske[1]
[1]Student Contributor, University of Denver

How can we empower high school students across Colorado to advocate for themselves and their peers in the political and public policy realms? Upon consulting our community partner and coach, we decided we can best leverage our capacity, resources, and connections as a team by organizing a lobbying day at the Colorado state capitol for Colorado Youth Congress high school members. This will empower these students by both educating and training them on how to lobby, contact their elected officials, and make meaningful political and public policy change while applying these skills to specific contemporary issues they care about. We anticipate that this experience will be transformational and highly beneficial for the youth that attend, as it will further aid them in their skills in and passion for public policy and political advocacy. We will measure the success of this project by debriefing with attendees and sending out surveys, conducting interviews, and following up with the impact made both in the legislature and among those involved.

FOSTER FORWARD

Hannah Rosenberg[1], Ellia Nakahara[1], Sophia Espinoza[1], Ivan Woolhouse[1]
[1]Student Contributor, University of Denver

How can we assist foster youth members who are aging out of the system? We wanted to prepare members of the foster care system by connecting them with resources that aid them in the aging out process. We met with a variety of stakeholders to get insight into how our help would be most useful. Additionally, we gained support to compile research on the most helpful resources that are needed to transition into adult living. We established that foster youth need resources before they age out, so we created a resource booklet to provide easy access for them to view. It will be given to our community partner, Hope and Home, to receive feedback on how helpful the booklet was for foster youth.

RECURRENT PROCESSING OF LUMINANCE AND ILLUSORY VISUAL CONTOURS

Simon Ruland[1], Gorkem Er[2], Timothy Sweeny[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

The visual brain stitches together luminance contours (boundaries between light and dark) to detect illusory contours (partially occluded surfaces). Can the visual brain detect illusory contours with linear, feedforward communication alone, or is recurrent processing necessary? The answer could shed light on the brain's architecture and on the construction of neural networks designed to parse visual scenes. Object substitution masking is a noninvasive tool believed to disrupt recurrent processing, and thereby detection, of an object by overwhelming recurrent communication with new stimulus-associated activity. If luminance contours prove to be more resistant to masking than illusory contours, then we may have evidence that luminance contours are less reliant on recurrent processing. Though we found overall effects of masking and contour type on visibility of visual objects, we did not find that luminance contours were more resistant to masking than illusory contours. As such, we have evidence that recurrent processing may be necessary for awareness of contours broadly, regardless of type.

BRUSH-E BOT: MAKING TOOTH BRUSHING FUN AND EASY FOR KIDS THROUGH ROBOTICS

Melaku Saketa[1]
[1]Student Contributor, University of Denver

How can we make daily tooth brushing more engaging for children to encourage better oral hygiene habits? We designed and tested multiple versions of a kid-friendly robot using 3D modeling software and 3D printing. Each prototype was evaluated for functionality, usability, and its potential to make brushing more engaging for children. We developed and refined multiple working prototypes of the Brush-E Bot, focusing on ease of use, interactive features, and educational potential. While the robot was not tested on children, internal evaluations showed improvements in design functionality and user engagement elements.

WATER INEQUITY IN THE DENVER METROPOLITAN AREA: TRUST BUILDING BETWEEN COMMUNITIES AND GOVERNMENT ENTITIES

Michela Schenk[1], Maren Lynch[1], Madi Hamm[1]
[1]Student Contributor, University of Denver

How has historical instances of environmental injustice in marginalized communities led to a lack of trust in government solutions to water inequity? How can we bridge the gap between these community organizations to support initiatives around water equity and sanitation? Utilizing interviews with a wide variety of stakeholders, we gained perspective on the multi-faceted nature of water inequity and the compounding social, legal, and environmental factors that have created the public health situation that is present today. In our partnership with Denver Water, we ideated various routes of action that could sustainably benefit the affected communities. Ultimately, we directed our project towards building relational trust between community organizations and governmental agencies that have the resources to solve the infrastructural issue. Through a partnership with Denver Water's Lead Reduction Campaign, we aided in the expansion of Denver Water's network of community partners. We hope through this project to strengthen the trust between marginalized communities and Denver Water. This trust will be crucial in solving decades of infrastructural issues of the low-income and predominantly immigrant areas of Denver and will in turn solve the resulting public health issues that stem from water inequity.

PSYCHOPHYSIOLOGICAL REACTIVITY AND ANXIETY IN YOUTH: A SYSTEMATIC REVIEW AND META-ANALYSIS

Grace Schroeder[1], Michelle Rozenman[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

Research studies have shown mixed findings for the association between psychophysiological arousal/reactivity and anxiety, with some studies showing a significant positive association and others showing no association, necessitating clarification. This systematic review involved two meta-analyses of eligible studies examining psychophysiology and anxiety in youth. A systematic literature search was conducted in PsycINFO, PubMed, and Web of Science for peer-reviewed English language papers using stem abstract search terms relating to youth, anxiety, and psychophysiology. Full text of articles were then reviewed for inclusion, and eligible study data was then meta-analyzed in Comprehensive Meta Analysis V4. The overall effect size for single sample study correlations between psychophysiology and anxiety symptoms was small, positive, and statistically significant, indicating that overall higher anxiety symptoms are significantly associated with higher psychophysiological arousal at resting baseline. The overall effect size for psychophysiology between diagnosed anxiety/high symptom versus no anxiety diagnosis/low symptom groups was not significant, indicating that youth with anxiety diagnoses/elevated symptoms do not significantly demonstrate higher psychophysiological arousal at resting baseline than non-anxious peers. Together, these results suggest that the association between psychophysiological reactivity and anxiety may not be particularly robust, at least not with the sample sizes and included studies.

REDESIGNING NYKU'S BASE ROTATIONAL MOBILITY MECHANISM AND SOFTWARE

Rana Seif[1], Jackson Hall[1]
[1]Student Contributor, University of Denver

How can the current base-mobility mechanism and software on Nyku be altered in order to maintain functionality and reduce unnecessary external peripherals in order to produce a more life-like base that is easier to transport? We approached the problem by selecting some options for the redesign, then ultimately deciding on the simplest version of the base redesign which we then fully simulated the mechanism in SOLIDWORKS. We then wrote software that could independently run each motor, and finally, the system was prototyped using subtractive manufacturing and 3D printing. A base was successfully designed and prototyped to be enclosed within the penguin base and was able to still provide 3 degrees of rotational freedom with some added limits to the rotational angles dictated by built-in hardware and software restrictions. The updated mechanism faced less issues with traction than the older design because it relied on solid joints held together by screws rather than frictional elements.

BRAIN HEMORRHAGE ASSOCIATED BLOOD BIOMARKERS USING CAPILLARY ZONE ELECTROPHORESIS

Marisela Simental[1], Daniel Paredes[2], Aaron Mena[2]
[1]Student Contributor, University of Denver
[2]Advisor, Knoebel Institute for Healthy Aging, University of Denver

What are the concentration patterns of common biomolecules present in the blood samples of brain hemorrhage patients? This research project involved running and processing of blood samples through the CZE, acquiring data in the form of electropherograms, and analyzing the collected data. As well as data analysis via concentration calculations from the electropherogram data and calibration curves of standard solutions. The results include electropherograms of actual patient blood samples and all standard dilutions of the biomolecules we are interested in analyzing.

TRPML1 KNOCKDOWN USING SHRNA RNA INTERFERENCE

Preston Spaan[1], Lyndsie Salvagio[2], Yan Qin[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

Mucolipidosis type IV (MLIV) is an extremely rare neurological disorder that is linked to the loss of function of the MCOLN1 gene, which encodes the protein TRPML1, a lysosomal channel permeable to Zn^{2+} and Ca^{2+}. MLIV is characterized by neurodevelopmental and ocular impairment. Currently, there is no cure for the disease but it is known that the impairment caused by the disorder is due to the dysfunction of the TRPML1 channel. My goal in this project was to create a shRNA construct that would knockdown TRPML1 and stimulate a cell affected by MLIV. Through transfection of the shRNA plasmid and fluorescence imaging it was ultimately found that one of the transcripts, shRNA 1079, was successful in knocking down TRPML1 expression. Furthermore, the finding that there was no Ca^{2+} spike in wildtype hela and astrocytes indicates that there could be higher endogenous levels of TRPML1 in neurons as opposed to other cells.

THE RECONSTRUCTION OF THE AMERICAN JEWISH IDENTITY POST-OCTOBER 7TH

Evelyn Stovin[1]
[1]Student Contributor, University of Denver

The goal of this project was to determine if a Jewish national identity was forming post-October 7th. If a national identity is forming, this project also aimed to determine why this is happening and what this could mean for the future of the Jewish community. I decided to do surveys and interviews to gain insight into how Jewish students at the University of Denver are defining their Judaism and Jewishness, what their perception of Israel is and its relationship to their identity, and whether they feel they belong to the Jewish community, while factoring in social media. For the social media portion of this project I followed the ADL, Jewbelong, Jewish on Campus, and Rootsmetal on Instagram in addition to liking and sharing what Jewish students liked and shared in order to see what these posts did to my algorithm. There is a national identity forming. However, there is a disconnect between Jewish leadership and the Jewish community. Jews are being asked to make a decision on whether to support their community when neither political wing really acknowledges the American Jewish experience, or compromise their identity in order to stay true to their values.

OPTICAL VORTEX STABILIZATION AND MODELED TURBULENCE

David Andrew Swartz[1], Mark Siemens[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Physics & Astronomy, University of Denver

Can we test and develop a method to reduce the effects of turbulence acting on vortices within a laser beam? How can we simulate turbulence in the lab? Using models of turbulence theory in holography to simulate turbulence in our lab to be able to test the counteract the affects of turbulence on a laser beam. Using models of turbulence theory in the field of holography, i developed a way to emulate turbulence using a spacial light modulator on a laser beam. This is a way we are now able to effectively enact scales of turbulence on a laser beam in our laboratory .

CONSTRUCT SUSTAINABILITY HUB DATABASE A STORAGE TO LARGE SUSTAINABILITY DATA SOURCES

Anh Tran[1], Daniel Pittman[2,3], Kerstin Haring[2], Luke Farchione[3], Emily Boyer[3]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Computer Science, University of Denver
[3]Collaborator, Metropolitan State University of Denver

Sustainability Hub is a project focus on gathering data on Colorado Sustainability. This research aim collect large data source to perform information extraction in assisting LLM to generate response given user question. Large Language Model (LLM) is a model used to generate response base on pre-trained knowledge.
Sustainability Hub have a chatbot, also called as Sustainability Engine, in which LLM is critical model to run conversation between user and computing system. This correlates to sustainability data collection with intention to help community members to learn more about sustainability data in their own area to Colorado as a whole. In my research, building a SQL database help storage this large database that assist the Chatbot.
The Sustainability Hub Database is constructed to store large sustainability data sources using PostgreSQL with SQL primarily handling table structure setup. The PostgreSQL engine extension in VSCode facilitates database creation and data insertion while ensuring well-organized output. To automate database connectivity, the psycopg2 Python package is implemented, allowing parsed data to be directly inserted without manual intervention. Within the Python script, a parser processes incoming data using an algorithmic structure. To execute the INSERT INTO operation, a variable with placeholders (%s) is declared to dynamically accept and store values efficiently. The PostgreSQL extension in VSCode enables efficient table visualization, with the first 1,000 rows used to verify data insertion. Successful entries appear as expected, while "null" values indicate missing data requiring attention. SQL structures relevant categories, though fields like organization names remain in development due to storage challenges. For complex data extraction, LLMs can interact with APIs to retrieve missing information. The parsing method lays the foundation for future data sources, with potential for a reusable library. This structured storage will help LLMs extract keywords, find relevant data, and generate sustainability-related summaries.

PYTHON-BASED MACHINE LEARNING FOR ANALYZING DEER MICE MUSCLE AT HIGH ALTITUDES

Ukari Verner[1], Lacey Conrad[2], Jonathan Velotta[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

My proposal will use Python-based machine learning approaches to provide an improved, effective, and automatic quantification of oxidative fibers and capillaries from stained histological images of deer mouse skeletal muscles. My work intends to illustrate the efficacy of offering a reliable and straightforward way to examine tissue physiology and cellular metabolism in mouse models by comparing it with previous research. I will use Python and OpenCV to develop a computer vision tool that isolates and quantifies skeletal muscle oxidative fibers and capillary density through image segmentation and machine learning. The model's accuracy will be validated against 150 hand-quantified images, and once optimized, it will be applied to analyze the full 3,000-image dataset. The goal is to accurately quantify capillary density and oxidative fiber count, validating the model by comparing its results to 150 hand-quantified images using correlation analysis. If needed, the model will be adjusted to ensure statistical significance.

DENVER ISSA STUDENT AMBASSADOR PROGRAM

James Weiner[1], Jagger Gossett[1], Noah Sherry[1], Sam Proud[1], Ben Block[1], Avi Narayana[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

How can we address the growing cybersecurity workforce shortage in the U.S., where nearly 470,000 unfilled positions leave organizations vulnerable to rising digital threats, financial loss, and reputational harm? We partnered with Denver ISSA to develop a Student Ambassador program aimed at addressing the cybersecurity industry's talent shortage and job vacancies. Our project achieved its goal by connecting students with cybersecurity professionals and mentors through networking events, while also enhancing their resumes and engagement in the field through the Student Ambassador role.

ECONOMIC WARFARE AGAINST IRAN'S NUCLEAR PROGRAM

Zoey Weiss[1]
[1]Student Contributor, University of Denver

This study evaluates the effectiveness of economic sanctions imposed on Iran's nuclear ambitions, with a particular emphasis on the Joint Comprehensive Plan of Action (JCPOA) and the Maximum Pressure Campaign (MPC). Using the Economic Coercion Trilemma framework, this research analyzes the impact of these sanctions regimes on Iran's nuclear program through the lenses of efficacy, political feasibility, and unintended consequences. Ultimately this study explores the question: Could sustained sanctions have constrained Iran's access to critical resources, effectively halting its pursuit of nuclear weapons? The findings suggest that while both the JCPOA and MPC had varying degrees of success, neither fully achieved their desired objective of halting Iran's nuclear development. This analysis contributes to the broader discourse on the limits of sanctions as a tool for nuclear non-proliferation and offers insights into optimizing future sanctions strategy.

RELATIVE FITNESS OF NEWLY EVOLVED CRICKET MORPHS IN REALISTIC SOCIO-SEXUAL SETTINGS

Alyssa Wilson[1], Hannah Eckert[1], Gabrielle Walsh[1], David Zonana[2], Robin Tinghitella[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Biological Sciences, University of Denver

What's the relative fitness between purring and ancestral males in the field? This is important because the fitness of a species determines if their traits will be inherited over another trait. We used field mesocosms in Wailua, Hawaii and there were 20 replicates and deployed adult animals for 1 week, before collected. Then we collected tissue samples from all adults and females laid eggs for fitness calculations. The average time to parasitism is 10 days for ancestral males vs. 66 days for purring. Currently determining parentage using microsatellites and the parents have been sequenced, now sequencing 16 offspring/mom and the mom's spermatheca.

ASSOCIATION BETWEEN BODY MASS INDEX AND EMOTIONAL EATING BEHAVIORS AMONG THREE-YEAR-OLD CHILDREN

Keely Wright[1], Kena Riveria[2], LillyBelle Deer[2], Jena Doom[2], Elysia Davis[2]
[1]Student Contributor, University of Denver
[2]Advisor, Department of Psychology, University of Denver

Greater frequency of emotional eating is associated with a higher body mass index (BMI; kg/m2) in 7-12-year-old children (Webber et al., 2009). However, few studies have examined the emotional eating-obesity relation in preschool-aged children and instead use parent reports such as the Children's Eating Behavior Questionnaire. We aimed to examine whether specific behaviors during an objective emotional eating task were associated with BMI at three years old. Based on the existing knowledge, we hypothesized that a higher engagement with food and puzzles would be associated with a higher BMI. This study utilized data from an ongoing longitudinal project called the Care Project. As part of the study, mother-child dyads came into the lab for a 3-year visit where an emotional eating task took place. During the task, kids had to do a puzzle but a piece was missing. When the evaluator went to look for the piece, the kids were left alone for 5 minutes and could either eat the snacks or play with the toys given to them. Behavioral coding of the task took place in The Observer XT. The behaviors coded were the duration of engagement of food, toys, and the puzzle. The engagement was coded as any time the child looked at or touched the objects. Additionally, the frequency of eating for every bite was also coded. At the same visit, 3-year-old BMI data was collected using child height and weight objectively measured by trained research assistants. We only have preliminary results right now and will have updated data by the time of the presentation. For the first aim of evaluating the emotional eating behavioral codes, we ran correlations of the behaviors with each other. Engagement with food was negatively correlated with engagement with toys (r(142) = -.65, p = <.001), and positively correlated with engagement with puzzles (r(142) = .28, p = .006), and frequency of eating (r(142) = .69, p = <.001). Engagement with toys was also negatively correlated with engagement with puzzles (r(142) = -.41, p = <.001) and frequency of eating (r(142) = -.55, p = <.001). For the second aim we examined correlations between child behaviors and child BMI. There was no significant association between child BMI and engagement with food (r(142) = -.08, p = .383), engagement with puzzle (r(142) = .16, p = .123), or frequency of eating (r(142) = -.04, p = .676).

PHOTOCHEMICAL KINETICS OF ANTHRACENE DERIVATIVES IN THE PRESENCE OF HUMIC ACID

Isabelle Yaremenko[1]
[1]Student Contributor, University of Denver

Anthracene is a polycyclic aromatic hydrocarbon, which is formed from burning organic fuels and is correlated with a range of health problems including cancer and respiratory diseases. When anthracene interacts with electrophiles in the ocean, such as bicarbonate, it forms the carcinogen anthraquinone. Anthracene can also be photodimerized. Humic acid is formed during the decomposition of and is known to increase the rate of solubility of anthracene in aqueous environments. This research focuses on the effects of humic acid on the photolysis and solubility of anthracene in a bicarbonate buffer as well as on the pH of the anthracene-bicarbonate system.This research showed that after the addition of anthracene, the buffer became more basic by about 0.8 pH, photolysis had no effect on the pH. The rate of dissolution of anthracene was significantly increased with the addition of humic acid upon photolysis and in unphotolyzed samples. As hypothesized, the anthracene derivatives, including photodimers, formed from the interactions with electrophiles occurred more frequently and had a higher formation rate than those reported in past literature, which was due to the addition of both bicarbonate and humic acid.

USING GIS AND LIDAR TO SUPPORT COMMUNITY ARCHAEOLOGY IN SURPRISE VALLEY, CA

Caitlyn Young[1]
[1]Student Contributor, University of Denver

The first Indigenous Traditional Ecological Knowledge (ITEK) Field Day in Surprise Valley was held in June 2023 and was supported by the Northern Paiute Gidutikad Band of the Fort Bidwell Indian Community, the Kosealekte Band of the Pit River Tribe, Lomakatsi Restoration Project, Bidwell Canyon Farm, and community residents. This event illustrated the importance of traditional land management practices in shaping local ecologies and developing community relationships. This poster explores how LiDAR and 3D printing, implemented through community archaeology workshops, reveal the innovations, strategies, and embedded histories that can be leveraged from ITEK perspectives.

EDITOR'S NOTES

These abstracts have not been peer-reviewed.