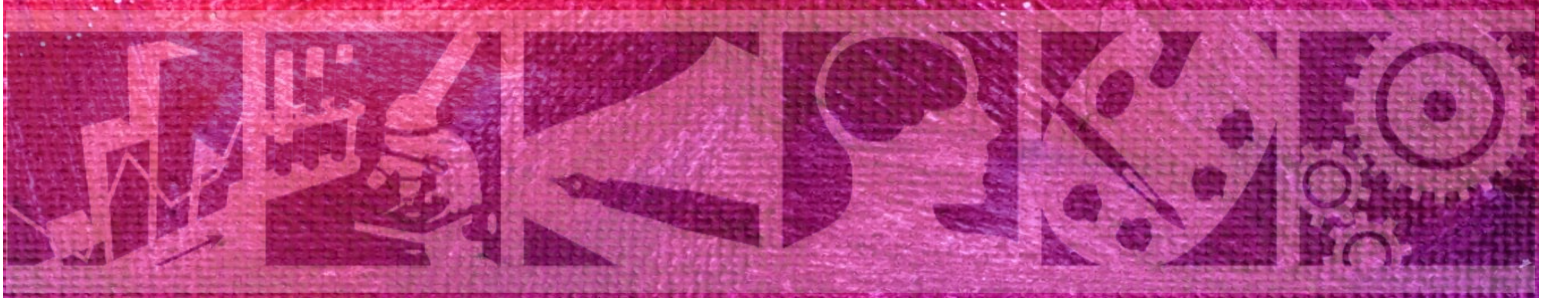
15th Annual

Undergraduate Research Conference

A Symposium of Scholarly Works & Creative Projects



April 24th 2026

Jordan Student Success Building

UNDERGRADUATE RESEARCH & CREATIVE SCHOLARSHIP PROGRAM

Metropolitan State University of Denver

TABLE OF CONTENTS

WELCOME

Welcome to the 15th Annual Undergraduate Research Conference! This Symposium of Scholarly Works & Creative Projects celebrates the hard work and dedication by our students and mentors over the past year. Being involved in undergraduate research builds resilience, fosters creativity, and develops self-efficacy. This research conference is a culmination and celebration of undergraduate research and the students and mentors involved.

To me, the most exciting thing about research is discovering or creating something new – being the first person to stumble upon an interesting data point or being the first person to assemble music notes in a particular way. That is what today is all about – new scholarly and artistic contributions to knowledge made by our amazing students. As I read through the abstracts of this year's presentations, I am incredibly impressed by the body of knowledge produced by our students from a diversity of disciplines across campus.

In addition to the students, I would like to celebrate the mentors. Sixty faculty mentored 150 students in the 100 projects presented today. These mentors work tirelessly to provide research opportunities for students. Without them, this conference would not be possible.

Kristy L. Duran, PhD
Faculty Director for Undergraduate Research
Professor of Biology
MSU Denver

KEYNOTE

Dr. Karen Z. Naufel

"Thriving in Research: Minimizing Risks, Maximizing Rewards"

Synopsis: Research experience, which is often regarded as an opportunity for students to hone their skills, is not risk-free. Researchers can experience physical harm (e.g., being physically harmed by an apparatus or participant), psychological distress (e.g., experiencing stress when interviewing others about sensitive topics), and social risks (e.g., being shunned by others for their role in research). Although mentors may have their students' best interests in mind, they may be unaware of these risks or unsure how to mitigate them before they occur. Yet there are methods and tools that buffer against these risks while also enhancing the validity of a study. Moreover, when risk-mitigation strategies are used, students develop both knowledge and professional skills. Ultimately, addressing risks to researchers poses a unique opportunity to cultivate students' ability to succeed.

Biosketch: Karen Z. Naufel, PhD, is a professor at Georgia Southern University in Statesboro, Georgia. She has strong interests in the ethics of teaching and research, and she is committed to optimizing research experiences for undergraduate students. She loves psychology and its applications, and she lives out her goal to "teach everyone about psychology." Beyond her college classroom, she shares psychological science with children, community members, and interdisciplinary partners. Her work has supported classrooms, volunteer organizations, and her local community. As part of the team behind *Squashing the Spread*, she applied psychological science to community health efforts, work that was recognized with the City of Statesboro's Key to the City. Her accomplishments in teaching have been recognized both locally and nationally, including Georgia Southern's Award for Excellence in Instruction and national honors from the Society for the Teaching of Psychology: the 2010 Jane S. Halonen Early Career Teaching Award, the 2022 Civic Engagement Award, and the 2024 Presidential Citation.

OUTSTANDING MENTOR FOR UNDERGRADUATE RESEARCH:

Dr. Jovan Hernandez

I cannot emphasize enough how much Dr. Hernandez's mentorship means to me and how much it has impacted where I am today. Dr. Hernandez created a safe space to learn and grow. When I had questions, he always took the time to explain concepts and theories to help answer them. He created the space to grow as a student, a researcher, a professional, and as a person. In addition to working with us on IRB proposals, Qualtrics surveys, data analysis on SPSS, and presentations at various research conferences, he helped us work on grad school applications, interview preparation, and our CVs. Dr. Hernandez was one of the first faculty members at MSU Denver who saw my potential, and it wasn't until I began working with him that I started to see it for myself. I am currently in the clinical mental health counseling master's program at the University of Colorado Colorado Springs, and I truly believe I would not be where I am today without Dr. Hernandez's support and guidance. Dr. Hernandez welcomes and supports any student that walks into his office and continues to be an amazing mentor, advisor, and professor for so many undergraduate students.

- Julia Sickrey, Student (Graduated 2025)

Dr. Hernandez takes a student-centered approach to research and frequently supports students in projects that pertain to equity and inclusion, making space for them to explore topics that are often marginalized in more mainstream, traditional academic research. As one of the few full-time faculty of color in his department, he has been sought out as a mentor and support for students of color, and students with other marginalized identities, for the ways that he uniquely understands how identity can shape academic and professional experiences. As a mentor, Dr. Hernandez skillfully uses engagement in research to cultivate curiosity, ethical practice, critical thinking, collaboration, professional development, and of course, research skills. His mentorship style is accessible, encouraging, empowering, and student-centered. Dr. Hernandez is incredibly deserving of the award for Outstanding Mentor for Undergraduate Research.

- **K Scherrer, Professor of Social Science**

Join me in congratulating Dr. Joven Hernandez!

Use the QR code to nominate an Outstanding Mentor for Undergraduate Research today!

UNDERGRADUATE RESEARCH GRANT RECIPIENTS

Meet this year's Undergraduate Research Mini-Grant Recipients! Students have to opportunities to apply for a mini-grant, in October or February. Congratulations go out to the Grant Recipients and their mentors!

Fall 2025

Alejandra Contreras, Bachelors of Fine Art
Mentor: Marin Abell

Benjamin Del Barco, **Logan Hetzel, Jaiclyn Smith,** Psychology
Mentor: Kristen Lyons

LaKrisha Fehringer, Psychology
Mentor: Cassandra Bailey

Viktoriya Gidenko and Isabel Thomas, Chemistry
Mentor: Shailesh Ambre

Stain Gilbertson, Chemistry
Mentor: Shailesh Ambre

Rex Herlin, Bachelors of Fine Art
Mentor: Maeve Leslie

Katherine Karakourtis, Bachelors of Fine Art
Mentor: Marin Abell

Kelly Kossoff, Psychology
Mentor: Katherine Grace Hill

Victoria Lokken, Bachelors of Fine Art
Mentor: Anne Yoncha

Daniel Niewiarowicz and Elias Pike, Psychology
Mentor: Bethany Fleck-Dillen

Katie Perry, Bachelors of Fine Art
Mentor: Helene Ver Eecke

Allison Reed, Kenzie Cann, Biology
Mentor: Jennifer Gagliardi-Seeley

Brittany Rogers, Psychology
Mentor: Keson Drayton

Isabel Thomas, Biochemistry
Mentor: Shailesh Ambre

Spring 2026

Alyssa Thornton - Hospitality Leadership
Mentor: Kiyan Shafieizadeh

Fernando Urrutia, Biochemistry
Mentor: Megan Filbin

Andrea Valencia Espinoza,, Biology
Mentor: Megan Filbin

Ezra Toledo, Psychology and GWS
Mentor: Chad Mortensen

Elise Midcap, Psychology
Mentor: Bethany Fleck-Dillen

Angelina Djibilova, Psychology
Mentor: Jovan Hernandez

Jailene Carrillo, Biology
Mentor: Vida Melvin

Kirsten Zeitler, Psychology
Mentor: Kristen Lyons

Elena Herrera, Biology
Mentor: Vida Melvin

Elliana Ortiz, Biology
Mentor: Robert Hancock

Trinity Taylor, Biology
Mentor: Vida Melvin

Samuel Michael, Communication Design
Mentor: Kelly Monico

Julio Ramirez, Communication Design
Mentor: Kelly Monico

Angela Fleenor, Computer Science
Mentor: Steve Beaty

Maze Swainston, Bachelor of Arts in Music
Mentor: Nicole Predki

Research Scholars

In the Fall of 2021, we piloted the Undergraduate Research Opportunities Workstudy Program (U-ROWdy) to pay students through workstudy to do research with a faculty mentor. In the Fall of 2022, we received 3 years of funding from the Provost's Office to include non-workstudy eligible students. At that time, U-ROWdy became Research Scholars. Since its inception, the program has grown from eight to eighteen scholars a year.

Research Scholars are exceptional students who commit a minimum of 4 research hours a week to work on a research project with a faculty mentor. Scholars are required to submit a report on their progress each semester, attend at least 2 workshops, and present at MSU Denver's Undergraduate Research Conference.

Meet the 2025-26 Research Scholars

Annalyse Bastres, Criminal Justice & Criminology
Mentor: Jennifer Cheek

Ronan Brennan, Geography
Mentor: Sylvia Brady

Tev Cole, Anthropology
Mentor: Michala Stock

LaKrisha Fehringer, Psychology
Mentor: Cassandra Bailey

Juniper Finch, Anthropology
Mentor: Jade Luiz

Jessica Gerome, Art Education
Mentor: Rachel Delaney

Yujin Kim, Computer Science
Mentor: Ranjidha Rajan

Daniel Niewiarowicz, Psychology
Mentor: Bethany Fleck Dillen

Caoimhin Perkins, Physics
Mentor: Kamran Sahami

Katie Perry, Bachelor of Fine Art
Mentor: Helene Ver Eecke

Elias Pike, Psychology
Mentor: Bethany Fleck Dillen

Cody Rowe, Economics
Mentor: Glenn Furton

Christina Mae Speegle, Psychology
Mentor: Katherine Hill

Noah Steinbrecher, Linguistics
Mentor: Samuel Beer

Isabel Thomas, Biochemistry
Mentor: Shailesh Ambre

Ezra Toledo, Psychology and GWS
Mentor: Chad Mortensen

Zoe Ward, Biochemistry
Mentor: Andrew McMillan

Tasha Weiss, Bachelor of Fine Art
Mentor: Anne Yoncha

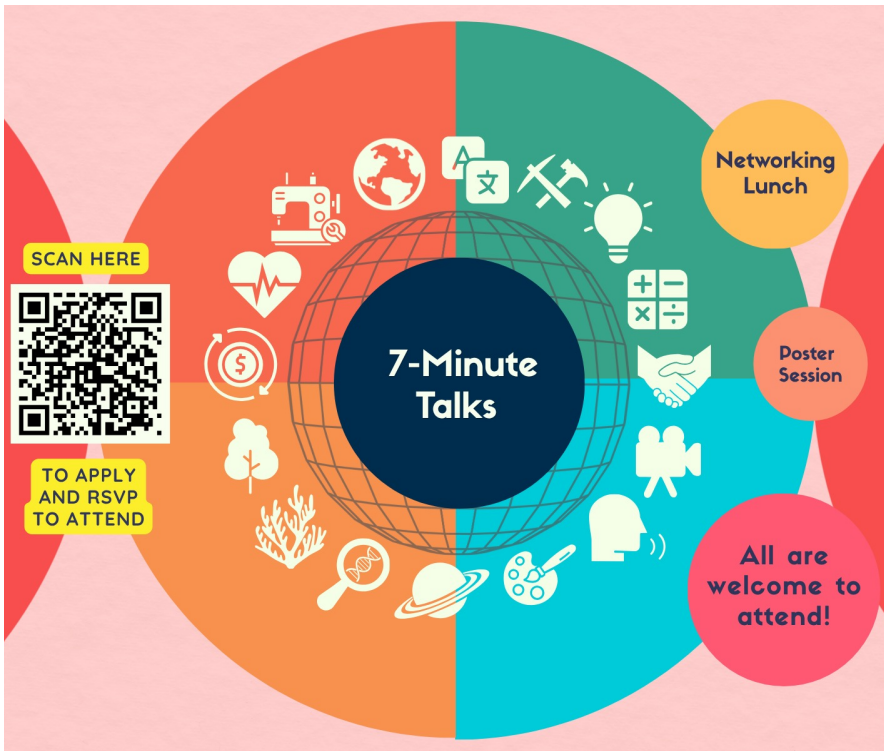
Visit our website for more information:

MSU Denver

Faculty Research Symposium

Learn about the research of faculty at MSU Denver in a lightning talk format (7 min presentations)

SAVE THE DATE



October 23rd, 2026

Email researchsymposium@msudenver for more information

ACKNOWLEDGEMENTS

We would like to extend our thanks and appreciation to the following offices and individuals for their contributions to the success of the Undergraduate Research & Creative Scholarship Program and the annual conference:

Undergraduate Research Grant Reviewers

Pam Ansburg
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Kim Klimek
Megan Lazorski
Hsiu-Ping Liu
Kristen Lyons
Vida Melvin
Bridget Murphy-Kelsey
Jeffry Parker
Aaron Richmond
Sarah Schliemann
Anne Yoncha

Janine Davidson, Ph.D.
President

Matt Makley, Ph.D.
Provost & Executive Vice President Academic Affairs

Elizabeth Parmelee, Ph.D.
Associate Vice President for Undergraduate Studies

Shaun Schafer, Ph.D.
Vice Provost

Thank you to our Keynote Speaker Karen Z. Naufel, our Session Moderators, and all Volunteers!

A special thank you to all undergraduate research mentors who devote their time and expertise to provide research opportunities and excellent mentorship to students. This program and conference would not be possible without their dedication.

Conference Program / Scheduling: Kristy L Duran, Ph.D.
Budget Coordinator: Shayla Bischoff

CONFERENCE-AT-A-GLANCE

8:00-3:00 pm: Conference presenters and all guests sign-in
Jordan Student Success Building (JSSB)

8:30 – 9:45 am: CONFERENCE SESSION I
Oral Presentations – JSSSB
Room 200 Room 203
Room 205

10:00 – 11:15 am: CONFERENCE SESSION II
Oral Presentations – JSSB
Room 200 Room 203
Room 205

Poster Presentations – JSSB
Mezzanine / 1st Floor

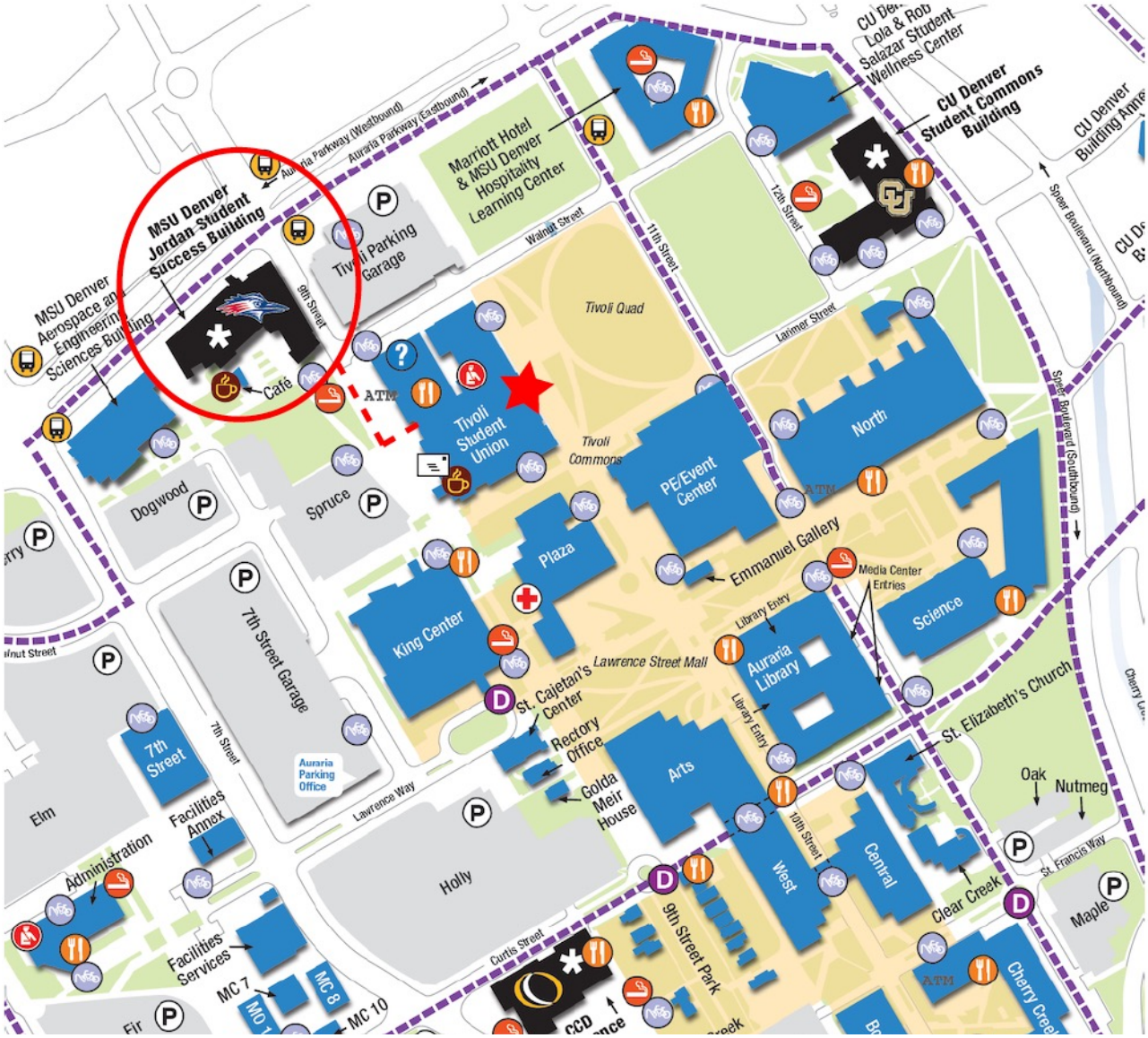
11:30 am: Lunch in Tivoli Turnhalle
11:45 am: Keynote: Dr. Karen Z. Naufel
Thriving in Research: Minimizing Risks, Maximizing Rewards

1:15 – 2:00 pm: CONFERENCE SESSION III
Oral Presentations – JSSB
Room 200 Room 203
Room 205

Poster Presentations – JSSB
Mezzanine / 1st Floor

2:45 – 4:00 pm: CONFERENCE SESSION IV
Poster Presentations – JSSB
Mezzanine / 1st Floor

MAP



Jordan Student Success Building (JSSB): Presentations
Tivoli Student Union, Turnhalle: Keynote Lunch

Parking is available at any lots including the 7th "Street Garage

Oral Presentations will be held in upstairs classrooms 200, 203, and 205, and Poster Presentations will be held on the 1st floor and Mezzanine. Enter the building using the doors under the Student Success sign and the staircase to the left will lead to the Mezzanine, walking further past that to the right will be the classrooms.

ABSTRACTS

ABSTRACTS

(listed alphabetically by submitting presenter's last name)

Near-Peer Observations - Noyce U-R STEM

Johnny Adams - Math (researching in Teacher Education- SOE)
Faculty Mentors: Janelle Johnson & Daniel Moore

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 203

Aspiring science and math teachers often encounter significant barriers to entering STEM teaching careers, particularly a lack of established mentor-mentee networks in teacher training programs. At Metropolitan State University of Denver, these barriers are heightened for its diverse student body, which can have underdeveloped STEM identity and self-efficacy. To address these challenges, Noyce U-R STEM at MSU Denver developed a Near-Peer Observation (NPO) Program funded by the National Science Foundation's Robert Noyce Teacher Scholarship Program. This NPO program was developed to build peer networks that support teacher candidates and new teachers experiencing a lack of confidence and/or efficacy. The NPO program offers Noyce Scholars (NS) at MSU Denver clinical observation and discussion experiences. It pairs an NS teacher candidate with an NS colleague who is no more than 3 years ahead of them in their career trajectory. Following a classroom observation, the teacher candidate and the near-peer mentor complete a guided reflection survey together. Although the NPO program was not designed as research, this study is intended as action research to better understand how to support teacher candidates' transitions to confident, adaptive, and resilient new teachers. We focused on responses to three questions from the near-peer-guided reflection surveys and used thematic analysis to identify patterns in the records (n = 92). Many of the teacher candidates responded about the sense of community the NPO program provided, specific ways their mentor teachers would change the observed curriculum, and how they saw the concepts learned in teacher education courses here at MSU apply in real classrooms.

Introductory Science Courses: What is Happening During Class Time?

Nana Akua Adu Owusu - Psychology
Co-Author: Dean Austin Fraser
Faculty Mentors: Shalini Srinivasan, Arijana Barun, Cynthia A. Erickson

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #17

Active learning and student engagement are increasingly recognized as important factors influencing student success and retention in Science, Technology, Engineering, and Mathematics (STEM). In prior research presented at this conference, our group found increases in self-efficacy and a sense of belonging in active learning courses over the semester. However, in those studies, active learning was poorly defined. In this interdepartmental study, we used the Classroom Observation Protocol for Undergraduate STEM (COPUS) to a) code how instructors use class time in entry-level biology and chemistry courses, b) observe teaching practices and student engagement, and c) compare the two departments. COPUS codes were used to quantify instructor and student behaviors during class sessions. Classroom observations were conducted in biology (6) and chemistry (3) courses. Student researchers made observations every two minutes on three measures: 1) student behavior, 2) instructor behavior, and 3) general student engagement. The observations were then averaged for each class, and then rater data were averaged. student engagement was categorized into three levels: Low (10-20%), Medium, and High (80+%).

Across all classes, students listened to the professor over half of the time (64%). The remainder of the time students engaged in individual thinking (16%), answered questions (16%), asked questions (14%), and various other activities. The instructors lectured over half of the time (57%); they also wrote on the board (25%), posed verbal questions to students (23%), and engaged in various other activities. In all observed classes, students were highly engaged. There was no difference between the two departments in classroom engagement. In the future, we will expand on how teaching practices across a diverse population of students in various STEM courses shape classroom environments, which may provide insight into factors that support inclusive learning experiences in STEM fields.

Music Therapy and Music Medicine in Healthcare

Enzo Albert - Music
Mentor: Elizabeth Macy

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 205

Music plays an important role in healthcare because it improves both patient and provider outcomes through psychological, neurological, and physiological mechanisms. While music therapy has a long history, and music has been associated with healing since prehistoric times, its modern application spans a wide range of evidence-based practices used to address these needs. In this paper, I examine how and why music therapy and music medicine are used in healthcare to treat mental health, pain, Autism Spectrum Disorder, Alzheimer's, traumatic brain injuries, and other conditions. My research draws on archival work, ongoing studies, and interviews with practicing music therapists (these interviews provide clinical application and the daily experiences of therapists, offering perspectives that are not always captured in academic research).
In my presentation, I define what a music therapist is and what music therapy does. Through a review of existing literature, I show how music therapy is used in different areas such as cardiology, neurology, and psychiatry. I highlight two ways music is used in healthcare: music therapy by certified music therapists and music medicine (music used in clinical or hospital settings outside of direct music therapy). Findings suggest that music, whether delivered through structured music therapy or music medicine, plays a significant role in improving patient and provider outcomes

across many applications. However, limitations in current research, such as a lack of standardized protocols, indicate a need for continued investigation. This study shows the importance of further research and funding to better understand the full scope of use of music in medicine.

How siblings shared interpretations of major life events shape the support they provide each other in adulthood

Abigail Arnove - Psychology
Co-Author: Alejandra Vasquez
Faculty Mentors: K Scherrer & Emily Kazyak

Poster Presentation, Session II (10:00 – 11:15 am), Poster #14

Many aspects of social and psychological science are involved in examining familial dynamics, although there is room for further research on sibling relationships, especially as they move through adolescence and adulthood. More specifically there is a distinct lack of information of how sibling dynamics and support are altered by major life events, from the perspective of both siblings. Having a sibling come out as gay, lesbian, bisexual or queer (GLBQ) may be one such major life event that alters the experiences of sibling relationships. Previous research indicates that siblings are often sources of support in the process of coming out to other family members. In this paper, I use family systems and ecological theories to examine the shifting dynamics in sibling relationships, following major life events, like coming out. The goal of this paper is to review the factors that shape how adult siblings support one another. This paper is a component of a larger qualitative study involving forty-six participants, where researchers interviewed 3 members of the same family system, from different generations, and where one member of the family system identifies as GLBQ. I analyze 6 qualitative interviews with 3 pairs of siblings that describe their family relationships after one sibling has come out as GLBQ. This paper examines how each participant interpreted their relationship with their sibling in childhood, their experiences of either themselves or their sibling coming out, and their current interpretation of support in their adult relationship. I examine qualitative themes such as levels of support, shared interpretations of major life events, conflicts between siblings, mediation from other family members, and relationship closeness. These themes describe how major life events in adolescence or early adulthood shape how adult siblings interpret the closeness of their relationships and experiences of social support.

AETHER: Agent Ecosystems for Testing, Hardening, Evaluation and Research of LLM Security and Tool-Based AI Systems

Monica Ball - Computer Science
Co-Authors: Lulu Abuaba, Angela Fleenor, Umulbanin Gulzar, Alex Muzika, Ella Taylor, Jackson Thomas, Emma Tran, Vashti Trujillo, Alina Valshchuk
Faculty Mentors: Daniel Pittman & Alyssa Williams

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #13

We present AETHER (Agent Ecosystems for Testing, Hardening, Evaluation, and Research), a configurable framework for evaluating large language model (LLM) behavior in adversarial, tool

augmented, and agent-based scenarios. AETHER extends the open source BiliCore platform and was developed using NAIRR Pilot cloud resources (Allocation NAIRR240197), including AWS and Azure allocations, as part of the NSF-funded Sustainability Hub project (Award No. 2318730). AETHER enables systematic, reproducible testing of LLMs across commercial and open source providers by allowing models to be dynamically swapped mid-session while preserving shared conversation history. This capability supports the evaluation of prompt injection, jailbreak resistance, memory based bias propagation, and cross model context inheritance. The framework also supports retrieval-augmented generation (RAG) and tool chaining, enabling researchers to study how models interact with external data sources and APIs under varying trust and security conditions.

AETHER supports configurable "agents," defined as modular bundles of prompts, tools, and memory policies. These agents can be evaluated individually or composed into early-stage multi-agent ecosystems, providing infrastructure for studying coordination, failure modes, and security boundaries in agent-based AI systems. Multi-agent systems are defined declaratively through YAML configuration files, requiring no code changes to swap models, restructure workflows, or adjust agent behavior. Researchers can interact with these systems through two interfaces; a graph-based visualizer for inspecting system topology, and a conversational chat interface for running live multi-agent sessions. This poster highlights AETHER's architecture, its declarative approach to multi-agent system configuration, and its graphical interfaces for system design and interaction. AETHER contributes to an open, extensible foundation for AI safety research, evaluation, and education, with a focus on transparency, reproducibility, and community reuse. Project repository: https://github.com/msu-denver/bili-core

Identification of a Novel Non-Fermenting Organism in Tissue Culture

Regan L. Bartow - Biology
Co-Authors: Maya DiGiacomo
Faculty Mentor: David Merriam

Poster Presentation, Session II (10:00 – 11:15 am), Poster #5

All microorganisms have a preferred environmental niche. Key environmental factors that impact growth include temperature, salinity, pH, and carbohydrate availability. Identifying microbes with unique adaptations to these conditions is of critical importance in both medicine and environmental science. Many organisms can be identified using a variety of biochemical and molecular techniques, including gram staining, carbohydrate fermentation, and PCR. We observed an unknown microbe initially isolated from a mammalian immortalized cell culture (RAW264.7 cells) and subjected it to an array of these tests in attempts to identify it.

First, we performed a gram-stain and observed a gram-negative streptobacillus arrangement. We further discovered that the organism is a slow grower on normal nutrient media (TSA, DMEM, and 7H9) which makes culturing for isolation and additional testing difficult. When regrowth success was consistent, we attempted to grow the organism on Eosin Methylene Blue (EMB) agar, which normally inhibits gram positive bacteria. Surprisingly, our organism did not grow on EMB. We also performed a Kirby-Bauer assay which provided inconclusive results due to the slow and minimal growth of the organism. With a colony from successful regrowth cultures, on normal media, we

performed a catalase test which yielded a positive result for catalase production. Additionally, PCR was unsuccessful multiple times with a standard 16S rRNA primer set. We are testing primers that bind to conserved regions between seven variable regions of the 16S rRNA gene. One primer set successfully amplified under the expected conditions of PCR so far. We plan to next sequence this region to identify the organism on a molecular level. Testing and identification of this organism requires the employment of various testing practices. Its identification using biochemical and molecular techniques will aid further research into its ideal environmental conditions and how to control its growth in the future.

Through Their Eyes: Child Victims of Sexual Exploitation and Trafficking - A Case Study of Born into Brothels

Annalyse J. Bastres - Criminal Justice and Criminology
Faculty Mentor: Jennifer Cheek

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 205

This case study examines the documentary *Born into Brothels: Calcutta's Red Light Kids*, analyzing how it represents the experiences of marginalized children in Kolkata's Sonagachi district. Utilizing content analysis, I explored how human trafficking and sexual exploitation in the film compares to the literature in both the United States and India. The study highlights recurring themes in the children's living conditions, emphasizing creativity and education as avenues of escape. These children's perspectives reveal common struggles and provide insight into overlooked populations affected by sexual exploitation. The analysis also considers how media portrayals shape public understanding of social inequalities and trafficking risk factors; this documentary's depiction of human trafficking highlights the larger social and economic factors that put children at risk. Contemporary discussions on trafficking and exploitation benefit from the documentary, which offers a vital lens for exploring childhood, marginalization, and the ethical representation of vulnerable populations in media.

The T-box gene *eomesa* specifies few sclerotome cells to expand and form the median fin skeleton

Raelyn Begay - Biology
Faculty Mentors: James T. Nichols & Vida Melvin

Poster Presentation, Session II (10:00 – 11:15 am), Poster #6

Paired fins, namely the pelvic and pectoral fins, have garnered considerable scientific interest due to their homology with tetrapod limbs. However, the most evolutionarily ancient vertebrate skeletal appendages are the median fins, including the anal, caudal, and dorsal fins, which remain relatively understudied. Previous work demonstrated that median appendages are derived from paraxial mesoderm, yet the genes that determine the location and development of these fins remain unclear. In recent work, we used Cre-based lineage tracing to demonstrate that these appendages originate from the sclerotome, a sub-compartment of the paraxial mesoderm. Surprisingly, permanent, early labeling of a very small number of these sclerotome cells led to labeling of the

entire fin later suggesting a mechanism in which a few sclerotome cells are specified to migrate to the site of the nascent fin, then expand to contribute to the full fin structure. To investigate the genetic mechanisms governing this specification, we focus on the zebrafish *eomesa* mutant, which exhibits a loss of the dorsal, median fin skeleton. The *eomesa* gene encodes a T-box transcription factor known for its role in dorsal-ventral patterning, epiboly, and endoderm specification. We did not detect strong *eomesa* expression in the sclerotome but did detect it in the early fin bud. These data motivate the hypothesis that *eomesa* functions to specify a few sclerotome-derived cells to migrate to the median fin bud and expand. Our study provides insights into the mechanisms of vertebrate appendage development through the underexplored angle of the median skeletal appendages. Funding: SDB Choose Development! Program and CU Anschutz start-up funds.

Operational Metaphysical Ethopathology

Michael Belayneh – Physics

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 203

A preliminary analysis of the long and storied history of medical practice, science, and philosophy—as detailed in Kevin Fong's Extreme Medicine—reveals an axiomatic-forward phenomenology. While the failings of medical history over the past millennium are well-documented, I argue one vital benefit emerged: a constant focus on operational and clinical pathology. This "forced immediacy" allowed treatment to successfully predate a complete biological understanding of the organism. I contend that social philosophy currently lacks such an operational guide, remaining trapped in an axiomatic-foundational scholastic state which inadvertently protects "harm". Drawing upon "Four Conceptions of Social Pathology" (Särkelä et al.) and the ontology of social philosophy (Bojanić & Babić), this paper critiques the shared epistemological limitations within the current status of social pathology, as well as the, albeit brilliant, contemporary works of Axel Honneth (Theory of Recognition), Christopher Zurn (Diagnosing Social Pathology), and also the legacy of Rousseau, Hegel, Marx, and Durkheim. These works are summarized as "Normative" and "Naturalist" social philosophies. These frameworks phenomenologically prioritizes their axioms over any pathological/empirical effort to treat and identify harm. In contrast, I propose a framework of Operational Metaphysical Social Ethopathology, which shifts the subject of study toward a "social ethological" and "meta-epistemological" format. This approach maintains a strictly anti-foundationalist, treating societal philosophies not as truths, but as ethological systems to treat as well as discover simultaneously. Utilizing Yael Kedar's research into "conceptual scaffolding," this framework justifies the use of current, albeit flawed, social philosophies/sciences as procedural bridges. Ultimately, this allows operational protocols for prioritizing the clinical stabilization of intersectional morbidity while investigating the underlying ethological nature. By centering the intersectional Black woman's maternal health crises as one focal sensor example, I hope to enable a clinical pathology of the social ethological environment.

Integrating a Decade of Undergraduate Field Data: Impacts of Prolonged Flooding on Bird and Plant Communities in Chatfield State Park

Quinn Bell - Biology

Co-Authors: Kai Cann & Patrick Lane
Faculty Mentor: Erin Bissell

Poster Presentation, Session II (10:00 – 11:15 am), Poster #7

Increased water retention in Chatfield Reservoir has inundated lowland cottonwood forests for most of the growing season since 2020. This study evaluates the effects of prolonged flooding on bird and plant communities along the South Platte River in Chatfield State Park, using Deer Creek and Bear Creek Lake Park as control sites. Undergraduate researchers collected bird and vegetation data at sites dominated by broadleaf cottonwoods (*Populus deltoides*) from 2017-2019 (pre-flooding) and again in 2021-2022 (post-flooding). Following extensive tree mortality and removals in 2023-2024 under the adaptive management plan, several permanently flooded lowland sites were replaced. Additional upland cottonwood sites were established in 2025, including locations in a transitional hybrid zone (*P. x acuminata*) and a narrowleaf cottonwood forest (*P. angustifolia*).

Bird surveys used point count methods centered on a designated focal tree, with vegetation data collected using a modified BBIRD protocol. Although methods remained consistent, data were collected by four cohorts of student researchers accompanied by changes in some sampling locations. To visualize these differences, we mapped focal tree coordinates in ArcGIS with a 50-m sampling radius to compare spatial alignment across years. This work supports a broader effort to validate and integrate six datasets collected over the past decade. Before assessing ecological responses to the new flooding regime, we must first assess the influence of year-to-year variation in sampling locations. This presentation summarizes our progress on cleaning and collating existing datasets and outlines plans for a final sampling season in 2026.

Sleep Disturbance as a Mediator Between Social Media Use and Depression in U.S. College Students

Natalie Blackman - Psychology
Faculty Mentor: Maureen Flynn

Poster Presentation, Session II (10:00 – 11:15 am), Poster #15

College students in the United States experience high rates of psychological symptoms, with over 60% meeting criteria for at least one mental health problem. Sleep disturbances are especially common among undergraduates and are a strong precursor to depression, yet fewer than half of undergraduate students obtain adequate sleep. Excessive social media use can further impair functioning and has been linked to shorter sleep duration and greater psychological distress. Previous research by Ma et al. (2025) found that poor sleep quality and daytime sleepiness mediate the relationship between Chinese college student social media use and depressive symptoms. The current study extends this research by examining whether sleep disturbances mediate the relationship between social media use and depression among U.S. undergraduates (n = 233). Participants completed validated measures assessing social media use, sleep disturbance, and depressive symptoms. Mediation analysis indicated that sleep disturbances significantly mediated the relationship between problematic social media use and depression. These findings highlight sleep disturbance as a key mechanism linking problematic social media use to depressive

symptoms, suggesting that interventions targeting sleep may help mitigate the negative mental health effects associated with social media use among college students. This has important implications for campus-based mental health initiatives, including promoting sleep hygiene, increasing awareness of the impact of social media use on sleep, and integrating behavioral interventions that address both sleep and technology use. Future research should examine the directionality of these relationships using longitudinal designs to better understand causal pathways. Expanding this work across more diverse samples and incorporating objective measures of sleep could further strengthen the validity and generalizability of these findings.

Professionally vs. Self-Diagnosed: How Diagnostic Source Impacts Stigma of ADHD

Ash Blondo - Psychology
Faculty Mentor: Maureen Flynn

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #19

Attention-Deficit/Hyperactivity Disorder (ADHD) impacts 2-8% of college students, leading to academic and personal struggles. Negative attitudes toward ADHD are widespread and often persist even among those diagnosed with the disorder. These stigmatizing views create significant barriers to help-seeking, self-advocacy, education, employment, and social relationships. Understanding factors that influence these attitudes is essential for reducing stigma and improving outcomes. Prior research identifies two consistent predictors of reduced stigma: knowing someone with ADHD and having accurate information. The recent rise in online psychoeducation and increased public discussion of neurodiversity has shifted how individuals understand and label their symptoms, leading to the concept and practice of self-diagnosis becoming more visible and socially relevant. An emerging factor that may also shape perceptions is whether an individual is professionally diagnosed or self-diagnosed. Therefore, the aim of this study is to examine whether attitudes towards individuals with ADHD differ based on reading a vignette with someone stating they were professionally diagnosed with ADHD versus someone reporting it is a self-diagnosis. Undergraduates (n = 87) completed an online survey including a vignette and the Adult ADHD Stigma Questionnaire. Results indicated no statistically significant difference in stigma based on diagnostic sources. These findings suggest that diagnostic sources may not strongly influence stigma, potentially reflecting a societal shift in awareness and acceptance of ADHD. Future research should explore this question with larger, more diverse samples to clarify its role. This study also highlights the need for continued research examining the role of evolving cultural understandings, diagnostic accessibility, and virtual psychoeducation in shaping perceptions and stigma.

amRviz: A framework for visual interpretation of antimicrobial resistance models

Emily Boyer - Computer Science & Mathematics with a Prob/Stats Concentration
Co-Authors: Raymond L. Lesiyon, Abhirupa Ghosh, Evan Brenner, Charmie Vang, David Mayer, Ethan Wolfe
Faculty Mentor: Janani Ravi

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #16

Antimicrobial resistance (AMR) is a complex and rapidly evolving global threat, driven by diverse molecular mechanisms that vary across bacterial species, antibiotics, and geographic and temporal contexts. While machine learning (ML) models trained on bacterial genomes have shown strong predictive performance for AMR phenotypes, interpreting these models and translating results into biological insight remains a major challenge. To address this gap, we developed amRviz, an interactive R Shiny dashboard and data viz package for visualizing, interpreting, and exploring the ML outputs generated by the amR package suite (https://github.com/JRaviLab/amR).

The amRviz package integrates genomic metadata, model performance metrics, and multiscale predictive features derived from thousands of bacterial genomes. The dashboard enables users to explore isolate distributions by species, drug, geography, and time; compare model performance across bug–drug and drug/class combinations; and examine top resistance-associated features at the gene, protein cluster, protein domain, and structural variant levels. Interactive heatmaps and plots support cross-model analyses, revealing drug-specific and context-dependent AMR mechanisms, including those that emerge under geographic and temporal stratification.
By operating on precomputed outputs from amRdata and amRml, the amRshiny package allows for flexible deployment without rerunning computationally intensive pipelines. By decoupling visualization from data curation and model training, amRshiny lowers the barrier to interpreting complex AMR ML results. Curated ESKAPE AMR data, model performance metrics, and predictive features are available through an interactive Shiny dashboard at https://jravilab.cuanschutz.edu/amr/.

Preparation of the Solid Support for the synthesis of a solid-supported oxidant

Karemma Brown - Chemistry
Faculty Mentor: Shailesh Ambre

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #6

Photocatalysis is difficult to scale up for real world applications due to reliance on rare, expensive 4d and 5d metals. Earth abundant first-row transition metal (FRTM) photocatalytic complexes such as Lewis acid (LA)- bound Mn (IV)-oxo-complex with a non-heme (nH) ligand (e.g., [nHMnn+O]z+-(LA)x) are promising alternatives. However, the lability of FRTM-ligand bonds and high oxidation states results in extreme sensitivity to reduction to Mn(II) or Mn(III) and subsequent dimerization, contributing to the challenge of both purifying and characterizing these complexes. In particular, iodobenzene, a by-product produced from the oxidation of [LMn2+]z+ precursor with iodosylbenzene (PhIO) , may facilitate reduction of the [LMn4+O]z+-(LA)x complex if it remains in solution. Increasing stoichiometric equivalents of PhIO to compensate for this raises concerns for ligand oxidation. To remedy the issue, this study centers on synthesizing a solid-supported oxidant (SSO) that could permit separation of the oxidant by simple filtration and improve stability of the oxidized [LMn4+O]z+-(LA)x complex. The SSO design involves Merrifield and Wang resins as the solid support connected to a spacer further connected to the oxidant molecule. This work presents proof-of-concept studies conducted to modify the resins with spacers of variable lengths, and creating SSOs of different loading capacity to further study their efficacy at oxidizing [nHMn2+] precursor and improving complex stability. The protocols were optimized to protect the linker-amine and obtain desired loading capacity on the solid support. Assays to determine the loading capacity of modified resins have been established.

Lewis Acid and Counterion Effects on the Excited-state Behavior of Mn(IV)-Oxo Complexes

Keairra Brown - Chemistry
Co-Authors: Luis Millian & Jesus Paredes
Faculty Mentors: Megan Lazorski & Shailesh Ambre

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #5

Photocatalytic complexes play pivotal roles in many crucial chemical and biological processes, including photosynthesis; however, these complexes are predominantly comprised of noble metals (e.g, Ru, Ir, Os, Rh), which are expensive and rare. Earth-abundant first-row transition metals (FRTMs), such as manganese (Mn), are an alternative to making photocatalytic complexes without expensive and rare metals. FRTMs are attractive because they have long-lived excited states (τ=≥425 μs) with high quantum yields, and strong spin-orbit coupling comparable to those of conventional photocatalytic noble metal complexes. Extensive research exists on the effects of LA binding on the oxo-group of Mn(IV)-oxo complexes with nonheme (nH) chelating ligands [nHMn^(n+)O]^(z+)-(LA)x, but the excited state photophysics remain underexplored. Therefore, this work explores ways to manipulate and optimize the excited-state properties through systematic modification of the outer-sphere ligands. Specifically, the LA metal(e.g., Sc3+, Al3+, Lu3+, and In3+) and counterion (e.g., trifluoromethanesulfonate and perchlorate) are altered, and their resulting excited state behavior is compared. This work aims to identify the operant electronic transitions and quantify changes in the excited-state lifetimes on ultrafast (fs – ps) and nanosecond timescales. Steady-state and transient spectroscopies, including Ultraviolet-visible (UV-Vis) spectroscopy, nanosecond and ultrafast transient absorption spectroscopy (TAS), and time-resolved photoluminescence (TRPL), are used to gain insight into how these structural changes impact the excited state properties of the [nHMn^(n+)O]^(z+)-(LA)x complexes. The 1 ps difference in kinetics observed indicates that the manganese precursor counterion may influence the emissive decay when switching from trifluoromethanesulfonate to perchlorate. Furthermore, differences in the fs-ps TAS spectral features and a difference of up to 1,500 ps in the kinetics suggest that changing the LA counterion may influence the excited-state energies. Therefore, a detailed analysis of the electronic and excited-state effects related to changing the LA metal and counterion of a [nHMn^(n+)O]^(z+)-(LA)x complexes is presented.

The Effect of Offspring Developmental Stage on Parental Aggression in Convict Cichlids (*Amatitlania nigrofasciata*)

Kai Cann - Biology
Co-Authors: Allison Reed & John Rutherford
Faculty Mentor: Jennifer Gagliardi-Seeley

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #12

Parental care is energetically costly but increases individuals' reproductive success. Convict Cichlid fish (*Amatitlania nigrofasciata*) display parental care in the form of aggression towards conspecifics (same species) and heterospecifics (different species). The stage of offspring

development has been shown to affect the level of parental aggression; however, the target of this aggression at different stages was unable to be determined. (possible site paper). Our study was conducted to determine the amount of aggression towards heterospecific versus conspecific targets based on offspring developmental stage (cave and free-swimming fry stages). If offspring developmental stage effects parental aggression towards target species, then we expect to observe a difference in aggressive behavior towards conspecific versus heterospecific intruders depending on what stage the offspring are in. In Lomas Barbudal Reserve, Guanacaste, Costa Rica, we recorded males and females of breeding pairs for both cave and free-swimming fry stages. Currently, we are analyzing aggressive behavioral data from the videos using Ethovision. Based on anecdotal observations in the field, we except that there will be more aggression towards conspecific intruders during the cave stage of offspring development. We cannot support or reject our hypothesis until we complete data analysis.

Cro

Rosaelena Cardenas - Environmental Science

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 200

Pedestrian safety is becoming a bigger concern in communities where high speed highways run through areas with schools, parks, and local businesses. In Fort Lupton, Highway 52 serves as both a major traffic route and a local access point for pedestrians traveling to schools, parks, and nearby businesses. Several uncontrolled crosswalks along this corridor near Grand Avenue, Fulton Avenue, Park Avenue, and Harrison Avenue do not have traffic signals or signage to warn drivers of the crosswalk, meaning pedestrians must rely on drivers to yield. When drivers do not consistently yield, it can lead to longer wait times, riskier crossing decisions, and a lower sense of safety for people trying to cross. This study examines how driver yielding behavior impacts pedestrian safety at these uncontrolled crosswalks using a mixed methods approach. Field observations were conducted using staged pedestrian crossings to measure how often drivers yield in real conditions. In addition, a survey was given to community members to better understand how safe they feel when using these crossings. Results show that about 68% of respondents reported feeling unsafe crossing at these locations. By comparing actual driver behavior with community perceptions, the study helps determine whether the crossings are as unsafe as they feel and how improvements can be implemented. The research focuses on three main questions including current driver compliance rates, how driver behavior influences pedestrian safety and decision making, and what strategies or improvements could increase safety and encourage more walking within the community.

Function of *macc1* in Embryonic Development in Zebrafish

Jailene Carrillo - Biology
Faculty Mentor: Vida Melvin

Poster Presentation, Session II (10:00 – 11:15 am), Poster #8

Metastasis associated in colon cancer 1 (*MACC1*) is an oncogene identified as a regulator of tumor growth, invasion, and metastasis. Most research on the *MACC1* gene is related to its expression and function in cancer, but its normal function remains unknown. The *macc1* gene is expressed

during vertebrate face development and morpholino knockdown of macc1 expression in zebrafish caused craniofacial defects. To better understand the function of macc1 in development, the Melvin lab used CRISPR/Cas9 to induce heritable mutations in zebrafish *macc1* at two loci, called AD and AA. Our first step in understanding the effect of *macc1* mutation was to test its requirement for survival. Two fish heterozygous for macc1 mutations (+/-) were mated and the resulting embryos were genotyped at 24 hours post fertilization (hpf), 72hpf, and 5 days post fertilization (dpf). At 5dpf, the larvae were also used to conduct a skeletal stain to examine craniofacial cartilages. Using a goodness of fit test, we were able to show that AD mutants survived to 5dpf at expected Mendelian ratios, whereas AA mutants did not. Additionally, we have been able to raise AD mutant fish to adulthood. We also compared the standard length of *macc1* mutant larvae at 5dpf to WT to determine whether *macc1* is required for embryonic growth but did not see any significant size differences. Although this study is still ongoing, we believe that *macc1* is not required for embryonic growth or survival. We are currently determining whether maternal expression of *macc1* is required for development by mating homozygous *macc1* mutant females (-/-) to wild type males. The resulting embryos will be heterozygous for *macc1* mutation but will lack *macc1* transcripts that may be required for early embryonic development. Our findings will provide better insight into the developmental role of *macc1* beyond its cancer-associated functions.

Optimizing a Biochemistry I CURE: A Student-Informed Approach to Course Development, and Course Improvement

Cinthia M. Cervantes - Biochemistry
Co-Authors: Zoe Ward, Bridget Villegas, Anna Solteto & Juan Mendez
Faculty Mentor: Andrew McMillan

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #11

The Biochemistry I course CURE at MSU Denver is focused on investigating substrate specificity within the malate dehydrogenase (MDH) superfamily, with emphasis on Plasmodium falciparum MDH as part of the collaboration with other schools using making up the MDH CURE Community (MCC). P. falciparum MDH is excellent for modeling substrate specificity due to it being closely related to Lactate Dehydrogenase and Apicomplexan parasites having independently re-evolved LDH activity multiple times. To improve MDH research and ensure that students are producing accurate and quality results, outside course work was performed. The outside class work was designated as laboratory prep work which then shifted t0 research to improve the course. The CURE in the biochemistry I lab course was implemented Spring of 2025 and adjustments have been made as the course has moved along. Adjustments to the original course included testing conditions used in purification, working with different storage conditions of the purified protein to ensure the stability, testing methods for E. coli cell lysis to receive more soluble proteins. Other adjustments included working with homemade mutagenesis kit vs the Q5 Site-Directed Mutagenesis Kit to have a more cost-efficient way to produce mutations, the quality of agar plates over time and purifying proteins through FPLC (Fast Protein Liquid Chromatography) for faster purification results. The conclusions of these experiments were then used as a baseline for protocols originally used in the course. This poster will also include data from participating in the course as a student along with comparisons from class data obtained.

Using Metrics of the Fourth Lumbar Vertebrae in Order to Estimate Sex in Forensic Cases

Tev Cole - Anthropology
Faculty Mentor: Michala Stock

Poster Presentation, Session II (10:00 – 11:15 am), Poster #1

In forensic cases, anthropologists use various skeletal indicators to estimate sex of an individual. The most prominent skeletal indicators of sex come from the features of the *os coxa* and of the skull. It remains unclear whether other skeletal regions may also provide accurate estimate of sex. Due to their proximity to the *os coxa*, I decided to target the lumbar vertebrae, specifically focusing on the fourth lumbar vertebra (L4). I sampled twenty individuals (10 male and 10 female) the New Mexico Decedent Image Database (NMDID). All included individuals were over 25 years old with no trauma or postmortem changes that would influence measuring the vertebral dimensions. I measured the L4 vertebral body height, vertebral body width, vertebral foramen width, and vertebral body length of each individual. I performed a linear discriminant analysis (LDA) on these data to assess which of the variables were most influential and to test sex estimation accuracy from L4 measurements. Results showed that vertebral body length and vertebral body width are the two most heavily weighted variables in the LDA. Vertebral body length was the most heavily weighted variable (LD coefficient = 0.32), and vertebral body width being the second most (LD coefficient = -0.15). Furthermore, the jack-knifed LDA performed with 80% cumulative accuracy; sex was correctly estimated for eight out of ten female individuals and for eight out of ten male individuals. Correctly estimating sex of an unknown individual is important because it can help forensic anthropologists properly identify unidentified decedents by narrowing the missing person's pool. Further research is needed to determine if the L4, or other vertebrae can be used to accurately estimate sex.

Now Do You See Me?

Alejandra J. Contreras - Bachelor of Fine Arts
Faculty Mentor: Marin Abell

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 200

This paper highlights the research conducted for the artwork Now Do You See Me? A multimedia exhibition: looking through cultural ethnography of Mexican-American iconography. By utilizing visual storytelling the viewer/audience observes the ‘Others’ perspective; An anthropological approach to observation by visualizing an alternate perspective. This installation focuses not only the sociopolitical situations within the Latin community, but the ramifications of suppression, resistance and resilience as tools for community advocacy and voice. Through critical theories of Michael Foucault , Marxism and Critical Race Theory (Chicanismo), the reader explores conceptual ideologies that observe the fluid changes and challenges of Mexican-Americans/ChicanX in race, social and economic disparities under the scope of art. Now do you see me? is a visual storytelling of the horrors of stigmatization, power, politics and community resilience. Through the usage of Latin American iconography to help distinguish the pain, absence and suffering that generations of immigrants must tread to reach a better life expectancy, not only comes with a price but can cost people's livelihood. To fully explain my work I have researched historical events that have

represented the government's role and lack of empathic contingencies that have cost Mexican-Americans and immigrants their lives, liberty and pursuit to happiness. The Mexican-American dream is now the American Dream, through attainment Latino/a's are pursuing advancement beyond the humble status of parental generations with opposing forces such as lack of legal documents, the absence of economic and educational opportunities, or racial and ethnic discrimination, this community has sought resistance and resilience throughout the generations.

Pyla-Koutsopetria Archaeological Project: Discoveries from EUs 24 & 30

Paris N. Cook - Anthropology
Faculty Mentors: Justin Stephens & Brandon Olson

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 200

Participating in the Pyla-Koutsopetria Archaeological Project (PKAP) study abroad program in Cyprus offers students a unique opportunity to engage and learn about the island's rich archaeological history. Through fieldwork, students gain academic experience with professionals in the industry, develop connections with fellow students, and broaden their global and cultural awareness. Beginning in 2019, excavations on the plateau began with EU20 showing two distinguishable rooms and promising indications of a fortified settlement. This was a leading point of continued excavations in this area to obtain more data of daily life at Vigla during the Late Classical to Early Hellenistic period.

As part of this program, I worked alongside Dr. Brandon Olson and Dr. Justin Stephens of the History Department during excavations at Pyla-Vigla in the 2023–2024 field seasons. The fieldwork I focused on were two adjacent excavation areas, EU 24 and EU 30, both of which yielded significant data for interpreting occupational phases, use and structure on the south-central plateau. EU 24, excavated in 2023, was divided into five Stratigraphic Units following topsoil removal. Excavation concentrated on the West Central Room and proceeded through eight SUs. These stratified deposits provided interpretations of room function and internal use. EU 30, excavated in 2024, produced substantial amounts of artifacts that produced more domestic context. Key features included a plaster/gypsum slab in the mid-eastern trench and a north–south wall segment in the northwest. From the excavations it may suggest that both EUs served as a domestic or industrial space.Findings from EU 24 and EU 30 contribute to the interpretive understanding of its occupational phases, the use of land, and domestic/industrial use on this site.

Rideshare Use Amongst the Blind and Low-Vision Community

Noah Cowperthwaite - Geography
Co-Authors: Jordan Lestenkof, Ronan Brennan, & Libby McGavran
Faculty Mentors: Sylvia Brady & Sarah Schliemann

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 200

As users of all abilities have incorporated rideshare into their transportation habits, individuals with disabilities that limit their ability to drive have adopted these services disproportionately. However,

the Blind and Low Vision (BLV) community faces unique, yet underexamined barriers to accessing these services. The purpose of this research was to identify key themes observed across BLV people's experiences with rideshare services. This work builds on the quantitative findings of Brady et al. (2026), by evaluating 50 follow-up, open-ended, semi-structured interviews with BLV users of rideshare. Using reflexive thematic analysis, we coded the interviews to look for common themes amongst the responses that address our research questions: How do BLV individuals experience and evaluate ride-hailing services compared to other transportation options? How do experiences of discrimination influence the transportation mode choice of BLV individuals? And how do public-private partnerships between rideshare companies and transit agencies influence accessibility, cost, and ADA accountability for BLV riders? Early analysis suggests that BLV individuals may prioritize reliability of service over avoiding discriminatory experiences, though the perceptions of reliability for given transportation modes vary significantly, and full thematic findings are forthcoming. This research will benefit BLV users of rideshare and will inform future research on the impact of public-private partnerships, helping to make recommendations to transportation network companies, transit agencies, and policy-makers interested in implementing public-private partnerships.

Emotional Identification for Pediatric Clients with Expressive Language Difficulties

Karalynn Cromack - Speech Language & Hearing Sciences
Faculty Mentor: Marcia Walsh-Aziz

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 205

Emotions are a confusing concept to express for many people. These are especially difficult concepts for preschool children with expressive communication disorders and often lead to maladaptive behaviors which delays intervention. In this project, I explore strategies for encouraging socio-emotional identification for pediatric clients with expressive language difficulties. I draw upon my experience assisting different student clinicians working with pediatric clients to target speech-language at the Auraria Early Learning Center. I also utilize scholarly literature to gather evidence about which emotions should be identifiable to pediatric clients at different stages of development and communication, as well as behavior management techniques to support the different emotions the client may be feeling. The goal of this project is to emerge with a tangible item that toddler-aged children are able to use to assist in communicating their emotions during a speech-language session. I am interested in making this item with the purpose of engagement, practicality, and potential use as a tool to teach about new emotions that the client can later express. Learning to identify, self-advocate for, and state emotions for the individual and for others is an essential skill for toddler-aged children who are beginning to interact in new environments. This would not only be beneficial for clients who have expressive language/ socio-emotional difficulties but would allow the clinician smoother communication and better understanding of the client's needs.

Does Precise Instructional Language Improve Learning Outcomes, Perceived Competence, and Academic Motivation in Undergraduate Students?

Benjamin Del Barco - Psychology

Co-Author: Simon Cheistwer
Faculty Mentor: Bethany Fleck Dillen

Poster Presentation, Session II (10:00 – 11:15 am), Poster #16

Instructional clarity plays an important role in student learning, yet most research examines teacher clarity as a broad construct rather than isolating the specific effects of precise instructional language. The present study investigates whether the precision of instructional language influences undergraduate students' knowledge retention, perceived competence, and academic motivation. Grounded in Self-Determination Theory, this research examines whether more precise and clearly structured instructional explanations enhance students' understanding of psychology content and does it strengthen their sense of competence and motivation to learn. Participants include approximately 50 students are MSUD undergraduate students recruited from the Department of Psychological Sciences participant pool. Using an experimental design, participants are randomly assigned to one of two instructional conditions. In the high-precision condition, students view a lecture video explaining Bronfenbrenner's Ecological Systems Theory using explicit, specific, and clearly structured language. In the low-precision condition, students view a lecture covering the same theoretical content but delivered using less specific and more ambiguous instructional language.

Participants first complete a brief pre-test assessing prior knowledge of the theory. After viewing the lecture, they complete a post-test measuring knowledge retention. Students also complete validated measures assessing perceived competence and academic motivation. Perceived competence is assessed using the Perceived Competence Scale, and academic motivation is measured using the Academic Motivation Scale. It is expected that students exposed to high-precision instructional language will demonstrate greater knowledge retention and report higher perceived competence compared to students exposed to low-precision language. Increases in perceived competence are also expected to be associated with higher levels of self-determined academic motivation, particularly intrinsic motivation. These findings may indicate that instructional language precision is a simple, low-cost instructional strategy that can enhance both learning outcomes and motivational processes in higher education settings.

Play as a Stress Intervention for Undergraduate Students

Benji Del Barco - Psychology and Human Development and Family studies
Co-Authors: Logan Hetzel, Kirsten Zeitler, & Jaiclyn Smith
Faculty Mentor: Kristen Lyons

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #20

Undergraduate students frequently experience elevated stress, particularly during academically demanding periods such as midterms and final exams. Brief, accessible, and engaging interventions may provide effective strategies for reducing stress in this population. Previous research suggests that short activities, including social interaction and leisure engagement, can reduce both physiological and self-reported indicators of stress. The present study investigated whether brief social gameplay could serve as a stress-reduction intervention for undergraduate students.

Participants were undergraduate students recruited from the Auraria Campus. Using an experimental design, participants were randomly assigned to one of two conditions: a control condition (quiet studying time) or an experimental condition (playing a game). Baseline measures of stress were collected prior to the intervention using self-report questionnaires and physiological measures of heart rate variability (HRV) obtained through a non-invasive finger pulse oximeter. Participants then engaged in their assigned activity for approximately 30 minutes. Following the intervention, participants completed a post-test survey and a second HRV measurement to assess changes in stress levels.

Results indicated that participants in the gameplay condition demonstrated greater improvements in physiological stress regulation, as reflected by increases in HRV, compared to participants in the control condition. No significant changes were observed in self-report measures. These findings suggest that brief social gameplay may support physiological stress recovery in undergraduate students. This research contributes to growing literature on play and mental health by identifying social game-based interaction as a simple, accessible intervention that may help reduce stress during demanding academic periods.

Masked Bias: How Professionalism Standards and Microaggressions Impact the Well-being and Self-Efficacy of Counseling Students of Color

Angelina Djibilova - Psychological Sciences
Faculty Mentor: Jovan Hernandez

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 203

This study investigates the systemic and interpersonal stressors impacting the professional development and mental health of graduate students of color in counseling-related programs. It examines the associations between professionalism expectations, racial microaggressions, imposter feelings, psychological distress, and counselor self-efficacy. The central research question explores how experiences of bias, which are often masked as “professionalism”, contribute to psychological distress and affect the confidence of emerging practitioners of color. This study utilizes a cross-sectional, survey-based quantitative design. Data is collected from a national sample of students of color via an online questionnaire hosted on Qualtrics. Participants complete a comprehensive set of standardized instruments, including the Chronic Work Discrimination and Harassment measure, the Racial Microaggressions scale, the Depression Anxiety Stress Scales (DASS-21), the Clance Imposter Phenomenon scale, a professionalism scale adapted from Rowland’s thesis-based research, and a counselor self-efficacy measure based on Melchert’s developmental framework. By analyzing these variables, this research aims to identify the pathways through which discriminatory professionalism practices translate into psychological distress and diminished self-efficacy. Findings are expected to highlight the need for counselor education programs to critically re-evaluate “professionalism” standards that may disproportionately marginalize students of color. Ultimately, this research seeks to inform the development of more equitable institutional policies and frameworks to ensure a more supportive and inclusive environment for mental health professionals in training.

Underrepresented Voices in a Colorado Biobank: Perspectives from Focus Groups on Data Sharing

Isabella Eaton - Data Science and Machine Learning
Faculty Mentors: Katrina Claw & Lucas Rozell

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #18

Most participants in large genetic cohorts, such as biobanks, are of European descent and not representative of all individuals. The lack of representation of other populations has been an ongoing challenge in genomics research. The historical exclusion and underrepresentation of diverse populations can lead to the unequitable implementation of precision medicine efforts, potentially exacerbating health disparities. Understanding the perspectives on genomics research and participation in biobanks of historically underrepresented populations could provide insight into ways to better engage with these groups. We conducted a series of virtual and in-person focus groups with individuals who self-identified as American Indian or Alaska Native (AI/AN), African American/Black (AA/B), or Hispanic/Latino (H/L) and who were enrolled in the Colorado Center for Personalized Medicine (CCPM) biobank. The focus group discussions were centered around participant experiences, including but not limited to their motivations, return of results, and data sharing. One key finding from this project included takeaways from participant perspectives surrounding data sharing. Participant opinions on data sharing are crucial to understand, especially for underrepresented communities who have been harmed by unethical research practices in the past. Overall, participants tended to view data sharing positively when it benefits research but worry about where else their data may be used. Primary concerns that remained regarding data sharing included the impact of EHR's (electronic health records) on life insurance or health insurance policies as well as the inclusion of genetic data in criminal databases. Due to these concerns, many participants shared risk analysis they conducted personally that led them to continue participating in the biobank. The findings of this project can be used to guide recruitment and engagement of biobank participants, especially from diverse backgrounds, contributing to enhanced partnerships advancing knowledge and healthcare.

Legal professionals' understanding of psychological terminology in forensic mental health reports

LaKrisha Fehringer - Psychology
Faculty Mentor: Cassandra Bailey

Poster Presentation, Session II (10:00 – 11:15 am), Poster #17

Previous research shows that psychologists frequently use technical terminology (i.e., jargon), which can be difficult for audiences without psychological training to understand. As expert witnesses, forensic mental health professionals' (FMHP) role is to educate the court based on their extensive psychological training, yet jargon can reduce clarity of communication as many legal professionals have little to no previous understanding of psychological constructs. The current study explores legal professionals' understanding of technical terms used by FMHP in reports and testimony. Our online Qualtrics survey collected information regarding respondents' demographics and knowledge of frequently used terminology. Participants were presented 47 terms and asked to

rate their understanding of each (i.e., “unclear,” “somewhat clear,” or “clear”) and after being provided with the technical definition and an example of each term used in a sentence, they were asked if they previously understood the word as technically defined (i.e., “yes” or “no”). We hypothesized (H1) most (i.e., > 50%) of the included clinical jargon will be self-reported as “unclear” or “somewhat clear” by legal professionals and (H2) most legal professionals (i.e., >50%) will self-report not knowing the terms as defined.

Data analysis is ongoing, so current results are preliminary. Preliminary analyses (n = 18) show: (H1) 38 of the 47 terms were rated as only “somewhat clear” or “unclear” by >50% of respondents and (H2) 26 of the 47 terms were reported as not previously known by >50% of participants. Findings preliminarily suggest that an overwhelming amount of terminology used by FMHP is not adequately understood. When legal professionals cannot understand language used by FMHP, it can impact legal outcomes. It is imperative that psychological input is accurately interpreted to ensure that testimony is impartial, scientific, and accessible to the court.

Phytoremediation: Lupinus perennis & Lupinus polyphyllus Sequestration of Mercury in Auraria Campus Soil

Braxton R. Fenton - Applied Geology
Faculty Mentor: Uwe Kackstaetter

Poster Presentation, Session II (10:00 – 11:15 am), Poster #3

This study investigates the potential of two Colorado-native plant species, *Lupinus* perennis (Sundial Lupine) and *Lupinus polyphyllus* (Bigleaf Lupine) and their ability to sequester mercury from contaminated soils through phytoremediation. Twelve soil samples were prepared and planted with one seed of a single species per plot. Growth time intervals were used to evaluate how developmental stages influenced mercury uptake. This research aims to determine whether growth stages of each species affect sequestration rates and to assess applicability for remediation efforts on the Auraria Campus. Mercury and other heavy metals, such as arsenic and cadmium, have been recognized for their toxicity to plants, microorganisms, and human health. Exposure has been associated with inhibited plant growth and physiological harm to humans, including impairment of the central nervous system and organ failure. These risks underscore the importance of remediation in urban, agricultural, and ecologically sensitive environments, particularly in areas with dense populations or proximity to water systems.

Phytoremediation, which utilizes plants known as hyperaccumulators to absorb contaminants, offers a cost-effective and environmentally sustainable alternative to traditional remediation methods. While the selected Lupinus species have not been studied for this purpose, their adaptability to Colorado’s climate, combined with their large biomass and rapid growth, suggests suitability. Previous research on hyperaccumulators indicates that characteristics like extensive root systems, large shoots, and high biomass correlate with increased heavy metal accumulation. Studies also demonstrate that mercury accumulation often occurs in root tissues, though distribution may vary among plant structures and species. Accordingly, plant tissues were analyzed to determine accumulation patterns. Findings from this research were expected to clarify the relationship between growth stage and mercury sequestration efficiency while contributing to the identification of viable, regionally adapted species for phytoremediation. Results could inform

future remediation strategies on the Auraria Campus, and similar environments impacted by heavy metal contamination.

An Analysis of Artifacts from the Late 19th Century Brothel District in Central City, CO

Juniper Finch - Anthropology
Faculty Mentor: Jade Luiz

Poster Presentation, Session II (10:00 – 11:15 am), Poster #2

This poster presentation explains the analysis conducted on clothing fasteners such as buttons, belt buckles, and corset boning found in archaeological excavations from 24 units of the Central City Brothel District from 2023-2025. Central City, Colorado was a gold mining town that became very popular in the 1860s and many of its residents and visitors alike enjoyed gambling, alcoholic beverages, sex, and pursuit of the American Dream. One primary goal of this research was to assess any evidence of "queer" spaces that might be present in the brothel district that had once been a popular stop. Initial research led to acknowledging that spaces involving sex work are queer in an archaeological sense and there was no documentation or artifact currently present that points to other queer identities such as LGBTQ+ identities. Further analysis of site data was performed through historical documentation and lab work and using theoretical frameworks such as embodiment theory, queer theory, and intersectionality. Gender and socioeconomic class are two of the main identities assessed in this research. By performing a lab analysis of the buttons from this site's excavation via material type, style, historical usage, quantity, location, and depth, interpretation could then be performed based on data. The following questions were asked. Did these buttons come from the women who worked at the brothel? Did they come from their patrons? What does this say about the different brothels within the district and about economic factors relating to sex work in the town that was once considered "the richest square mile on earth?" How do intimate economies compare to other types of economies? This presentation will bring light to some of these questions.

Dark Enigma: Indexing the Dark Web to Disrupt Human Trafficking Networks

Angela Fleenor - Computer Science
Faculty Mentors: Steve Beaty & Annjanette Alejano-Steele

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 203

Human trafficking remains one of the most pervasive yet least visible forms of exploitation. While public attention often focuses on surface-level internet platforms, far less scrutiny is given to the role of the dark web—particularly The Onion Router (TOR) network—in facilitating the buying and selling of human beings. Dark Enigma is an exploratory research project that seeks to illuminate this hidden ecosystem by indexing TOR Hidden Services to identify patterns, vulnerabilities, and potential points of intervention. Using a purpose-built web crawler, Dark Enigma indexes Hidden Services operating within the TOR network. TOR promises anonymity through layered encryption, decentralized routing, blockchain-related technologies, and frequently changing service addresses—often rotating every twenty-five hours via distributed hash tables. These features,

combined with CAPTCHA protections, create significant technical and ethical barriers to investigation and raise a critical systems-level question: if anonymity is not absolute, can its limits be identified and leveraged to reduce harm without indiscriminately eroding privacy?
At present, anonymity functions as a reliable shield for malicious actors. Human traffickers rely on TOR's privacy guarantees to evade identification and accountability, and law enforcement successes have been rare—typically hinging on isolated technical or behavioral errors, as seen in takedowns such as the Silk Road. Dark Enigma examines whether trafficking-related Hidden Services exhibit patterns, persistence, or metadata signals detectable at scale. Guiding questions include: How many Hidden Services exist, and how long do they persist? Can trafficking activity be distinguished from other illicit content using available data? Methodologically, this study proposes scraping selected areas of the dark web using secured servers and evaluating tools for navigating CAPTCHA barriers. Ultimately, Dark Enigma challenges the assumption that technological anonymity must supersede human rights, contributing to broader conversations about data systems, accountability, and justice.

Cultural Commodities: A Study of Exchange and Ethics in the Antiquities Market

Angelica Galstyan - Anthropology
Faculty Mentor: Rebecca Forgash

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 200

The antiquities market raises important ethical, cultural, and legal questions about how artifacts are collected, exchanged, and valued. While some sales occur through established and legitimate channels, antiquities may also circulate with limited provenance, unclear histories of acquisition, or reduced attention to their cultural significance and archaeological context. This project examines how the Colorado antiquities market operates through the perspectives and practices of sellers working within auction house settings. It asks how antiquities are marketed, valued, and exchanged, how sellers understand their professional roles and responsibilities, and how social and professional networks shape the movement of artifacts through the market. This research uses ethnographic methods, including participant observation at Colorado auction houses and semi-structured interviews with auction house owners, staff, and affiliated sellers. Data includes ethnographic field notes, interview transcripts, and site-based documentation of sales practices, object presentation, and seller interactions. The study also explores how participants understand legal and ethical issues related to provenance, cultural property protection, and market regulation. By focusing on seller experiences and auction-based circulation networks, this project aims to develop a clearer understanding of how the antiquities market functions at the local level while remaining connected to broader concerns about cultural heritage protection. The findings will contribute to discussions of public education, ethical collecting, and the prevention of illicit antiquities sales.

Visits to the Void

Jess Gerome - Art Education
Faculty Mentors: Rachel Delaney, Anne Yoncha, Jill Mollenhauer, & Natascha Seideneck

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 200

Visits to the Void is an approximately 9' x 9' interactive art installation that provides an introspective experience as an exercise in developing metacognition. It is about stripping away distractions, including sensory input in order to focus inward and access the liminal unseen places in your mind where potential emerges. I am providing this place of inward focus as a way to enhance metacognition, which is the ability to think about your thinking and is central to my work as an art educator. It means we have the ability to monitor our thinking, critically assess our own lives, and this helps us to make informed decisions and most importantly in education, learn how to learn. I have taken a lot of inspiration from artist Andy Goldsworthy whose early work features lots of holes as well as Russian philosopher Grigory Pomerants who has also talked about holes as a breach in dogmatic thinking that limits our potential. I am therefore focusing on the ongoing cycle of organic decay and regeneration in choosing compost as the theme for the visual representation of my introspective space. This art requires participation for activation. Visitors will activate the sculpture by entering the space, sitting in the provided chair, putting on the provided noise cancelling headphones and eye mask. Then, sit and be inside your own mind. Visit the void that is the dark corners of your mind. After the experience, visitors are encouraged to write down something in their mind they are ready to compost and add it to the pile of organic detritus outside the sculpture which will be composted unread after the exhibition. Opening night is April 3rd, and the exhibition will be up at the Center for Visual Art through the month.

Synthesis of a Library of 6-deoxy-Talose-Containing Glycopeptidolipid Oligosaccharides for the Creation of Aptamer-Based Diagnostics

Viktoriya Gidenko - Chemistry
Co-Author: Isabel Thomas
Faculty Mentors: Shailesh Ambre & Andrew Bonham

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #7

Non-tuberculous mycobacterial disease is an emerging global health concern due to increased exposure to environmental pathogens and a growing population with increased susceptibility to pulmonary disease. Of the various non-tuberculous mycobacteria (NTM), Mycobacterium avium has been implicated in the development and progression of pathological conditions. Proper diagnosis is complicated by the difficulty in distinguishing NTM disease from other pulmonary infections in the microbiological laboratory and the need for genetic testing. The type of NTM disease caused by M.avium can be classified by pathogen-associated molecular patterns (PAMP) of NTM serovars. One of the PAMPs - glycopeptidolipids (GPL) are unique and composed of a lipid attached to the N-terminus of a tetrapeptide core decorated with sugars (glycans). Aptamer-based diagnostic tools offer a promising solution due to their high target-molecule specificity; however, a significant bottleneck to aptamer-based diagnostic research is the difficulty in obtaining workable quantities of defined GPL structures. This work aims to create a library of the oligosaccharides α-linked to the D-allo-Threonine residue of the GPL peptide core. These oligosaccharides begin with a 6-deoxy-Talose sugar at the reducing end, which is scarce in biological sources and is expensive commercially. Thus, it was chemically synthesized from the corresponding rhamnopyranosyl thioglycoside by selective inversion of the chiral alcohol at position-4 (C4). The effect of anomeric configuration (a vs b) on the efficiency of C4-inversion was also investigated. Future studies will

focus on stereoselective glycosylation and selective methylation of 6-deoxy-Talose, and the elaboration of the oligosaccharide chain to create a library for screening high-specificity aptamers.

Towards the Asymmetric Synthesis of Natural & Unnatural Amino Acids using Glycine Methyl Ester Schiff's Bases

Stian Gilbertson - Chemistry
Faculty Mentors: Shailesh Ambre & Joshua P. Martin

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #8

Protein structure determines function in biology; however, intrinsically disordered proteins (IDPs) lack a stable three-dimensional structure but still perform important roles such as gene regulation and cell signaling. The disordered nature of these proteins is thought to allow them to carry out a wider variety of functions, but it also makes them difficult to study, as they exist in a dynamic ensemble of conformations. To address this, single-molecule Förster Resonance Energy Transfer (smFRET) can be used, where two fluorophores, a donor and an acceptor, are placed at defined positions in a protein and monitored using fluorescence spectroscopy to gain insight into structural dynamics. The naturally occurring amino acid Tryptophan (Trp) and the unnatural amino acid (UAA) 2-Cyano-L-phenylalanine (2-CLPA) have been reported as a suitable donor–acceptor pair for these measurements. However, the synthesis of 2-CLPA is not well documented, and commercially available material is expensive. These limitations have made the development of a more economical and accessible synthetic route a worthwhile area of research. To achieve stereoselective synthesis of 2-CLPA, a strategy employing a Benzophenone Schiff's base of glycine methyl ester was implemented. This Schiff's-base modification enhances the acidity of a-hydrogens on the amino acid, allowing the alkylation of the a -carbon with corresponding halides under mild conditions. This work is a proof-of-concept demonstrating the synthesis and characterization of D/L-Phenylalanine. Future work will focus on achieving stereoselective synthesis incorporating chiral catalysis and asymmetric induction strategies enabling synthesis of 2-CLPA for use in smFRET studies of IDPs

Optimization growth of *Mycobacterium bovis* strain Bacillus Calmette-Guérin and RAW 264.7 immortalized murine macrophages with flow cytometry

Kattya Gonzalez - Biology
Co-Author: Kali Julien
Faculty Mentor: David Merriam

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #6

The immune system consists of multiple mechanisms that protect against pathogens. Unlike adaptive immune memory, trained immunity refers to the enhanced response of innate immune cells. BCG (Bacille Calmette-Guérin) is a live attenuated strain of *Mycobacterium bovis*, which exhibits the ability to induce trained immunity in innate immune cells. The aim of this project is to evaluate the potential of BCG to increase the phagocytic potential of macrophages.

BCG cells were cultivated and evaluated using flow cytometry, which characterizes individual cells by size and granularity and allows rapid enumeration. Once validation of the assay is complete, proliferation of RAW264.7 cells, (an immortalized murine macrophage lineage), and exposure to BCG will be next steps. It is necessary to assess the ability of BCG to train RAW264.7 cells to respond more strongly against a homologous second challenge from BCG as well as heterologous challenge from other bacteria. The RAW264.7 cells will then be evaluated for expression of CD80 and other markers of macrophage activation, as well as phagocytic potential using fluorescent particles.

Several challenges were encountered during the validation process. The 7H9 media used to culture BCG may have caused autofluorescence within the sample, making proper enumeration difficult. The replication of this calibration technique using sterile saline was conducted and compared with the use of 7H9 media. Reliable and rapid enumeration of BCG is vital to establishing appropriate controls and conditions using RAW264.7 cells. Findings from these experiments can provide other researchers with the opportunity to evaluate BCG's capacity to train the immune system. This data could also contribute to the greater understanding of the role of proinflammatory markers from BCG-induced macrophages.

Investigations of species distributions and suspected hybridizations of *Cx pipiens* and *Cx. salinarius* along Colorado's front range

Maritza Gonzalez - Biology
Faculty Mentors: Robert Hancock & Vida Melvin

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #11

Mosquito surveillance technicians who conduct surveillance for Vector Disease Control International along Colorado's Front Range have had difficulties using morphological features to accurately differentiate between adult female *Culex pipiens* and *Cx. salinarius* captured in CO2-baited CDC mini light traps. *Cx pipiens* is broadly-distributed in the surveillance area while *Cx. salinarius* is more patchy and less abundant. We present here an intensive study of the distributions of these species with a focus on identifying locations of high sympatry. We are actively genetically testing individuals from sympatric locations that exhibit intermediate morphologies using selected loci that when heterozygous will indicate hybridization.

An Examination of PragerU Curriculum and its Harms

Milo Halpern - Math w/secondary education concentration
Faculty Mentor: Janelle Johnson

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 203

This paper examines the inequity created by educational policies which endorse or mandate PragerU curriculum. It reviews specific instances of biases and factual errors contained within the curriculum, as well as providing a broad examination of the ways this curriculum can fail to meet district and state academic standards. It discusses the specific harms PragerU curriculum can

cause in its failure to meet these standards. Specifically, this paper recognizes both broad harm when curriculum does not prepare students to meet standards of critical analysis and the development of evidence-based conclusions, and specific harm to newcomer students whose experiences are diminished by or excluded from PragerU curriculum materials. It centers these assertions within the current context of the Heritage Foundation's Project 2025 document, and actions which have been taken by the Trump administration to dismantle the Federal Department of Education. Finally, it proposes actions which can be taken by educators and families to recognize and reverse these harms, in order to improve public education.

Worth my Weight in Woe

Rex Herlin - BFA in Studio Art (Jewelry and Metalsmithing Concentration)
Faculty Mentors: Maeve Leslie & Leslie D. Boyd

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #4

What is the value of a human life? How is that value prescribed and mediated through the material wealth one can produce? *Worth my Weight in Woe* is an artistic project that combines jewelry with soft sculpture to investigate these questions, representing the quantification and devaluation of human life under capitalism. Presented in this manner, *Worth my Weight in Woe* brings an awareness of labor issues to audiences with an interest in jewelry, an industry that recognizes value as a material quality but seldom speaks to the human labor behind that value. The project consists of a soft-sculpture base in the shape of a stuffed elephant and a collection of handmade jewelry to adorn it, with each jewelry piece designed to represent an aspect of the worker's life through the visual language of the "worker bee." Through the use of these contrasting mediums, both of which are noteworthy for their laborious production, *Worth my Weight in Woe* creates a visual dichotomy of two rhetorical entities: the "elephant," slumped and soft to represent the inconvenient fatigue and sentimentality of the individual, and the "bee," symbolizing the unattainable ideal of a perfect worker, their image enshrined in brass and gemstones. These elements, each visually at odds with the other, reflect the internal conflict of workers in conditions that overtax, underpay, and coerce them. In presentation and process, the work reveals a deep longing for a world that values slow, meticulous work—and the hands that make it—over a quick buck wrung from the desperate and underprivileged.

***Macc1* is Expressed in the Testes and Ovaries of Adult Zebrafish**

Elena Herrera - Biology
Co-Author: Peyton Minner
Faculty Mentor: Vida Melvin

Poster Presentation, Session II (10:00 – 11:15 am), Poster #9

Metastasis Associated in Color Cancer 1 (*MACC1*) is an oncogene that promotes proliferation and metastasis of cancer cells. MACC1 is a transcriptional regulator that is activated by the HGF-c-MET pathway. In turn, MACC1 is a direct transcriptional regulator of the *MET* gene leading to a feedback loop that is important for the cancer phenotype. MACC1 also regulates the expression

of *NANOG* and *OCT4* pluripotency genes that are known to be expressed in cancer stem cells. While we know a lot about *MACC1* and cancer, little is known about its normal function. We propose that the normal function of *MACC1* is to regulate *MET*, *NANOG*, and *OCT4*. To test this idea we used RT-PCR to compare the expression of *macc1* to *met* and *nanog* in adult zebrafish tissues. RNA was purified from zebrafish organs, cDNAs were synthesized, and PCR was performed using primers that spanned exon-exon boundaries of all three genes. The expression of *macc1* was detected in the ovaries and testes, while *nanog* was only detected in the ovaries. No other organs showed *macc1* or *nanog* expression. Expression of *met* was observed in the liver, intestine, brain, and testes. Both *nanog* and *met* have been previously shown to be expressed in the ovaries, but our preliminary data does not support this. We will repeat these experiments to confirm the results. However, the overlapping expression of *macc1*, *nanog*, and *met* in the testes supports our hypothesis. We plan to expand our studies to other *macc1* target genes, including *oct4* and *klf4*. To further test this idea, we will examine the expression of these target genes in *macc1* loss-of-function mutant zebrafish.

Alpine Black Flies of the Continental Divide

Silver Hull - Biology
Co-Authors: Elliana Ortiz & Tayler Arnold
Faculty Mentor: Robert Hancock

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 200

Black flies (Simuliidae) are a family of flies with aquatic larvae and pupae and often blood-feeding adult females. Larvae and pupae live in fast-flowing water and attach themselves to substrates such as submerged vegetation or rocks. They are highly sensitive to water conditions and act as important bioindicators for water quality. While blood-feeding by adult females is not typically medically significant to humans, it can cause severe irritation and often impacts livestock. Individuals of the genus *Simulium* can also transmit *Onchocerciasis* in affected regions.
This presentation will discuss the research project taken on by MSU Denver undergraduates regarding the Simuliidae of Colorado found at three locations along a narrow lake-fed alpine stream near Loveland Pass at 11,990 feet. Collected specimens underwent morphological identification and were visually assessed for signs of parasitism. Diversity and parasitism rates by both the fungus *Coelomycidium simulii* and water mites were calculated and analyzed across the three locations. A total of 12 species across 3 genera were found across 63 identifiable specimens within a single day of sampling, well exceeding the average number of species found at a location at a time. The overall rate of parasitism was 40%, with fungal infections being the most prevalent.

Have you really looked at your data set lately?: Appraising Temperature Taking Methods in Urban Forestry

ReAnn Jacob - Environmental Science
Co-Authors: Savannah Verner & Monique Nem
Faculty Mentor: Erin Bissell

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #12

The emerald ash borer has been invading urban areas in Colorado for over a decade, affecting ash trees' critical ability to shade our cities. This study's original goal is to assess the impact of the duration of emerald ash borer infestation on urban forest health and its possible relationship to the Urban Heat Island Effect. We used infrared (IR) thermometers, sling psychrometers, and a soil moisture probe to measure the microclimate around 90 trees in a series of three seasonal replicates across Denver, Boulder, and Westminster. We collected data on ash tree canopy cover, diameter at breast height, ambient air temperature, ground temperature, soil moisture, and ground cover. In 2025, we noted inconsistencies in ground temperature data collected with the IR thermometers. Consequently, our focus shifted to assessing the reliability of common field instruments that measure temperature and how to address variability in field sampling. Statistical tests were run to assess the consistency of the IR readings, to compare the ambient air temperatures to weather station readings, and to evaluate the effect of soil moisture on ground temperatures. The results identified discrepancies in temperatures taken by IR thermometers; between two thermometers side by side, and between data points collected by the same thermometer. This could indicate imprecision and inaccuracy in the calibration of the instruments. We see a consistency between ambient temperatures that would allow them to serve as a calibration tool. This creates a framework for assessing the precision and accuracy of our IR readings to determine their reliability for further analysis. Outside of ecology, these implications extend into fields such as healthcare, the food industry, and engineering, potentially calling into question temperature data collected with this ubiquitous tool.

The Dung Beetle's Effect on Soil Quality in Daniel's Park

Ashley Johnson - Environmental Science
Co-Authors: Madeleine Palmgren
Faculty Mentor: Sarah Schliemann

Poster Presentation, Session II (10:00 – 11:15 am), Poster #11

Historically, dung beetles, such as the Rainbow Scarab (Scarabaeinae), have been important organisms in the short grass prairie where they break down the dung from bison. These beetles are nutrient recyclers that have increased aeration, nutrient availability and may sequester carbon. In the early 1900's when the Bison was nearly eradicated, dung beetles also disappeared from the landscape. With the loss of the dung beetles, the soil quality in Daniel's Park has degraded over time, resulting in excess invasives and high rates of erosion. This project is part of a larger restoration effort at the park, including the reintroduction of dung beetles. Once a month, we collect samples using a probe from various locations within Daniels Park in Douglas County, Colorado. In the lab, we sieve the soil, dry it and then grind it. Carbon content of samples is measured using Shimazau total carbon analyzer. Results show that carbon content ranges from 12.017 - 23.932 mg of C / g of soil, with the higher measurement being where the Bison are present. These numbers will be used as a baseline to compare after introduction to determine whether the dung beetles are having a positive effect on the soil condition.

here, now: archiving the ephemeral

Katie Karakourtis – Studio Art

Faculty Mentor: Marin Abell

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 200

here, now gives form to what is often left unspoken and unremembered: emotions, connections, trauma, and fragments of embodied experience. While archives are conventionally framed as objective repositories of institutional memory or achievement, theorists such as Ann Cvetkovich, Audre Lorde, and Catherine Hobbs propose that emotions, sensations, and personal experience constitute equally vital forms of knowledge. This textile project contributes to that discourse by constructing an alternative archive grounded in emotion, memory, and survival.

The properties of thread and fabric function as both material and metaphor, transforming what is invisible or ephemeral into tangible object that documents personal history. Thread's ability to fray, knot, bind, and unravel becomes a parallel for the processes of identity formation and queer survival. Through hand embroidery, free-motion machine stitching, and sewing on sheer, patchworked fabrics, materials are approached as collaborators rather than tools; and imperfection, undoing, and failure become integral to meaning-making. The resulting installation of suspended textile panels invites viewers to encounter both surface and underside, mirroring the layered nature of memory, existence and identity.
here, now ultimately proposes that archiving the ephemeral is not a contradiction but a necessary act: a way of remembering, understanding our history, and envisioning futures in a way that goes beyond dominant narratives.

Not All OCD Is Viewed the Same: How Symptom Subtypes Shape Stigma

Leif Kenamond - Psychology
Faculty Mentor: Maureen Flynn

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #22

Obsessive Compulsive Disorder (OCD) affects around 4.1% of the population and is a source of significant distress and impairment. Despite the negative impacts OCD has on a person's quality of life, help-seeking and diagnosis are often delayed by over 5 years from symptom onset. One reason for this delay could be due to stigma surrounding the disorder. It is important to understand public attitudes toward OCD so that efforts can be made to target and reduce this stigma. One of the ways in which these attitudes can be investigated is by looking at differences in attitudes across different OCD symptom subtypes. Thus, the goal of this study is to investigate whether any differences in attitudes exist between three OCD subtypes; symmetry-, harm-, and scrupulosity-OCD. Undergraduate students (n = 21) were randomly assigned to a vignette depicting one of the three OCD subtypes. They were then given the Attitudes Questionnaire (AQ-27) which measures attitudes toward the vignette character across 6 factors; Fear, Help/Interact, Responsibility, Forced Treatment, Empathy, and Negative Emotions. Participants were also asked about their religious affiliation to see if religious participants differed from non-religious participants in their attitudes toward the scrupulosity-OCD vignette character. Significant differences in scores for two of the six AQ-27 subfactors, Forced Treatment and Fear, were found between the conditions with those in the harming OCD condition having the highest scores. The impact of participants' religious affiliation on attitudes toward the scrupulosity vignette character was not significant. These findings suggest

that individuals with harm-related obsessions may face greater stigma and thus may be less likely to seek treatment. Future research should replicate this study with a larger sample size and a greater number of OCD symptom subtypes.

Explainability Analysis of Retrieval-Driven Behavior in RAG Pipelines

Yujin Kim - Computer Science
Faculty Mentor: Ranjidha Rajan

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 203

Large Language Models (LLMs) are powerful but remain susceptible to hallucinations and reliance on outdated training data. Retrieval-Augmented Generation (RAG) addresses this limitation by integrating external knowledge retrieval into the generation process. However, we still do not fully understand exactly how the quality of that retrieved information affects the final generated text. This research provides a clear analysis of a RAG system to explain how these parts interact. This study provides a systematic analysis of how key RAG components influence answer correctness and stability. Using subsets of the SQuAD v2 dataset, we tested three embedding models, finding that e5-large was the most accurate. We also tested multiple FAISS search strategies, showing that HNSW provided the best mix of speed and accuracy. To see exactly how the model uses this retrieved evidence, we used interpretability methods like token-level attention analysis, Integrated Gradients attribution, and confidence tracking.

Our results show that retrieval quality is the dominant factor affecting RAG reliability. When testing the full pipeline, we found that wrong answers mostly come from confusing or weak search results, not from the generator model itself. Also, our attention analysis shows that the generator usually focuses heavily on just one main passage of text, rather than combining information from multiple sources. As a result, if the search step pulls in off-topic information, the model gets confused and accuracy drops. By measuring how off-topic searches affect the final answers, this study connects overall system performance with a deeper understanding of the model's behavior. These findings offer practical guidance for designing more transparent, reliable, and robust retrieval-augmented AI systems.

Exploring Barcode Loci for Hawthorn Identification at Red Rocks Park, Colorado

Dawson Lee - Biochemistry
Faculty Mentors: Megan Filbin & Tyler Williams

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #1

The Red Rocks region of Colorado features unique geology and topographical complexity that supports over 120 species of plants. Rock formations of different sizes and angle direct the flow of water into natural gullies, supporting a unique ecosystem including many hawthorn species. There has been little study into the ecology of the area, what plants are growing within it, or the complex ecosystem it contains. As members of the Crataegus genus, hawthorns partake in complex hybridization networks and can clone offspring through asexual reproduction, decreasing the

efficacy of many tools such as traditional keys and AI assisted, apps. The challenge continues with the use of barcoding loci due to hybridization, recent speciation and inconsistent concentration of DNA among members of the same species. In our research we aim to utilize multiple barcoding loci including variable intronic regions to differentiate between hawthorn species. To test this, we extracted total DNA from leaf plant tissue and used PCR to amplify DNA at multiple molecular barcoding loci. Our next step included nanopore sequencing and analyzing the barcode sequences using the Barcode of Life Data Systems (BOLD). In addition to molecular identification, we obtained morphological data that displayed waxy, glabrous leaves with a regular presence of black glands along the leaf margins, suggesting the presence of cerro hawthorns. Further morphological data will be collected for other unidentified species in the region, with fireberry and large-thorned hawthorn among the possible species. Ultimately, we expect our paired molecular and morphological data to identify which Colorado hawthorn species thrive in the unique ecology within the Red Rocks region.

Divalent Metal Ion Transporters In Insects

Bella Maher - Biology
Faculty Mentor: Emily Ragan

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #9

Malvolio (Mvl) is a divalent metal ion transporter in Drosophila melanogaster, orthologous to mammalian DMT1, and is essential for maintaining iron (Fe^{2+}) and potentially copper (Cu^{2+}) homeostasis. Because metal ion transport is highly conserved across species, we used the Drosophila Mvl sequence to perform a BLAST search across a variety of insect species to identify homologous proteins. Mvl was present in most insect species we examined, including honeybees, mosquitoes, and beetles, but was not detected in insects belonging to the order Lepidoptera. This absence is notable because Lepidoptera must still regulate iron transport, suggesting that another transporter or mechanism likely fulfills this role. Disruptions in metal ion balance are linked to neurodegenerative and metabolic disorders in humans, and Drosophila has been used as a model system to study metal-related diseases. This project uses AlphaFold structural modeling and ChimeraX visualization to investigate the three-dimensional structure of Mvl and compare conserved regions across insect species, focusing on potentially conserved, negatively charged residues involved in ion transport. Several residues identified in the analysis appear to be highly conserved across the insect species examined, suggesting they are essential for transporter function, and mapping these residues onto the predicted structure helps identify possible ion transport pathways. By identifying these conserved residues and visualizing their positions within the protein structure, our analysis contributes to a broader understanding of how Mvl facilitates iron uptake across insect species while maintaining key structural features.

The Role of Play-Based Therapy and DIR/Floor time in Supporting Communication Development

Megean Mayfield - Speech Language Pathology
Faculty Mentor: Marcia Walsh-Aziz

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 205

This capstone project explores the use of play-based therapy, specifically the Developmental, Individual Differences, Relationship-Based (DIR/Floor time) model, in supporting communication development in children. During my clinical internship experience in a speech-language pathology setting, I have observed therapy sessions that emphasize child-led play, shared attention, and interaction between the clinician and child. These sessions highlight the importance of engagement and relationship-building as foundations for communication development.
The central question guiding my project is: How does a play-based approach such as DIR/Floor time support the development of speech, language, and social communication skills in young children? This question is significant because traditional therapy approaches often focus on structured tasks or direct instruction, while play-based approaches prioritize natural interaction, emotional connection, and the child's interests as drivers of communication. Understanding how these approaches support language development may help clinicians create more effective and engaging therapy environments.

To investigate this topic, I will review current research on play-based therapy and the DIR/Floor time model, while also reflecting on clinical observations from internship experiences. Additionally, this project will explore strategies used in play-based sessions to promote communication, such as following the child's lead, expanding language during play, and supporting joint attention. Preliminary insights suggest that play-based interventions can foster increased engagement, spontaneous communication, and social interaction. This project highlights the importance of relationship-centered therapy in speech-language pathology and raises further questions about how play-based approaches can be integrated across different clinical settings and populations.

The Dive to Survive: The impacts of nutrition on the diving behaviors and buoyancy of *Aedes aegypti* larvae

Sara Mazur - Biology
Faculty Mentor: Robert Hancock

Poster Presentation, Session II (10:00 – 11:15 am), Poster #10

Mosquitoes of the genus *Aedes* are known to exhibit both browsing behaviors and filter feeding. Diving is a crucial behavior in *Aedes* larvae that allows them to feed at the bottom of containers. This experiment was conducted to determine how diving behaviors are impacted by the amount of food available to the larvae. *Aedes aegypti* mosquitoes were hatched from eggs and placed in three separate cell culture flasks in counts of one hundred larvae per flask. One flask of larvae was given two scoops of food (starved), one was given 12 scoops of food (ideal), and the last was given 24 scoops (overfed). Their activity was monitored by the camera every day after feeding. The most diving activity was seen in the starved larvae. After seven days of monitoring, most of the overfed larvae were dead; the ideal larvae had pupated, and the starved larvae were still in their larval stage.

Legacy Metal Contamination at Denver's Auraria Campus: Linking Soil Pollution to Historical Land Uses

Stephanie McGavran - Geography
Faculty Mentor: Sarah Schliemann

Poster Presentation, Session II (10:00 – 11:15 am), Poster #12

The Auraria Campus was built on the site of Denver's oldest neighborhood, demolished between 1968-1972 before environmental regulations required soil contamination assessment. Recent soil sampling revealed unexpected mercury contamination hotspots exceeding 21 ppm—over ten times EPA residential guidelines—raising questions about the extent of unrecognized legacy contamination in urban environments built on former industrial sites. To investigate this contamination, samples were collected using a soil probe from 20 locations across campus, targeting areas near preserved historic structures and sites shown to have elevated contamination in preliminary assessments. Metal concentrations were measured using X-ray fluorescence spectroscopy (XRF) to provide screening-level data for spatial pattern analysis and guide further targeted testing. Results revealed widespread contamination with both mercury (3.0-25 ppm) and lead (12-83 ppm), with all samples exceeding EPA residential guidelines. Hotspots for both metals were distributed across northern and southern campus zones, indicating multiple historical sources from the demolished industrial neighborhood. The widespread mercury and lead contamination reflects legacy pollution from the neighborhood's industrial past, with spatial distribution patterns potentially corresponding to specific pre-demolition land uses. Historical analysis of archival records and additional soil testing will identify specific industrial sources and confirm contamination extent.

Beyond Pet Ownership: How Dimensions of Pet Attachment Predict Stress and Life Satisfaction

Kasey Mears - Psychological Science
Faculty Mentor: Maureen Flynn

Poster Presentation, Session II (10:00 – 11:15 am), Poster #13

Stress among college students is increasing and can have psychological impacts including higher prevalence of depression and lower levels of life satisfaction. Research is mixed on whether owning a pet reduces levels of stress and increases life satisfaction. Perhaps, aspects of the relationship with one's pet matters in these associations. The aim of this study was to examine whether aspects of pet attachment (i.e. love, emotional regulation, personal growth, and negative impact from a pet) predict stress and life satisfaction among college students. Our sample consisted of 161 undergraduate students from a four-year institution, and participants completed an online survey. Results found that emotional regulation from a pet positively predicts stress, and personal growth from a pet negatively predicts life satisfaction. These findings suggest that not all aspects of pet attachment are uniformly beneficial and may function differently depending on how individuals rely on their pets for emotional support. This has important implications for understanding the complexity of human–animal relationships and highlights the need to consider the quality and function of attachment rather than pet ownership alone. Future research should examine these

relationships longitudinally and explore potential mechanisms (e.g. over-reliance on pets for emotional regulation, reduced human social support) as well as differences across types of pets and levels of attachment.

How the MSU Writing Center could better serve ESOL students

Maria Medina Santellanes - English
Co-Authors: Myles Larrick & Jordan Gertner
Faculty Mentor: Elizabeth A. Kleinfeld

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 205

The purpose of this research project is to understand the needs of English as a second or other language (ESOL) students within educational institutions related to writing, and how the Writing Center at MSU Denver can better address these needs in a time where generative AI is advancing rapidly. Our main focus is to see how the Writing Center can better serve ESOL students and their needs, and understand why students feel they need to use AI instead of going to the writing center, and to see what we are missing as an institution, this leads to our thesis of how can the Writing Center be a better place that covers the needs of ESOL students in the information era where AI is used as a writing tool.

Through ethnographic interviews, we looked at why ESOL students choose not to come into the writing center, and for those who have been how helpful the writing center services were to them. We will also be conducting interviews with our multilingual consultants to understand their experiences in the writing center. We plan to apply our findings to the Writing Center, see how it can change to best accommodate ESOL students, and to see the reasons why we may be disserving them. Part of that understanding comes from the linguistic ideologies instilled into higher academia. Structuralism still persists in U.S. higher education, and puts a focus onto grammar, splitting it from the other half of language, meaning. This ideology harms ESOL students, and part of the study looked at how structuralism affects ESOL students at MSU. With the knowledge and experiences of the consultants, we will have a clear idea of what we might be missing as an institution and will also understand how monolingual students can better help ESOL students.

Find My Major

Nathan Meiners - Computer Science
Co-Authors: Thomas Miller, Bing Huang, Kayleen Gallegos, Owen Pick, Sayuj Shrestha, RJ Sam, Alex Muzika, Angela Fleenor, Firehiwot Tiruneh, & Nathan Groshek
Faculty Mentors: Ranjidha Rajan & Mark Yoss

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #14

This project develops a lightweight machine-learning–based career recommendation prototype designed to enhance short advising interactions for undecided students. Traditional career guidance tools frequently rely on the Holland Code (RIASEC) framework, which categorizes vocational interests into six personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. A person's interest profile is matched with compatible work environments and

careers. While widely used in career counseling, many implementations require lengthy assessments and provide broad or static recommendations, limiting effectiveness in time-constrained settings such as career fairs or brief advising meetings (EBSCO, n.d.).

This research investigates whether machine learning can improve the efficiency and relevance of Holland Code–based recommendations by inferring a student's RIASEC profile from a minimal set of adaptive questions. The system evaluates multiple AI/ML models and parameter configurations, trained on O*NET RIASEC occupational profiles, to determine the best-fit model and generate ranked career suggestions aligned with inferred preferences. The prototype is designed for lightweight local execution on mobile devices, enabling rapid inference without cloud reliance. The system incorporates an adaptive questionnaire in three sets of 12 questions to identify informative prompts based on previous responses, along with a feedback mechanism allowing users to reject undesirable career suggestions. This feedback refines future recommendations and reduces irrelevant options. Model performance will be evaluated through comparisons with full-length RIASEC assessments and ranking metrics such as Precision@K and NDCG@K, alongside qualitative user feedback on recommendation relevance. By combining a well-established career framework with machine-learning–driven inference and ranking techniques, this project demonstrates how AI can augment traditional advising tools. The prototype aims to provide faster, more personalized career guidance while maintaining alignment with Holland Code principles, supporting advisors and students during early career exploration.

Eri

Samuel Michael - Bachelor of Fine Arts in Communication Design
Faculty Mentors: Kelly Monico & Dr. Jacqueline McLeod

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #2

I was born and raised in the United States, and I haven't returned to Eritrea since I was six years old. Over time, that distance has created both a personal and psychological disconnect from my cultural roots. Growing up in America has been a gift, but it can also feel like parts of my cultural memory have softened or faded. This project is driven by both an internal and external desire; internally, it offers a sense of personal fulfillment by reconnecting me back to my heritage. Externally, it creates a space to educate and spark curiosity about a country that is often overlooked.

Eri, short for Eritrea, functions as a design-driven social campaign positioning Eritrea as a symbol of modern African identity and enduring cultural recognition. Through visual storytelling, the campaign reframes Eritrea, a small yet historically steadfast nation, as a powerful emblem of preservation, pride, and self-determination.

Afrocentricity, embedded in the project's visual framework, affirms a centered perspective that positions people of African descent as active authors of their own histories rather than the subjects of Eurocentric narratives. In this way, Eri reimagines what an Eritrean space can become when positioned not as a colonial spectacle but as a self-defined cultural anchor shaped by a collective, empowered vision. By adopting a campaign-style approach, Eri extends beyond a static representation into a dynamic experience, ranging from vivid posters and flyers to self-promotional materials such as informative zines and stickers. Ultimately, Eri stands as a visual testament to the

value of cultural differences, affirming that an understanding of diverse perspectives' histories and traditions is a source of strength.

Parents' Evaluations of Parenting Advice Generated by AI, Experts, or Family and Friends in Social–Emotional Contexts

Elise Midcap - Nursing
Co-Authors: Maria Mondragon, Daniel Niewiarowicz, Averie Mclain, & Elias Pike
Faculty Mentors: Bethany Fleck Dillen & Cynthia A. Erickson
Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 203

Parents increasingly rely on digital tools, including artificial intelligence (AI), to seek advice about child behavior, health, and development. The present study examined how parents evaluated parenting advice across three sources (AI, an expert, or a family/friend). It also explored how parents' evaluations were related to psychological parenting constructs.
A total of 593 parents of at least one child, age 18 or younger, completed an online Qualtrics survey. Parents completed the following scales: Parenting Sense of Competence, Parental Stress, Parenting Locus of Control, Parental Control of Child's Behavior, and Parental Responsibility. Parents then read two advice scenarios generated by ChatGPT concerning healthy sleep routines and managing a child's anger. For each scenario, participants were randomly assigned to read advice labeled as coming from one of the three sources. Parents rated the advice in terms of accuracy, trustworthiness, helpfulness, intelligence, ethics, relevance, and likelihood of recommendation.

Results indicate that parents evaluated the advice positively overall, but consistent source effects emerged. In the anger scenario, parents rated advice by experts, friends, and family members to be more trustworthy than AI-generated advice. In the sleep scenario, parents rated advice to be more trustworthy, intelligent, and ethical. No source differences emerged for accuracy, helpfulness, relevance, or likelihood of recommending the advice to others in either scenario.

Correlational analyses revealed strong internal consistency among advice evaluation variables. Parental stress indicated negative associations with most advice evaluations suggesting that the more parents reported stress, the less favorably they evaluated the advice. Findings indicate that parents view AI-generated parenting advice as useful, but not as credible as expert or peer advice. As AI tools become increasingly integrated into family life, understanding parent perceptions is essential for promoting responsible, accurate, and ethical use of AI in parenting and family contexts.

Spatiotemporal Trends in Colorado's Hydrology

Kevin E. Morales - Geography
Faculty Mentor: Andong Ma

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 200

This study evaluates long-term hydrologic change in Colorado and the Upper Colorado River Basin by integrating supervised image classification, surface-water change detection, and climate–snowpack correlation analysis. Landsat imagery from 1985 and 2025 was classified using a Support Vector Machine (SVM) workflow to map surface-water extent with high spatial precision. Change detection revealed a substantial net loss of surface water over the 40-year period, with a large proportion of areas classified as water in 1985 transitioning to land by 2025. This pattern reflects a long-term decline in reservoir surface area consistent with persistent regional drought, reduced Colorado River inflows, and sustained hydrologic stress across the basin.

To contextualize these landscape-scale changes, statewide climate and snowpack relationships were examined using Pearson correlation and linear regression. Annual Colorado average temperature and statewide snow water equivalent (SWE) exhibited a moderately strong negative correlation, indicating that warmer years tend to coincide with reduced snowpack accumulation. The regression relationship further supports this inverse pattern, suggesting a long-term temperature-driven decline in SWE. In contrast, the relationship between Colorado River discharge and Vail Mountain SWE showed a strong positive correlation, demonstrating that higher mountain snowpack strongly aligns with increased river flow. Together, these findings highlight the interconnected nature of rising temperatures, diminishing snowpack, reduced river discharge, and shrinking surface-water bodies. The combined evidence underscores the sensitivity of Colorado's hydrology to climatic variability and long-term warming trends, and it reinforces the importance of integrating remote sensing with climate indicators to assess water resource vulnerability in the Colorado River Basin.

Understanding the impact of invasive rusty crayfish on community structure in Lake Granby and the Little Thompson River using stable isotope analysis

James Dennis Morfeld - Biology
Co-Authors: Kim Drexler & Amy Teten
Faculty Mentor: Jason Kolts

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #13

Rusty crayfish, native to the Ohio River Basin, have become a key aquatic nuisance species in Colorado. First detected in the state in 2009, they have most recently been discovered in Lake Granby and the Little Thompson River. Their presence in Lake Granby is of particular concern as it serves as an entryway to the entire Colorado River system. As an omnivorous species, rusty crayfish have the potential to impact the community structure of ecosystems from the bottom up by consuming aquatic macrophytes, which are important as food and spawning habitat for native species. They can also disrupt the systems from the top down through their consumption of predators and can compete with native species for food and shelter resources. In this study, we are using nitrogen ($\delta^{15}N$) and carbon ($\delta^{13}C$) stable isotope analysis to better understand the impact of rusty crayfish in Lake Granby and the Little Thompson River. We collected rusty crayfish and crayfish species native to Colorado from Lake Granby using baited traps and from the Little Thompson River using hand nets. We also collected potential prey species as well as plant and algal samples. Initial review of stable isotope analyses of these samples suggests considerable trophic niche overlap among rusty crayfish and similar-sized resident crayfish. Across all species, there was a moderate increase in $\delta^{15}N$ values with increasing crayfish size, indicating that larger

individuals likely feed at higher trophic levels than smaller individuals. We noted few differences between males and females. While still early in our study, preliminary results suggest that rusty crayfish are likely having a greater top-down effect on community structure in these systems and that competition for available resources could negatively impact resident species in these waters.

FUN Sheet - a quick and simple homework sheet

Yajaira Muñoz Delgado - Speech, Language, Hearing Sciences
Faculty Mentor: Marcia Walsh-Aziz

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 205

In school or preschool settings, speech therapy services are commonly provided in short sessions. Even with perfect attendance, practicing the speech sounds should occur more often than in therapy sessions. A recurring question is how to practice at home without difficulty from language barriers or limited time. Regarding this, Tambyraja (2020) conducted a survey to determine whether parents found the homework given useful. While interning at Auraria Early Learning Center (AELC), I assist graduate students working with children aged 4 to 5 receiving speech therapy once or twice a week. The purpose of this project is to investigate whether a homework sheet would benefit the child by having words practiced during the session. Currently, the only practice suggestion for home is through the ProCare messages. When writing messages to parents, it can be difficult to explain in writing the position of the mouth needed to produce the sound. On this homework sheet, the practice words can be translated into other languages or include a picture. The homework sheet can also serve as a visual aid for parents to show what the tongue position or mouth shape might look like. Thus, parents or guardians can also produce and ensure they help correct the child if needed to produce it correctly. The goal is to consider whether a homework practice sheet would be a support for SLP, SLPA, or parent practice in a simple, practical way.

Designing Sustainability Spotlights: A Student-Led Approach to Making Sustainability Data Accessible

Alexio Muzika - Computer Science
Co-Authors: Angela Fleenor, Jackson Thomas, Alina Valshchuk, Emma Tran, Umulbanin Gulzar, Monica Ball, Daniel Pittman, & Alyssa Williams

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 203

Sustainability data is often scattered across government portals, research databases, and technical reports, making it difficult for everyday users to find and understand. The Sustainability Hub is a public web platform that aims to make this information more accessible across Colorado. This presentation focuses on how a team of students designed and developed Sustainability Spotlights, a new feature that brings together data, visuals, and AI-powered conversation around a single sustainability topic.

The team began by identifying a core design challenge: how do you take complex, multi-source environmental data and present it in a way that is useful to someone without a technical

background? To address this, students followed an iterative design process, starting with research into existing data sources and user needs, then moving through wireframing, prototyping, and stakeholder feedback cycles. Each decision, from page layout to how data sources are displayed, was guided by accessibility and human computer interaction principles.

A key part of the development was building a reusable framework rather than a one-off page. Students designed the Spotlight architecture so that future topics like energy, air quality, or food systems could be added without rebuilding from scratch. They also integrated Spotlights with Bili, the platform's AI assistant, allowing users to ask questions and explore data conversationally. The first Spotlight, focused on water allocation in the Colorado River Basin, served as the proof of concept for this framework.

This presentation shares the design decisions, technical challenges, and lessons learned from the process. It highlights how student researchers contributed meaningfully to a real-world, publicly facing platform and how collaborative, user-centered development can make sustainability information more approachable for diverse audiences.

Alzheimer's Disease Prevalence and Relationship to Regional Variations in Geochemical Lithium Concentration

Ariella Nadav - Sociology and Geology
Faculty Mentors: Uwe Kackstaetter & Brian O'Hara

Poster Presentation, Session II (10:00 – 11:15 am), Poster #20

The re-emergence of lithium in the 21st century has both scientific and culturally significant impacts. The intersections of environmental exposures and naturally occurring lithium in groundwater have become an increasingly important avenue of discussion. While lithium has been widely recognized for both psychiatric and industrial uses, natural sources of lithium in groundwater have become increasingly important, directing research toward its implications on human health and well-being. One avenue involves exploring neurodegenerative implications such as Alzheimer's Disease (AD). This interdisciplinary study focuses on findings from geology, hydrology, epidemiology, neuroscience, and sociology to examine how lithium appears in the earth, how it can be consumed, and how low doses may influence cognitive health outcomes.

This study aims to link the social sciences to the hard sciences in understanding the connection between human interpretations of environment and personal health effects. Through strong social contexts, it becomes clear that many people do not know what is in their water, what to do about it, or what it may do for—or to—them. This study aims to both educate and delve into uncharted areas of the geological and sociological sciences.

Null Space: An Experimental Faraday Structure for Disconnection

Tori O'Dea - Bachelor of Fine Arts, Art
Faculty Mentors: Anne Yoncha & Marin Abell

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #3

This project proposes an interactive installation that materializes electromagnetic silence within the gallery. At its center is a tent-like enclosure constructed from conductive mesh over non-conductive supports, forming a walk-in Faraday cage that blocks external wireless signals. Upon entering, visitors experience an immediate loss of cellular and network connectivity, encountering a rare condition of technological interruption. The central research question asks: how can electromagnetic energy, an invisible yet pervasive force, be mobilized as both material and subject to produce spaces of disconnection within a culture defined by constant connectivity? Drawing from my background as a Signals Intelligence Operator and Linguist in the United States Marine Corps, where I was trained to intercept and analyze radio frequencies, this project repositions technical knowledge of electromagnetic systems within a sculptural and experiential context.

Methodologically, the work combines principles of radio frequency shielding with installation-based art practices. Iterative prototyping of conductive materials, hand woven mesh densities, and enclosure geometries are used to test the effectiveness of signal attenuation across common wireless bands. These technical experiments will inform the final architectural form, which functions simultaneously as a scientific demonstration and an immersive artwork. The resulting installation produces a controlled absence: a space in which electromagnetic signals are redistributed and effectively nullified. This engineered silence invites reflection on the infrastructures that enable, and increasingly regulate, contemporary life. The project's implications extend beyond the gallery, suggesting new ways of understanding electromagnetic energy not only as a medium of communication and surveillance, but also as a material through which spaces of refuge and autonomy might be constructed.

Pricing stock options using random walk simulations

Sayo Owolabi - Computer Science
Faculty Mentor: Ben Dyhr

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 203

We consider the pricing of long call options for purchasing stock market investments. The Black-Scholes equation from financial mathematics is used in practice to price such options, also called financial derivatives. This equation is derived from a mathematical process called geometric Brownian motion (GBM). The simple random walk is a step-by-step random process that can be simulated computationally and used to approximate GBM. For our work, we use GBM simulations to approximate the average payoff of a specific long-call option and check that it agrees with the price prescribed by the Black-Scholes equations. Simulations like this can be used to price more complicated stock options that do not have an exact pricing formula like Black-Scholes equation. To conclude our work, we use our simulations to price a more complicated stock option.

When AI Hears What Isn't There: The Mimicry Problem in Bird Identification

Laura Patton - Biology
Faculty Mentor: Christy Carello

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #14

I investigated the limitations of bird-identification AI models integrated into acoustic monitoring devices. Three AI models – Merlin Bird ID, BirdWeather, and BirdNet – were compared against a human observer as the control. I collected the data across 15 sessions, each lasting 30 minutes, during peak bird activity within an hour of sunrise and an hour of sunset. This took place within a 15-mile radius of Denver, Colorado, providing a consistent environment. My primary research question is: Which acoustic monitoring device is the most accurate for bird identification? I came up with two hypotheses: (1) If acoustic monitoring devices and human detections differ, then each method will contribute a measurable number of unique species not detectable by the others. (2) If birds that mimic are present, then acoustic monitoring devices may misidentify species, resulting in inflated detections and apparent presence of species not actually present. My results provide strong evidence that mimicking species, such as European Starlings, frequently deceive AI models, leading to significant misidentifications. I found at least 12 of the species identified across the three AI models were mimicry events by European Starlings- impressions of Killdeer, Red-tailed Hawk, and Bald Eagle, to name a few. These findings raise important concerns about the reliability of acoustic monitoring devices for tracking sensitive or endangered species. The comparative analysis highlights the role of human expertise in distinguishing true bird calls from mimicry, especially in complex acoustic environments. My research emphasizes the need for cautious interpretation of AI-based acoustic data and suggests integrating human presence to enhance monitoring accuracy. Ultimately, while AI models offer valuable tools for avian monitoring, their limitations must be recognized to avoid misinforming conservation efforts.

Silent but Friendly: A Story of the Bioaccumulation of Trace Elements in Urban Moss

Quinn Pedrick - Biology and Environmental Science
Faculty Mentors: Erin Bissell & Sarah Schliemann

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 200

Bryophyta, or mosses, are often overlooked as members of the natural world, especially in urban environments. However, moss has the potential to help improve our urban environments by sequestering toxic trace elements from the atmosphere. Bryophyta do not have vascular tissue, and thus their root like structures do not absorb elements from the substrate. Prior research indicates that the species *Bryum argenteum*, commonly Silvery Bryum, can absorb and sequester trace elements from the atmosphere in urban environments. No strong correlations were observed between soil elemental concentrations and moss elemental concentrations, confirming that high concentrations of trace element in the moss came from the atmosphere exclusively. Noteworthy levels of aluminum, calcium, iron, copper, lead, and zinc were all found in urban Silvery Bryum sampled across Denver in Fall 2025. Sites sampled were in Denver Metro primary school and higher education campuses, areas that are meant to be safe from excessive pollution. Because these areas are meant to be environmentally safe, it raises a few questions. Are these moss populations indicators of atmospheric pollutants that cannot be observed in other ways? If so, how might moss be used as a bio-monitoring tool, especially in urban environments? Are all moss species sequestering trace elements from the atmosphere in the same way? Which moss species would be ideal for use as bio-monitors and how might they be used? This presentation will expand on that previous research and aim to answer some of the questions asked by sampling other urban moss species to assess their accumulation of trace elements compared to *B. argenteum*.

Measuring The Galactic Bar Angle Using Red Clump Parallax Data from Gaia DR3

Caoimhin Perkins - Physics
Faculty Mentors: Kamran Sahami & Matthew Penny (LSU)

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 203

The Nancy Roman Space Telescope will detect exoplanet microlensing events in windows along the galactic bulge. The frequency of these events varies with longitude as a result of the angle of the Milky Way's bar, which contains billions of sources, and models of star count and kinematic data for bulge stars return conflicting results between 10 and 40 degrees. We present a novel method to constrain the bar's geometry using precise parallax measurements of red clump stars from Gaia Data Release 3. RC stars are standard candles that allow a selection of a clean sample that enables a precise measurement of the bar angle and distance when averaging the parallax of hundreds of RC stars along multiple sightlines. The precise bar angle measured will improve the interpretation of detected planetary microlensing events in the Galactic bulge.

Developing an automated scanning methodology to quantify microbial motility in mixed culture

Katie Perry - Art
Faculty Mentor: Helene Ver Eecke

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #1

There has been a growing understanding in research of the complex symbioses that occur within microbial communities in natural environments. Stress testing mixed culture groups has become a standard for investigating social behavior in microbes, with quantification of growth as a key metric. Introducing the added variable of motility presents several challenges. Mixed cultures make direct cell counting difficult and the typical solution involving counting colony forming units is not usable when working with motile microorganisms that rarely form discrete units. To address this issue of quantification, an old methodology that combined commercial document scanners with machine learning was identified and adapted to modern hardware and software. Using Visual Studio Code and C#, modifications were made to the Microsoft.NET framework and the Windows Image Acquisition (WIA) interface and a new system for error handling and email notifications was added to the Scanning Manager. To assess the functionality of the updated code, two proof-of-concept tests were performed. A scanning-bed sized maze was designed and inoculated with *Physarum polycephalum* and tracked with the Scanning Manager for a week. The resulting images were compiled into an animation to demonstrate the effectiveness of the automation. The second test compared several groups of motile bacterial variants. A field isolate of *Bacillus mobilis* was grown in mixed culture with either a cultured or field isolate of *Paenibacillus lautus* on differing concentrations of nutrient media. These cultures were tracked by the Scanning Manager for a week and the resulting images were analysed by the updated machine learning software. This new scanning technique facilitated conversion of visual data of motile growth into quantitative data for analysis. Establishing this new methodology for visualizing and quantifying growth data creates an

opportunity to contribute to a more nuanced stress gradient model and will allow for more robust future projects.

Investigating Mitotic DNA Synthesis in Saccharomyces cerevisiae by Nascent Nanopore DNA Sequencing

Kyle Pineiro - Computer Science, Data Science and Machine Learning
Co-Authors/Faculty Mentors: Allison McClure & Samual R. Greenfield (CU Anschutz)

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #17

Mitotic DNA Synthesis (MiDAS) is a process by which cells complete DNA replication during mitosis and is seen in both human cancer cell lines and in budding yeasts. It is unknown why MiDAS occurs, where in the genome it occurs, and by what mechanism it occurs, but it is believed to play an important role in genome stability and maintenance. Older DNA sequencing technologies relied on PCR, which prevented direct detection of BrdU incorporation; however, DNAscent, a recently developed software, now makes this possible. Certain genomic features have been implicated as potential triggers of MiDAS due to their association with replication stress or stalled replication forks, including transfer RNA (tRNA), transposable elements (TEs), and G-quadruplex (G4) structures. We hypothesize that MiDAS occurs in a patterned manner across the genome with the specific genomic features mentioned above either promoting or suppressing its occurrence. Using S. cerevisiae W303 as a model organism, we conducted cell synchronization to incorporate BrdU in place of thymine during new DNA synthesis in mitosis, with incorporated BrdU directly detected via DNAscent. To test this, we developed a bioinformatics pipeline for extracting and visualizing potential MiDAS sites in Nanopore sequencing reads and parsing publicly available NCBI genomic annotation data. The coverage, BrdU count, and BrdU percentage are used to analyze whether BrdU incorporation is distributed randomly or enriched in specific regions. Here we show that BrdU incorporation across mitosis and S Phase can be visualized at the individual read level, providing a scalable approach to investigating the genomic context of MiDAS and contributing to a broader understanding of its role in genome stability.

Dark Matter Magazine

Julio (July) Ramirez - Communication Design
Faculty Mentor: Kelly Monico

Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 200

Dark Matter Magazine uses dark matter as a metaphor for intangible human experiences and draws on quantum mechanics as a framework to articulate them. The project explores the research question: How can a publication offer clear, comforting language for hard-to-articulate experiences such as love, fear, consciousness, identity and desire, while exposing the limits of consumer culture's efforts to commodify those experiences?

This inquiry appears throughout Dark Matter Magazine and its content, which target readers facing existential anxiety through accessible narratives, scientific analogies, and subtle satire. The print and digital formats blend research-based insights with visual critique to reach a general audience. The magazine draws direct parallels between dark matter, which constitutes 27% of the universe yet remains undetectable, and unseen dimensions of the human mind, including sudden intuition and deep longing that brands repackage as products. Quantum principles such as entanglement, the observer effect, and entropy reveal how reality depends on measurement and observation. These concepts mirror how advertisements selectively frame human desires to create distorted value. The content highlights shared human vulnerability, transforming abstract anxieties into relatable, evidence-based stories while satirizing lifestyle branding that turns desire into purchasable identities.

Dark Matter Magazine asserts that life's unmeasurable aspects resist reduction to mere commodities. The project synthesizes scientific metaphors with critical analysis to affirm these experiences as universal rather than personal voids. Through its spreads and overall design, the magazine provides clarity and solace, showing that the invisible forces shaping human existence hold profound, shared meaning that cannot be fully captured but rather experienced collectively.

Restoring CaMKII function in hippocampus and olfactory bulb enables odor association learning in CaMKIIα knockout mice.

Angela S. Ortiz - Biology
Co-Authors:, Ulrich K Bayer, Jason Aoto, & Diego Restrepo
Faculty Mentor: Daniel Ramirez Gordillo

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #15

The alpha isoform of calcium/calmodulin-dependent protein kinase II (CaMKIIα) is a key molecular mediator of synaptic plasticity, long-term potentiation (LTP), and memory consolidation. CaMKIIα is highly enriched in hippocampal pyramidal neurons and olfactory bulb granule cells, where its kinase activity supports experience-dependent circuit modification. Although CaMKIIα knockout (KO) mice exhibit pronounced deficits in neuronal maturation and cognitive function, its specific mechanistic role within the olfactory–hippocampal network remains incompletely understood. To address this, we combined behavioral training with simultaneous electrophysiological recordings to investigate how CaMKIIα loss disrupts olfactory associative learning and interregional communication. Adult CaMKIIα KO and wild-type littermates were trained on a go/no-go odor discrimination task while local field potentials (LFPs) were recorded concurrently from the hippocampal CA1 region and the olfactory bulb during awake behavior. KO mice displayed significant impairments in acquiring fine odor discriminations. Remarkably, targeted viral restoration of CaMKIIα expression in both regions rescued learning performance, demonstrating that local CaMKIIα activity is essential for sustaining effective cross-structure communication during odor-guided tasks.

Together, these findings identify CaMKIIα as a critical integrative component that enables dynamic information flow between early sensory and mnemonic circuits required for associative learning. By linking disrupted kinase signaling to weakened hippocampal–olfactory coupling, this work reveals a molecular mechanism for multisystem coordination underlying sensory-based memory formation

and establishes CaMKIIα as a key modulator of cross-regional network plasticity. This groundbreaking research received support from grants K01 NS127850-01 (to DRG), NIH R01 DC000566 (to DR), and R25NS130620. Procedures with mice were approved by the UC Anschutz IACUC.

Decanalization of development in *ndnf* mutant zebrafish

Casey Roberts - Biology
Co-Author: Raelyn Begay
Faculty Mentor: Vida Senkus Melvin, Ph.D.

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #16

It is estimated that every person carries 1-2 deleterious homozygous mutations, although they don't often present phenotypically. One explanation is that our cellular and developmental processes are buffered against the disease phenotype leading to normal development or canalization. One way to disrupt canalization and reveal cryptic mutations is by overwhelming the buffering system with environmental stress. Previous work from our lab has shown that genetic disruption of the *ndnf* gene alone does not cause observable mutant phenotypes, but knockdown of *ndnf* expression using a morpholino produced a specific and reproducible reduction in craniofacial cartilages of the zebrafish. Morpholinos produce a knockdown of post-transcriptional gene expression but also can have cytotoxic effects in neural crest cells that ultimately form the skeletal structures of the face. This has led to the conclusion that some morphant phenotypes are a side effect of cytotoxicity. On the other hand, cellular stress may actually de-buffer the developmental system and sensitize the neural crest cells to a genotype variation, such as loss of function in *ndnf*. To test this theory, we used three methods to experimentally decanalize development in *ndnf* mutant zebrafish – a Gal4VP16 transgene, inhibition of heat shock protein 90, and ethanol exposure, all of which have previously shown to exacerbate phenotypes associated with genetic variation in zebrafish. Though we haven't finished collecting the data, these studies will help us to understand the role of gene-environment interactions during development.

Psychosocial Predictors of Essential Oil Use and Conventional Treatment Substitution in University Students

London X. Rollins - Psychology B.S.
Faculty Mentor: Katherine G. Hill

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 203

With the growing popularity of essential oils (EOs) and other complementary and alternative medicines, it is important to understand how and why EOs are being used, as well as if they are being used as a substitute for conventional care. Various stressors and healthcare barriers may drive undergraduates towards EO use in lieu of or in compliment to traditional mental healthcare. This study used an online survey of undergraduate Introductory Psychology students to identify (1) What factors predict EO use in students? And (2) What are the prevailing patterns of EO use among undergraduates? Key factors investigated include locus of control, personality, processing style,

negative affect, trust in healthcare, socioeconomic status, and conspiratorial beliefs. Preliminary analysis (n = 64) shows that extraversion, depression, stress, experientiality, internal locus of control, and positive attitude towards EOs significantly predicted EO use. Regarding use behaviors, about 23% of students reported using EOs instead of a conventional treatment for mental health problems. The most common reasons for this behavior were that conventional treatments carried undesired side effects, and that conventional treatments were too expensive. These findings suggest that students may use EOs as a coping mechanism for poor mood, as a palliative remedy, and that students are facing barriers to access regarding mental healthcare. These data should cue universities to expand mental health support for undergraduates and to increase awareness among freshmen regarding what university resources are available to them. Future research should focus on university mental health resource utilization, what specific mental health problems are associated with EO use, and on replicating these findings at more traditional universities.

Personality Predictors of Attitudes Toward Artificial Intelligence: A Replication Study in U.S. Undergraduates

London X. Rollins - Psychology B.S.
Faculty Mantor: Maureen Flynn

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #21

Artificial intelligence (AI) has become pervasive across domains, with its use linked to both positive and negative outcomes. Similarly, positive attitudes towards AI correlate with both beneficial and adverse AI-related outcomes. Identifying factors associated with these attitudes is crucial for maximizing AI utility and preventing AI-related harm. Stein et al., (2024) found that only agreeableness predicted positive attitudes towards AI among German university students but openness to experience, conscientiousness, extraversion, and neuroticism did not. The aim of the current study was to replicate Stein et al.'s study by examining whether traits from the Big Five model of personality predict positive attitudes towards AI in undergraduates in the United States. Undergraduates (n = 89) completed an online survey. A multiple regression analysis was used to identify the predictive power of personality factors on AI attitudes. Openness to experience negatively predicted positive attitudes towards AI. Unlike Stein et al., (2024), the current study did not find any relationship between agreeableness and positive attitudes towards AI. These findings suggest that individual differences in personality may shape how students perceive and engage with AI, highlighting the importance of tailoring AI education and communication strategies to different user profiles. In particular, individuals higher in openness may approach AI with greater skepticism, potentially due to perceived threats to creativity or authenticity, which has implications for how AI tools are introduced in academic and creative contexts. Future research should examine the underlying mechanisms linking openness to AI attitudes, such as concerns about creativity, autonomy, or ethical use. Additionally, larger and more diverse samples are needed to assess the generalizability of these findings across cultural and educational contexts. Exploring domain-specific AI use (e.g., academic, creative, or professional applications) may also provide a more nuanced understanding of how personality interacts with AI perceptions.

Not All AI Anxiety Is Equal: Differential Predictors of AI Attitudes

London X. Rollins - Psychology B.S.

Faculty Mentor: Maureen Flynn

Poster Presentation, Session II (10:00 – 11:15 am), Poster #18

Artificial Intelligence's (AI) growing prevalence presents concerns and benefits. Positive AI attitudes are associated with greater benefits and negative consequences of AI use. Identifying factors that influence attitudes towards AI is important to enhance benefits and reduce negative outcomes of AI use. Kaya et al., (2024) found that knowledge of AI, AI learning anxiety, AI configuration anxiety, and job replacement anxiety predict positive attitudes toward AI among Turkish university students. The aim of the current study was to replicate Kaya et al.'s study by examining whether AI literacy and aspects of AI anxiety predict positive attitudes towards AI in undergraduates in the United States. Undergraduate students (n = 89) completed an online survey. A multiple regression analysis was used to identify the predictive power of the proposed variables on AI attitudes. Like Kaya et al. (2024), the current study found that AI anxiety negatively predicted positive attitudes towards AI. However, unlike Kaya et al., the current study found that configuration (i.e., humanoid) anxiety positively predicted positive attitudes towards AI, whereas Kaya et al., found that configuration anxiety positively predicted negative AI attitudes. Lastly, unlike Kaya et al. (2024), our study did not find that knowledge of AI, AI learning anxiety, or job replacement anxiety predicts attitudes towards AI. These findings suggest that different forms of AI anxiety may relate to attitudes toward AI in distinct ways. Notably, configuration (humanoid) anxiety may reflect more complex engagement with AI rather than purely negative perceptions. However, the small, homogeneous undergraduate sample and cross-sectional design limit generalizability and prevent causal conclusions. Differences in measurement and methodology may also explain inconsistencies with prior research. Future research should replicate these findings with larger, more diverse samples and more robust measures.

Measuring Experimental Reasoning in General Biology Laboratory Classes

London X. Rollins - Psychology
Faculty Mentors: Jonathan Dyhr, Cynthia A. Erickson, & Arijana Barun

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #18

The Department of Biology recently implemented a revised open educational resources (OER) laboratory manual for General Biology I with the goal of reducing student costs while improving alignment between laboratory activities and course learning objectives. This study investigates incoming biology students' understanding of experimental design concepts, evaluates the effectiveness of introductory biology laboratories in fostering experimental reasoning, and explores whether the revised OER-based laboratories enhance student learning compared to previous curricula.

A pre-test/post-test design was employed to assess changes in experimental reasoning over the course of a semester. Student understanding was measured using the 14-item Biological Experimental Design Concept Inventory (BEDCI), a validated instrument that evaluates comprehension of key concepts including hypotheses, controls, biological variation, accuracy, extraneous variables, sampling methods, and experimental purpose. Surveys were administered to 255 students enrolled in all sections of General Biology I (BIO 1090) at both the beginning and end

of the semester. Additionally, students enrolled in General Biology II (BIO 1091) completed the assessment at the start of the semester to provide a comparison group. Demographic data were also collected to examine potential patterns across student populations.

The present analysis focuses on baseline (pre-survey) data to characterize incoming student understanding of experimental design. Preliminary findings will inform future analyses comparing pre- and post-test performance within BIO 1090, as well as cross-course comparisons between students exposed to revised versus previous laboratory curricula. Ultimately, we aim to evaluate the impact of OER-based laboratory redesign on student experimental reasoning and to situate these findings within a broader national context by comparing results with data from other institutions.

Photocatalytic upscaling of methane using Metal/Semiconductor Nanoparticles

Ernesto Saenz-Rascon - Chemistry
Faculty Mentors: Megan Lazorski, Shailesh Ambre, & Joshua P. Martin

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #9

Advances in drilling and increasing incentives have made the recovery of shale gas more economical, with certain reserves containing upwards of 10% methane, spurring interest in converting methane into value-added fuels (VAF). Photocatalytic methane conversion is an energy-efficient strategy for producing VAF, but current titanium dioxide (TiO_2) and zinc oxide (ZnO)-based photocatalysts suffer from inefficient visible light conversion, instability to coking, and limitations from the use of soft oxidants, like CO2, for the oxidative coupling of hydrocarbons. The use of white light for the photocatalytic coupling of methanol through hole-mediated methanol decomposition has been demonstrated in literature using a composite system made from a post transition metal plasmonic core–shell nanoparticle engulfed by a metal oxide semiconductor. This work expands this technology by replacing the core–shell with transition-metal nitrides (TMNs) to enable affordable fuel conversion of hydrocarbons using sunlight or low-cost, high-efficiency LED lights. The rationally designed catalyst architectures in this work incorporate plasmonic titanium nitride (TiN) into ZnO and TiO_2 supports of varying thickness. Dopant impurities in the lattice of TiO_2-based semiconductors have been added to shift the absorption profile to the visible region to address the limitations of UV light-based photocatalysts. Lattice vacancies which have been shown to increase reactivity for photocatalysis were incorporated into these semiconductors, and they were further decorated with Au or PdCu NPs (<5nm) to improve selectivity toward different VAF products. Composite photocatalysts have been synthesized, and preliminary catalytic testing has yielded trace VAF from methane and CO2 using white light (425-725 nm) in the Au-N-TiO_2, as evidenced by gas chromatography with flame-ionization detection and thermal conductivity detection (GC/FID-TCD).

The Blindness–Mirage Spectrum: A Sociopsychological Model of Reality Alignment

Mickey Schieferecke - Sociology
Faculty Mentor: Desire Anastasia

Poster Presentation, Session II (10:00 – 11:15 am), Poster #19

This paper proposes the Blindness–Mirage Spectrum, a sociopsychological model explaining how individuals misalign perception and reality in contemporary media-saturated environments. The model argues that recognition failures occur along a continuum: Blindness, in which authentic phenomena go unrecognized because they fail to match internalized expectations, and Mirage, in which imitation or illusion is accepted as authentic because it aligns too closely with culturally learned scripts. Drawing on examples such as the "Tony Hawk Effect," celebrity look-alikes, impersonation scams, and misidentification in criminal contexts, the paper demonstrates that both under-recognition and over-recognition stem from expectation–reality discrepancies.

The framework integrates sociological theories—symbolic interactionism, dramaturgy, social proof, parasocial relationships—with psychological mechanisms including priming, confirmation bias, cognitive dissonance, inattentional blindness, and expectation violation. A formalized Reality–Alignment Equation models perception as a function of expectation (E), observed reality (O), bias (B), aesthetic tolerance (A), comfort threshold (C), and knowledge depth (K). When expectation and observation diverge, perceptual distortion occurs; accuracy emerges only when alignment is moderated by knowledge and linguistic sophistication. The paper introduces the Perfection–Flaw Axis, proposing that individuals calibrate authenticity along aesthetic thresholds: overly ordinary presentations trigger Blindness, while excessively polished or script-consistent presentations trigger Mirage. Cultural and technological contexts shift these thresholds, particularly in societies shaped by the Hollywood Effect, CSI Effect, and increasingly AI-mediated simulations.

Ultimately, the Blindness–Mirage Spectrum reframes recognition as a socially negotiated and emotionally regulated process rather than a neutral cognitive act. The model positions education, language, and critical literacy as stabilizing forces that expand perceptual bandwidth and reduce vulnerability to manipulation, suggesting broad implications for sociology, criminology, media studies, and institutional trust in an era where representation increasingly competes with reality.

Designing and immobilizing solid-supported hypervalent iodine oxidants to enable simple filtration

Erica Scott - Chemistry
Co-Author: Karemma Brown
Faculty Mentors: Megan Lazorski & Shailesh Ambre

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #10

Sustainable photocatalysis using earth-abundant metal complexes, such as Lewis acid (LA) bound manganese (IV)-oxo complexes (e.g., [LMnn+O]z+-(LA)x), is a promising strategy for replacing rare, expensive 4d- and 5d-metal based systems. A key challenge, however, is identifying efficient synthetic pathways to generate and isolate the [LMn4+O]z+-(LA)x complex. This project focuses on developing and optimizing the oxidation of the [LMn2+]z+ precursor to the [LMn4+O]z+ complex and facilitating isolation of [LMn4+O]z+-(LA)x. Traditional oxidants like iodosylbenzene (PhIO) generate byproducts that could reduce overall complex stability and ligand lability makes commonly used methods for complex isolation functionally unachievable. Thus, the hypothesis tested is the immobilization of traditional oxidants on solid supports: i.e., Wang or Merrifield resins,

facilitating excess oxidant removal via a simple filtration method. Our design involves attaching the oxidant to the solid-support using a linker of appropriate length. The efficacy of the amide formation to attach the oxidant to the linker, and the attachment of this construct to the solid support through esterification is dependent on resin porosity. Resin permeability is controlled by the choice of solvent used for these reactions. Currently, these challenges are being addressed by optimizing conditions where solvents used match those appropriate for optimal resin swelling. Amide formation has been optimized in two different solvents [tetrahydrofuran (THF), N,N-dimethylformamide (DMF)] in good yields. This intermediate will be immobilized on the resin after undergoing two oxidation steps. Successful assembly of the solid-supported oxidant will allow for the removal of the excess reagent, thus improving the stability of the complexes.

Patient-Reported Outcomes of Ketamine Treatment and Ketamine-Assisted Therapy

Christina M. Speegle - Psychology
Faculty Mentor: Katherine Hill

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #19

Ketamine-based treatments have gained significant attention due to their rapidly acting therapeutic results. It has been used to treat major depressive disorder, bipolar disorder, PTSD, anxiety disorders, suicidality, OCD, substance and alcohol use disorders, and chronic pain (Almeida et al., 2024; Gent et al., 2024; Yavi et al., 2022). Esketamine (Spravato) is the only FDA approved form of ketamine for psychiatric use and is given intranasally. Ketamine can also be administered intravenously, intramuscularly, or orally (Di Vincenzo et al., 2024). Ketamine treatment (KT) refers to the use of ketamine to relieve psychiatric symptoms. Ketamine assisted therapy (KAT) and KT are most-commonly provided in a controlled environment. Despite the increasing availability of KT and KAT, there remains a significant gap in patient-reported outcomes that document the individuals' experiences, perceptions of the treatment benefits, and changes in daily functioning following treatment.

This study examined patient-reported experiences with KT and KAT to better understand their perceived effectiveness. Using a mixed-methods design, data were collected from a sample of 199 participants who had undergone one or both forms of treatment. The diagnoses of the participants were recorded. We will analyze whether there was a spiritual/existential experience during ketamine treatment and participants' physical and psychological experiences during and after KT and KAT. The cost per session, insurance coverage, and the number of sessions completed will also be compared. The group of participants who have undergone KT will be compared to the groups that completed KAT or both treatments. Participants' feedback was generally positive regarding both KT and KAT.

Gene-Environment Interaction in Pregnancy: PRKAA1 and Uterine Blood Flow at Altitude

Skylar Stefonowicz - Biology B.S.
Faculty Mentor: Colleen Julian

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 200

Fetal growth restriction (FGR) increases perinatal mortality, with insufficient uteroplacental oxygen delivery contributing to its pathophysiology. High-altitude (HA, >2500m) hypoxia triples FGR incidence and reduces uteroplacental blood flow. We previously identified multiple adaptive PRKAA1 variants in Andean highlanders (e.g., rs1345778) associated with enhanced fetal growth and uterine artery (UA) diameter. Variants occur across diverse populations; thus, we investigated whether they confer similar physiological benefits in lowland ancestry populations. In a Colorado-based cohort of 95 maternal-infant pairs residing at moderate (1609m) or high altitude (2700m), maternal PBMC genomic DNA was genotyped for four PRKAA1 variants using TaqMan assays. Doppler ultrasound at 20 and 34 weeks' gestation assessed maternal UA hemodynamics and fetal umbilical (UmbA) and middle cerebral artery (MCA) pulsatility indices (PI). Birth weight was obtained via delivery records. Generalized linear models evaluated genotype main effects and genotype-by-altitude interactions under dominant and additive models, adjusting for maternal age, BMI, and gestational age.

At 34 weeks, rs1345778 was linked with increased UA diameter and volumetric blood flow ($p \leq 0.004$), and with higher birth weight ($p=0.028$, additive model). No associations were seen at 20 weeks. Other variants showed no associations with UA parameters or birth weight. Significant genotype-by-altitude interactions emerged for fetal hemodynamics at 34 weeks: rs1345778 and rs9292785 interacted with altitude to affect UmbA and MCA PI (rs1345778: $p \leq 0.027$; rs9292785 ≤ 0.019). Independently of altitude, rs3805490 and rs10035235 were associated with higher MCA/UmbA PI ($p=0.023$ and $p \leq 0.047$). PRKAA1 rs1345778 is associated with enhanced uteroplacental blood flow and fetal growth at moderate and HA in a lowland-ancestry cohort, supporting broader relevance of this adaptive locus across ancestral backgrounds.

Tracing the sources of Ik /dz/ with comparative and loanword data

Noah Steinbrecher - Linguistics
Faculty Mentor: Samuel Beer

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 205

Kuliak is a small family of languages spoken in Northeast Uganda, consisting of the languages Ik, Nyang'i, and Soo. The broader linguistic affiliations of Kuliak to the language families of East Africa are uncertain, with the primary theories concerning external relationships positing either a Nilo-Saharan or Afroasiatic connection, but none has achieved broad acceptance. Of particular interest to understanding the history of these languages are the alveolar sounds [dz] and [z], found in many words in the Ik language, but have very different realizations in Nyang'i and Soo cognate words, with [dz] especially being conspicuous in its absence. To date, reconstructions of these words and sounds have been hindered by a lack of data, further complicating attempts to ascertain the position of Kuliak in relation to its linguistic neighbors, and explanations of the theorized historical sounds have been convoluted. In recent years, extensive new data of both the Kuliak languages and many Nilotic, Omotic, and Cushitic languages spoken in proximity to Kuliak has been made available and may offer the opportunity to clarify the history of these sounds and explore potential linguistic connections in the East African linguistic context. Using a combination of comparative method and systematic loan analysis, this paper presents the findings of a comprehensive survey of this updated data, analyzing the thirty-three recorded words containing [dz] and nineteen words containing [z] in Ik. An external origin could not be ascertained in the languages examined, however

new cognates within the Kuliak languages do allow for the internal reconstruction of the family to be updated.

Cannabis Hyperemesis Syndrome: Prevalence and Associations with Cannabis Use Patterns

Kelly K. Stephens - Psychology
Faculty Mentor: Katherine G. Hill

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #20

Cannabis Hyperemesis Syndrome (CHS) is an underrecognized condition characterized by cyclical nausea, vomiting, abdominal pain, and excessive thirst. This cross-sectional study examined the prevalence of CHS-like symptoms and their relationship to cannabis use patterns in a sample of 168 current or past users. Participants were recruited through Prolific and the MSU Denver SONA system and completed a 10–15-minute anonymous Qualtrics survey assessing cannabis use (frequency, product type, perceived potency), symptom experience, healthcare interactions, and demographics. CHS-like symptoms were commonly reported, with 60% of participants endorsing at least one symptom, including nausea, vomiting, abdominal pain, and excessive thirst. Symptom severity varied widely across individuals. A significant negative correlation was found between age of first cannabis use and symptom severity, $r(96) = -0.35$, $p < 0.001$, indicating that earlier initiation is associated with more severe symptoms. In contrast, frequency of cannabis use was not significantly related to symptom severity, $r(96) = -0.14$, $p = 0.159$, potentially reflecting behavioral changes among symptomatic users.

Most participants with symptoms (n = 70) did not identify a specific cannabis product associated with their symptoms, though some reported perceived links, suggesting variability in individual responses to insight about symptom causes. The most commonly mentioned forms of cannabis linked to symptoms were edibles and smoking bud/flower. Participants described diverse symptom management strategies, including hydration, rest, dietary changes, medication use, and modification or cessation of cannabis use. Notably, only two participants reported bathing behaviors, challenging the emphasis on this hallmark characteristic symptom of CHS in the medical literature. These findings suggest that CHS-like symptoms may be more prevalent and variable than previously recognized, particularly among individuals who initiate cannabis use at younger ages. Expanding diagnostic awareness to encompass a broader range of symptom presentations, rather than focusing solely on classic features such as cyclic vomiting and hot bathing behavior, may improve early recognition and support more effective communication between patients and healthcare providers.

Somatic Benefits Across Dance-Based Cultural Rituals

Maze Swainston - B.A. in Music with a concentration in Jazz Guitar
Faculty Mentor: Nicole Predki

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #5

This project surveys cultures across the globe to observe rituals utilizing dance and movement and identify overlap in the meaning of the rituals and the movements utilized. Data collected will be analyzed in reference to somatic release and healing benefits that can be explained by modern science. By looking into ancient rituals and wisdom that have lasted through the ages, there is potential to unlock modern day discovery as mysticism predates scientific fact. Findings from this research can be used and implemented into healing practices and trauma-informed dance and movement therapy.

Trace Metal Analysis at Baker Hot Springs and Red Hill Hot Springs in Central Utah

Jessica Swanson - Applied Geology
Faculty Mentor: Uwe Kackstaetter

Poster Presentation, Session II (10:00 – 11:15 am), Poster #4

This study investigates the presence and distribution of trace metal signatures in hydrothermal waters from Baker Hot Springs and Red Hill Hot Springs in Central Utah. Hydrothermal systems are known to transport and concentrate metals, making them important for understanding ore-forming processes. The primary goal of this research is to identify trace elements and evaluate what these signatures indicate about subsurface geochemical conditions. Water samples were collected directly from active spring sources using standardized field procedures to minimize contamination and chemical changes. Temperature, pH, and electrical conductivity were measured to characterize fluid conditions at the time of sampling. Baker Hot Springs exhibits moderately acidic pH values (6.20), high temperatures (81.5°C), and elevated electrical conductivity (19.33 mS/cm), indicating highly mineralized fluid. In contrast, Red Hill Hot Springs shows near neutral pH (7.08), lower temperatures (67.6 °C), and lower conductivity (12.21 mS/cm). Downstream measurements at both sites show decreases in temperature and electrical conductivity. These trends are consistent with cooling, dilution, and degassing processes as hydrothermal fluids interact with the surface environment. Both raw and acidified samples were collected to preserve dissolved metal concentrations for laboratory analysis. Samples were later processed using Inductively Coupled Plasma Mass Spectrometry (ICP-MS), which is capable of detecting trace metal concentrations at parts-per-billion levels. Analytical results revealed that trace metals are present but there is no strong precious metal enrichment. Ongoing data analysis will further explain the presence of trace metals in these systems. The results of this study will contribute to a better understanding of trace metal mobility in hydrothermal systems, providing insight into the geochemical conditions of Baker Hot Springs and Red Hill Hot Springs.

Regulation of Neuron Derived Neurotrophic Factor by *Bmp* and *Shh* signaling in Zebrafish

Trinity Taylor - Biology
Co-Author: Jael Romo
Faculty Mentor: Vida Melvin

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #8

The Sonic Hedgehog (Shh) and Bone Morphogenetic Protein (Bmp) signaling pathways are important for the growth and organization of craniofacial structures, such as the palate and jaw, and disruption of these pathways can lead to craniofacial defects in humans. Bmp and Shh pathways are highly conserved and in the *Drosophila* wing, these pathways activate gene expression for a secreted protein called *nord*. Loss of *nord* showed decreased wing size and abnormal vein patterning. Interestingly, *nord* also regulates Bmp signaling by interacting directly with Bmp ligands and co-receptors, suggesting that there is a feedback mechanism at play. The vertebrate homolog for *nord*, neuron derived neurotrophic factor (*ndnf*), promotes neuron and endothelial survival and has been proposed as a regulator of craniofacial development in zebrafish. Loss of *ndnf* expression by morpholino knockdown led to reduction of the zebrafish ethmoid plate, which is homologous to the mammalian palate. At 24-hour post fertilization (hpf) in zebrafish embryos, *ndnf* is expressed in the forebrain, the cranial ganglia and the spinal cord. At 48hpf, these expressions domains persist, however, we also start to see more expression around what will become the mouth. Because the Bmp and Shh pathways are highly conserved across species, we propose that these pathways also regulate *ndnf* expression during zebrafish development. To test this idea, we will use in situ hybridization to examine *ndnf* expression in zebrafish embryos treated with the Bmp inhibitor dorsomorphin and/or the Shh inhibitor cyclopamine. If *ndnf* expression is regulated by Bmp and Shh, then we would expect to see a decrease in *ndnf* expression in the treated embryos. These studies will help us to understand the interaction between pathways that regulate craniofacial development and *ndnf*.

Making Sustainability Data Useful: Student-Built Spotlights in the Sustainability Hub

Jackson Thomas - Computer Science
Co-Authors: Alex Muzika, Alina Valshchuk, Angela Fleenor, Emma Tran, Umulbanin Gulzar, & Monica Ball
Faculty Mentors: Daniel Pittman & Alyssa Williams

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #15

Communities and decision-makers often need information about sustainability issues like water use, energy, or food systems, but the data are scattered, technical, and hard to interpret. For educators, community planners, and residents who are not data-savvy, finding and utilizing relevant data can be especially complicated and time-consuming. The Sustainability Hub is a public web platform designed to make sustainability information easier to find, understand, and use across Colorado. This poster highlights work by student developers on a new feature called Sustainability Spotlights. Sustainability Spotlights are interactive pages that focus on a specific issue, bringing together key data sources, maps, dashboards, and plain-language explanations in one place. Instead of searching through many reports or spreadsheets, users can explore a single topic through clear visuals and AI-powered conversation. The first Spotlight focuses on water allocation in the Colorado River Basin, an issue that affects communities, agriculture, and ecosystems across the state.

Students played a central role in designing and building the Spotlight framework. They worked on curating and organizing data sources, creating user-friendly layouts with embedded data products and interactive maps, and connecting the Spotlights to Bili, the Hub's conversational AI assistant, which helps users ask questions and navigate information about social, economic and environmental sustainability topics. The team followed an iterative, user-centered design process, building a reusable framework designed to grow over time, supporting future topics like energy, air quality, and food systems. By combining student innovation with public-focused design, the Sustainability Hub demonstrates how technology can better support informed discussion and decision-making around sustainability challenges. The platform invites users across Colorado to explore Spotlights and contribute to a growing community around sustainability data.

The Optimization and Synthesis of L-Rhamnopyranose Sugar fragments for the Development of Diagnostic Aptamers

Isabel Thomas - Biochemistry
Co-Author: Viktoriya Gidenko
Faculty Mentor: Shailesh Ambre

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #2

Mycobacterium avium complex (MAC) consists of non-tuberculosis mycobacteria (NTM) that cause a range of clinical manifestations, including disseminated infections in immunocompromised individuals. Glycopeptidolipids (GPLs) are combinations of lipid, protein, and sugar components located on the outer cell envelope of NTM species, contributing to their infectivity. In MAC, each subspecies possesses a unique saccharide signature, which can be used for identification, although genetic testing is still required for confirmation. Quick identification of specific MAC strains can enable more targeted antibiotic susceptibility profiles and the development of tailored therapies. Chemical synthesis of oligosaccharides allows access to well-defined, pure quantities of GPL for further study. Within the GPL, two sugar modifications occur: the C-terminal L-Alaninol is glycosylated with α-L-Rhamnose, and D-allo-Threonine is modified with oligosaccharides that begins with a 6-deoxy-α-L-Talose. Furthermore, these sugars can be differentially methylated or acetylated by bacteria increasing the structural variability. Aptamers are nucleic acid-based sensors that offer exceptional specificity in diagnostics by binding to target molecules. By synthesizing the glycopeptide fragments, we aim to elucidate unique structural features of the GPL that can guide the selection of aptamers capable of distinguishing individual subspecies. We have optimized the conditions for □-selective glycosylation with an aminopropanol linker and selective methylation protocols to prepare the 3-methyl-, 3,4-dimethyl, and 2,3,4-trimethylrhamnopyranoside are reported. We highlight our efforts at finishing a synthetic library of L-Rhamnose glycopeptide fragments of GPL with varying methylation and acetylation patterns to select aptamers with high structural specificity, with particular emphasis on control structures related to ns-GPL.

Building Consumer Trust in Short-Term Rentals: A Literature Review on Factors Influencing Consumer Booking Motivations and Trust Formation

Alyssa Thornton - Hospitality Leadership

Faculty Mentor: Kiyan Shafieizadeh

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 205

This study synthesizes existing research on consumer trust formation and booking motivations in short-term rental (STR) platforms through a systematic literature review. This study identifies a gap in research involving known trust factors, booking intentions, and overall consumer behavior in STR platforms. Drawing from 19 peer-reviewed studies published between 2015 and 2025, the literature review examines how trust-building cues and motivational factors jointly influence consumer booking decisions in peer-to-peer accommodation contexts, with a specific focus on Airbnb, VRBO, and Booking.com. Using a thematic analysis approach, the findings reveal five dominant themes: visual and aesthetic cues, host attributes, reviews and reputation mechanisms, economic and functional motivations, and host–guest interaction. Altogether, the five themes highlight that booking is a multi-dimensional process for consumers, involving property, host, and platform cues in the formation of booking intentions. The results highlight the central role of visual presentation, emotional responses, and social signals in reducing consumers' perceived risk and fostering trust, while economic and experiential motivations further shape consumer booking intentions. By integrating fragmented findings from multiple theoretical perspectives, such as Stimulus-Organism Response (SOR), Color Emotion Theory, Social Interaction Theory, and others, this study advances current literature understanding of consumer behavior on STR platforms. This study proposes a conceptual framework that illustrates the interaction among trust cues, motivations, and booking outcomes. Practical and theoretical implications are applied, highlighting a more holistic understanding of consumer behavior on STR platforms. Lastly, this study discusses future research that this subject could pursue to gain a deeper understanding and broader data.
Keywords: Short-Term Rentals, Consumers' Trust, Booking Motivations, Thematic Analysis

Nuances in Online Dating: Transgender and Gender Expansive Online Dating Behavior

Ezra Toledo - Psychology and Gender, Women, and Sexualities
Faculty Mentor: Chad Mortensen

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 203

There has been minimal research done on transgender and gender expansive (TGNC) individuals in psychology and the social sciences in terms of social behavior. Social romantic behaviors and perceptions of safety have been areas of interest for cisgender and heterosexual people for several years following the increase of online dating platforms and their use in pursuit of romantic or sexual attachment. By using an online anonymous survey of previously used scales across several studies assessment of online dating use, expectations, attachment style, and use of safety protocols will be assessed. I hypothesized that TGNC individuals with gender expansive sexual orientations will show increased anxiety or avoidance attachment in online dating in comparison to their counterparts who are attracted to cisgender or only people in the gender binary. Inclusion of online dating platforms can provide more in-depth information on deviations of behaviors as well as perceived safety and acceptance of LGBTQIA+ people on the platform. Further, it is expected that LGTBQIA+ people overall will show increased avoidance or anxious attachment styles based on their perceived safety with their potential partners with binary sexual orientations having higher anxiety or avoidance styles than people attracted to people outside of the binary. With these

explorations interest in the specific safety features of each platform will be evaluated as well to ascertain any relationship between individual dating sites and the perceived safety therein.

Investigating the Structure of Novel Viral Cap-Independent Translation Enhancer Using Selective 2'-Hydroxyl Acylation Analyzed by Primer Extension and Mutational Profiling (SHAPE-MaP)

Fernando Urrutia - Biochemistry
Faculty Mentor: Megan Filbin

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #3

Selective 2'-hydroxyl acylation analyzed by primer extension and mutational profiling (SHAPE-MaP) is a type of RNA chemical probing used to determine the secondary structures of RNA. This type of probing relies on the distance between the 2'-hydroxyl group on the ribose sugar and the 3' phosphodiester anion of the phosphate backbone which directly affects the reactivity of the 2'-hydroxyl group. In single-stranded RNA, the nucleotides are flexible enough to allow the 2'-hydroxyl group to act as a nucleophile and attack an electrophilic SHAPE probe like 1-methyl-7-nitroisatoic anhydride (1M7). This results in the formation of 2'-O-adducts that induce misincorporated bases during reverse transcription, which can be detected as mutations in the resulting cDNA and used to map the overall RNA secondary structure. We used SHAPE to investigate the structure of the cap-independent translation enhancer element (CITE) in the 3' untranslated region (UTR) of the Blackcurrant reversion virus (BRV) which is needed to initiate protein synthesis. Thus far, we have successfully modified the CITE RNA using 1M7 (SHAPE) and can see that there are multiple regions of the RNA that are single-stranded. Our next step is mutational profiling (MaP) to identify which specific nucleotides in the RNA sequence are modified and thus single-stranded. Using this information, we will build the first experimentally determined secondary structure for the BRV CITE RNA. Importantly, the modeled secondary structure is unlike any of the seven known classes of viral CITEs. Therefore, determining the BRV CITE structure may result in the discovery of a new type of CITE with a novel recruiting mechanism.

Functional Analysis of Mutations in the Cap-Independent Translation Enhancer of Blackcurrant Reversion Virus (BRV)

Andrea Valencia Espinoza - BioChemistry
Faculty Mentor: Megan Filbin

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #4

Some RNA viruses evade immune systems by mimicking the host's translation initiation process, allowing the viruses to take control of essential cell functions. The Blackcurrant Reversion Virus (BRV), a plant-infecting virus, uses a specialized RNA structure to imitate host molecules and hijack the cell's protein-making system. Specifically, the structured RNAs at the 3' end, called cap-independent translation enhancers (CITE), hijack translation machinery and deliver the machinery to the 5' end of the genome to make viral proteins. The purpose of this project was to investigate what mutations in BRV's CITE RNA structure are important for the hijacking process. To test this,

we transcribed and translated the CITE as part of a luciferase reporter mRNA, using the light generated by luciferase (when provided its substrate) as a measure of translation efficiency. Comparing the wild type CITE to mutations that affect the sequence and structure in a conserved stem-loop (SL2), we found a ~40% decrease in translation when the loop sequence was mutated, but no change when the loop was deleted. Secondary structure models show the loop deletion may generate a new loop by shortening SL2's stem, and that the new loop contains a GU sequence like wild type. This data supported a new hypothesis that the GU sequence in SL2's loop may be important for translation. Our work identifies RNA structural features that could help scientists develop antiviral treatments that block the virus's ability to hijack the host's protein-making machinery. By stopping the process before it begins, these antivirals could prevent the virus from replicating and spreading, which would be a valuable strategy for controlling viral infections.

Navigating a Dual Role: The Parenting Student Experience

Alissa VanMorter - Psychology/Political Science
Co-Authors: Eve Chadwick & Rianna Willson
Faculty Mentor: Kristen Lyons

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #22

Student parents represent a significant portion of college students, yet they remain underrepresented in research and college/university policies and programs. These student parents face unique challenges compared to their non-parenting peers and often need unique resources to ease these added burdens and foster success in school. The purpose of this study was to examine how MSU Denver student parents navigate their dual role by exploring and highlighting their experiences. Using an online survey, participants (N = 50) were asked questions regarding their college experience related to their role as parents, such as: the amount of caregiving they provided, how many days of class they missed in the last semester, how many exam and assignment extensions they needed in the last semester due to parenting responsibilities, what has helped most in navigating being a student parent, resources they have used off and on campus, and what resources the university could provide that would be most helpful to them. Respondents were mostly mothers (80%), and 40% of the sample reported that they were single parents. The resources most reported as helpful to students for navigating student parenthood were: previous knowledge and self-reliance (18%), technology/online resources (16%), and family supports (14%). The early childhood education center was the most utilized on-campus resource. Childcare subsidies/financial aid were also key factors (10.2%). Most participants (73.5%) reported that they had used none of the campus resources for student parents, with many reporting that they were unaware of the availability of these resources or their eligibility for them. The results of this study bolster previous research on student parents and show that MSU Denver student parents need visibility, representation, and specialized resources on campus.

Antibiotic resistance trends in *E. coli* from Cherry Creek

Briana Wagner - Biology
Co-Authors: Helena Arons & Charlotte Campbell
Faculty Mentor: Rebecca Ferrell

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #7

Escherichia coli bacteria are often used as indicators of fecal contamination in drinking and recreational water quality monitoring to detect sewage contamination and safeguard public health. The spread of antibiotic resistance also threatens public health by reducing the efficacy of treatment options. To reduce the threat of antibiotic resistance, it's important to understand how antibiotic resistance genes occur and potentially spread within a bacterial population. In this study, resistance rates against 4 antibiotics were determined for *E. coli* in Cherry Creek. Data from 3 seven-day studies allow comparisons of both daily trends and potential seasonal variations. Daily samples were incubated using the Quanti-Tray most probable number method (IDEXX) with Colilert medium either alone or supplemented with an antibiotic (ampicillin, kanamycin, streptomycin or erythromycin). Kanamycin and streptomycin are both aminoglycosides, erythromycin is a macrolide, and ampicillin is a penicillin. *E. coli* in Cherry Creek over time showed a trend of decreasing resistance to kanamycin and streptomycin, but rising resistance to ampicillin and erythromycin. Kanamycin resistance averaged 20.6% in Spring 2025, 4.5% in Fall 2025 and 4.9% in Winter 2026, while streptomycin resistance averaged 52.4% in Spring 2025, 11.5% in Fall 2025 and 18.7% in Winter 2026. On the other hand, resistance to ampicillin went from an average of 37.9% in Spring 2025 to 100.0% in Fall 2025 and Winter 2026, and erythromycin from 69.2% in Spring 2025 to 90.4% in Fall 2025 and 89.0% in Winter 2026.

Schizophrenia, Stigma, and Social Media: An Untold Story

Aden Walsh - Psychology
Co-Authors: Eloy Spotted Horse, Jennifer Ariana Rosales-Albanil, LaKrisha Fehringer, & Bug Bobitsky
Faculty Mentors: Aaron Richmond & Chad Mortensen

Poster Presentation, Session III (1:15 – 2:30 pm), Poster #21

Social media platforms, such as Facebook, YouTube, and Instagram, have rapidly become dominant sources of information for the general public. According to a 2025 Pew Research survey, the number of adults who regularly use TikTok for news has increased nearly 10-fold since 2020. This increase, along with an abundance of media on mental health content, could pose a major threat to public welfare in the form of mental health misinformation. However, research into the nuances of how we learn about schizophrenia is lacking. This is an especially vulnerable mental health topic due to significantly higher stigmatization and misinformation.

The present study seeks to address this research gap by examining the relationships among mental health stigma, social media use by platform, and knowledge of schizophrenia. Survey participants self-reported their social media screen time. Their mental health stigma was assessed using the Attitudes to Severe Mental Illness ([ASMI]) scale, and their schizophrenia knowledge, using the Knowledge of Schizophrenia Test ([KAST]). Participants then completed the demographic survey. Results reveal that there were small to moderate negative (and one positive) correlations among specific social media platforms (e.g., Instagram, X, Snapchat, and Quora) and mental health

attitudes (e.g., stereotypes and coping) with schizophrenia knowledge. Regression analysis revealed that using Instagram and ASMI Stereotype negatively predicted schizophrenia knowledge, whereas age predicted higher knowledge. Overall, our findings suggest that social media has a negative influence on schizophrenia knowledge and stigmatization, but further research is needed to understand social media misinformation itself.

Prospecting for Placer Diamonds in the State Line District Using Longwave UV Light

Tom Watson - Applied Geology
Faculty Mentor: Uwe Kackstaetter

Oral Presentation, Session III (1:15 – 2:15 pm), JSSB Room 200

This project focuses on the diamondiferous kimberlites of the State Line district along the border between Wyoming and Colorado. These Devonian-age diatremes are some of the most productive sites in the country for commercial diamond extraction, despite the fact that they remain relatively understudied and underexplored. While mining the kimberlite pipes has yielded hundreds of thousands of stones, recovery rates are measured in carats per hundred tons. Thus, while mining directly into the ore body is possible, it remains an expensive and time-consuming process. Fortunately, the kimberlitic host rocks are quite susceptible to erosion when exposed at the surface, meaning a high number of diamonds have likely been freed from the pipes and emplaced in nearby streams and drainages. Prospectors in both Colorado and Wyoming have reported diamonds in the localities of George Creek, Rabbit Creek, Sheep Creek, and the North Fork of the Cache la Poudre. Interest in placer deposits has increased in recent decades, and they could serve as an alternative to more destructive traditional mining techniques. There are a few natural properties of diamonds that actually make them well-suited to placer extraction: firstly, they are lipophilic minerals, meaning they are attracted to fats. Grease tables have historically been used because the diamonds stick to them while other minerals slide off. Secondly, roughly 40% of diamonds are known to be naturally fluorescent. This means that UV light can potentially be used in stream deposits to seek out small placer diamonds. Looking for fluorescent response will aid in selecting sample sites, which can then be filtered using a spiral concentrator and other methods. The total percentage of diamonds and other kimberlite indicator minerals (such as phlogopite, pyrope garnet, and eclogite) will be assessed. Recovery based on different wavelengths will also be quantified to see if one is measurably more successful than the others.

“No-Till” Composting: Evaluating Biofilm Formation, Water Retention, and Maturation of Aerated Static Pile Compost

Asa Willett - Biology B.S.
Faculty Mentor: David Merriam

Poster Presentation, Session IV (2:45 – 4:00 pm), Poster #10

In regenerative agriculture, no-till farming is a cornerstone of soil preservation, eliminating mechanical disruption by farmers to protect the delicate architecture of fungal hyphae, bacterial

biofilms, and pore-network geometry. Preserving these biological scaffolds is a primary strategy for enhancing hydrological resilience, particularly in drylands farming and drought-afflicted regions. The application of these principles to composting remains under-explored, as mechanical turning of conventional composting disrupts the very biofilm networks essential to the compost's bacterial metabolism and moisture-retention potential. Aerated static pile (ASP) composting offers a "no-till" alternative— utilizing forced-air ventilation rather than mechanical agitation to maintain aerobic conditions. By facilitating a stable bacterial community succession from thermophilic degradation to mesophilic maturation, ASP systems may allow for a more uninterrupted secretion of extracellular polymeric substances (EPS)— yielding a compost matrix with enhanced water-holding capacity, as these EPS "glues" can stabilize pore geometry and retain up to ten times their weight in water.

This project will begin to investigate these potentials, utilizing a comparative analysis of ASP samples across succession stages to quantify any correlation between microbial stability and hydrological resilience. By integrating PowerSoil Pro DNA extraction to map bacterial community shifts alongside Solvita Compost Maturity and volumetric slump testing, the research will evaluate the structural evolution of the compost matrix and the bacterial genera involved. Utilizing a Formaldehyde-NaOH extraction to quantify bound-EPS fractions, biofilm density will be compared to hydrological conductivity. Furthermore, the development of Soil Water Retention Curves (SWRC) will provide quantitative measure of the compost substrate's capacity to mitigate water stress. We aim to assess ASP composting as a unique tool for producing water-conserving amendments specifically tailored to arid-land soil restoration.

Conversation Groups in Gender-Affirming Voice Therapy: Supporting Communication and Identity

Karis Winston - Speech, Hearing, and Language Sciences
Faculty Mentor: Marcia Walsh-Aziz
Oral Presentation, Session II (10:00 – 11:15 am), JSSB Room 205

This capstone project explores the role of conversation groups in the scope of gender-affirming voice therapy and how these groups support communication confidence and identity expression. My internship experience includes observing and participating in a gender-affirming voice conversation group facilitated by a graduate student clinician. Through this experience, I have observed how participants practice vocal strategies within a supportive group environment, while working towards aligning their voice with their gender identity.
The central question guiding this project is: how do conversation groups support individuals practicing gender-affirming voice techniques and developing confidence within communication? This question is significant because voice is closely connected to personal identity and plays an important role in social communication. Many transgender and gender diverse individuals seek voice therapy in order to help their voice better reflect their gender identity and feel more comfortable and confident in everyday interactions. While individual therapy often focuses on developing specific vocal techniques, conversation groups provide opportunities to practice these skills in a supportive, safe, and more naturalistic communication setting.

Through my internship experience, I observe how the graduate student clinician structures the conversation group to encourage conversational practice using voice strategies, such as

adjustments in pitch and resonance, and also invites the participants to ask for feedback related to their voice throughout the group time. I am also reviewing current research on gender-affirming voice therapy to better understand and communicate how group-based practice may support the generalization of learned vocal techniques into real-world application. This project highlights the potential value of supportive and low-pressure group environments within gender-affirming voice therapy. By examining how conversation groups facilitate practice, confidence, and peer connection, this project aims to contribute to a better understanding of effective clinical approaches for supporting transgender and gender diverse individuals in developing comfortable communication that aligns with their gender identity.

Attitudes Toward Adventurous Play

Kirsten Zeitler - Psychology, Human Development and Family Studies
Co-Authors: Erin Carrillo, Kimberly Caceras, Aurora Fernandez, Jayline Moreno Fernandez, Allie Garrison, Erin Klein, Alissa VanMorter
Faculty Mentor: Kristen Lyons

Oral Presentation, Session I (8:30 – 9:45 am), JSSB Room 203

Research suggests parental anxieties, (including those influenced by social and environmental factors) as well as misconceptions regarding risk-taking, limit opportunities for child independence while shaping how children perceive risk and their own physical abilities. Examining the existing literature revealed there are two important limitations in this body of research. Our study aims to address these gaps. First, most research has focused on mothers' perspectives, but very little is known about fathers' attitudes toward adventurous play. Second, most cited research has occurred outside of the US. There are cultural and social reasons to suspect parental attitudes towards adventurous play may be more cautious in the US compared to other global samples studied. Thus, we adapted the methods used in other countries for use in this study. The central objective of our study is to gather a higher percentage of father respondents, using four validated scales in our survey to ensure results are able to be compared to other findings. We expect to see differences in parental attitudes based on gender and other sociodemographic factors, such as parental education, geographic location, number of children in the household, child gender, and child age. Our second objective is to gain overall parental perspective on the need for adventurous play in children's lives in the US. Findings from this study can help promote healthy child development and inform parents and policymakers about opportunities and resources for adventurous play.

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