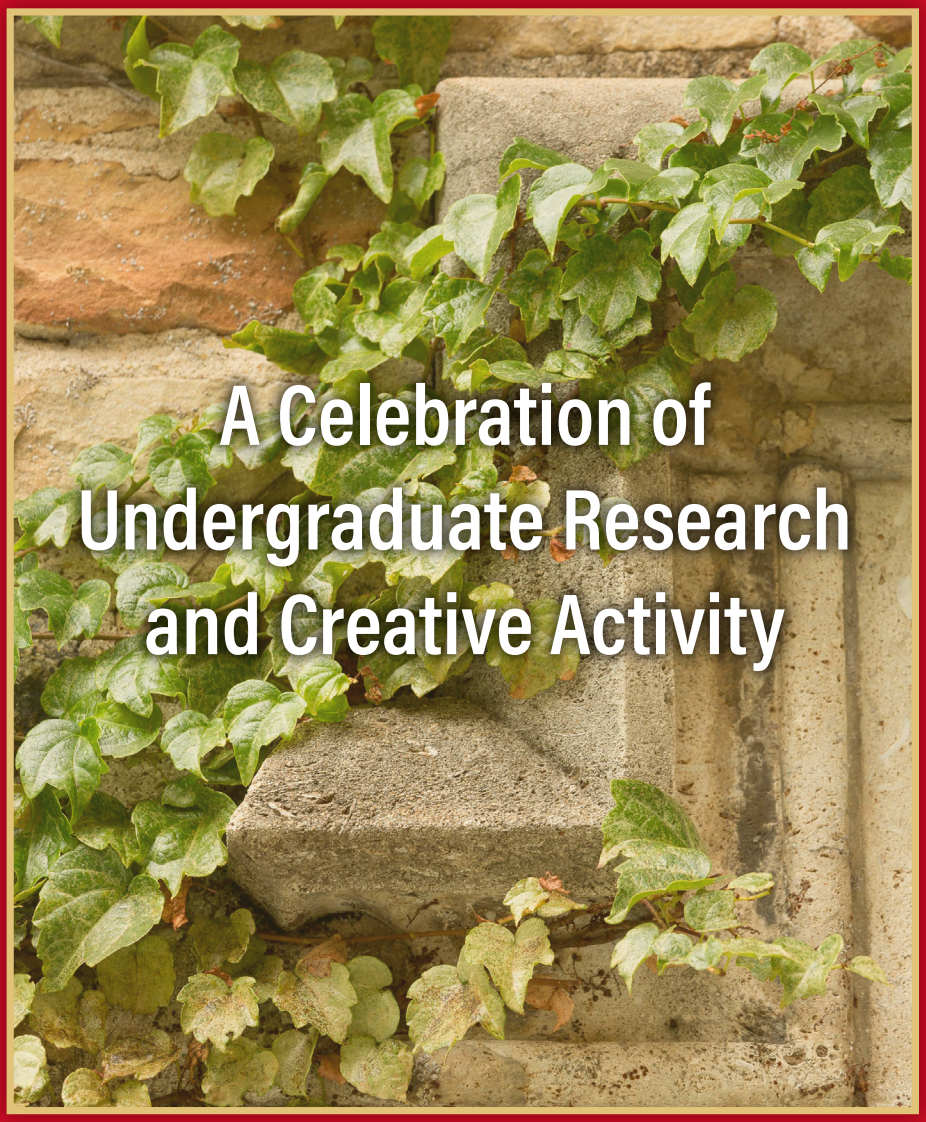
CELEBRATE THE LIBERAL ARTS



RHODES SYMPOSIUM
APRIL 26, 2024

rhodes.edu/symposium

Rhodes College

RHODES SYMPOSIUM
APRIL 26, 2024

SCHEDULE BY DIVISION

TIME	ROOM	SESSION TITLE	DEPT/PROGRAMS
FINE ARTS			
11:00 – 12:20	Hassell 100	Music	Music
11:00 – 12:20	Clough 204	Art / Art History/ Media Studies	Art & Art History
1:00 – 2:00	Tuthill Recital Hall	Chamber Music Recital	Music
2:00 – 3:00	Tuthill Recital Hall	Songs in Spanish	Music
3:00 – 4:30	Tuthill Recital Hall	The Cauthen Competition	Music
HUMANITIES			
11:00 – 12:00	Buckman 200	Rhodes Historical Review	History
11:00 – 12:15	Southwest LLC	Spanish I	Modern Languages
11:00 – 12:15	Southwestern 207	English	English
12:30 – 1:30	Buckman 200	History	History
12:30 – 1:30	Southwest LLC	Spanish II	Modern Languages
12:30 – 1:30	Southwestern 207	English Honors	English
2:00 – 3:40	Southwestern 207	Humanities / Politics & Law	Philosophy/Anc. Med. Modern Languages Politics & Law
2:00 – 3.:35	Southwest LLC	German	Modern Languages
2:00 – 3:00	Southwestern 207	Africana Studies	Africana Studies
3:30 – 4:30	Southwestern 207	Meeman Center	Meeman Center
NATURAL SCIENCE			
11:00 – 12:15	Frazier Jelke-B	Physics	Physics
11:00 – 12:15	Robertson 110	Computer Science / Math	CS / Math
12:30 – 1:50	Frazier Jelke-B	Biology / Chemistry / Physics	Biology / Chemistry / Physics
12:30 – 1:30	Robertson 110	Computer Science I	Computer Science
2:00 – 3:15	Robertson 110	Computer Science II	Computer Science
SOCIAL SCIENCE			
2.00 – 3:40	Southwester 207	Humanities / Politics & Law	Politics and Law
2:15 – 3:15	Buckman 200	Econ I	Economics
3:30 – 4:30	Buckman 200	Econ II	Economics
POSTERS			
1:00 – 2:30	BCLC Multi Sports	Poster Session I	
2:45 – 4:15	BCLC Multi Sports	Poster Session II	

LLC = Language Learning Center

Rhodes College

RHODES SYMPOSIUM
APRIL 26, 2024

SCHEDULE BY BUILDING

BUILDING	TIME	ROOM	SESSION TITLE
Buckman Hall	11:00 – 12:00	200	Rhodes Historical Review
Buckman Hall	12:30 – 1:30	200	History
Buckman Hall	2:00 – 3:00	200	Economics I
Buckman Hall	3:15 – 4:15	200	Economics II
Clough Hall	11:00 – 12;00	204	Art & Art History/Media Studies
Frazier Jelke	11:00 – 12:15	Lecture Hall B	Physics
Frazier Jelke	12:30 – 1:50	Lecture Hall B	Biology / Chemistry / Physics
Frazier Jelke	2:00 – 3:40	Lecture Hall B	Humanities / Politics & Law
Hassell Hall	11:00 – 12:20	100	Music
Hassell Hall	1:00 – 2:00	Tuthill Recital Hall	Rhodes Chamber Music Recital
Hassell Hall	2:00 – 3:00	Tuthill Recital Hall	Songs in Spanish
Hassell Hall	3:00 – 4:00	Tuthill Recital Hall	The Cauthen Competition
Robertson Hall	1:00 – 12:15	110	Computer Science / Math
Robertson Hall	12:30 – 1:30	110	Computer Science I
Robertson Hall	2:15 – 3:15	110	Computer Science II
Southwestern Hall	11:00 – 12:00	Southwestern LLC	Spanish I
Southwestern	12:30 – 1:30	Southwestern LLC	Spanish II
Southwestern	2:00 – 3:15	Southwestern LLC	German
Southwestern	11:00 – 12:00	207	English
Southwestern	12:30 – 1:30	207	English Honors
Southwestern	2:00 – 3:00	207	Africana Studies
Southwestern	12:30 – 1:30	207	Meeman Center
Bryan Campus Life Center	1:00 – 2:30	Multi Sports Forum	Poster Session I
Bryan Campus Life Center	2:45 – 415	Multi Sports Forum	Poster Session II

LLC = Language Learning Center

Rhodes College

April 26th Events

- Awards Convocation: 9:30 a.m., McCallum Ballroom, Bryan Campus Life Center
- Oral Presentation Sessions: 11:00 a.m. – 4:30 p.m., various locations
- Poster Session I: 1:00 p.m. – 2:30 p.m. Multi-Sports Forum of the Bryan Campus Life Center (snacks and refreshments provided)
- Poster Session II: 2:45 p.m. –4:15 p.m. Multi-Sports Forum of the Bryan Campus Life Center (snacks and refreshments provided)

Acknowledgements and Special Thanks

- Communications – Rhodes Symposium program cover design, flyers, and program schedule (esp. Charlie Kenny)
- Dr. Natalie Person, Office of Academic Affairs – leadership and support
- Kate Collier-Cissoko, Math/CS/Physics Admin – catering, reservations, planning and coordination
- Golam Hisham, Rhodes Student Associate for Fellowships – program creation, coordination, approvals, Qualtrics wrangling, and communication

Rhodes Symposium Planning Committee

- Dr. Brian Larkins, Department of Computer Science, Director of Fellowships and Undergraduate Research
- Professor Raina Belleau, MFA, Assistant Professor, Department of Art & Art History
- Dr. Qian Shen, Assistant Professor, Department of Biology
- Dr. Matthew Weeks, Associate Professor, Department of Psychology
- Dr. Scott Newstok, Professor, Department of English

Related Events

- Rhodes College Venture Challenge – 4/25 5:30 p.m.-7:30 p.m. – Blount Auditorium
- English Creative Writing – Senior Reading 4/25 7:00 p.m. – Hyde Hall
- Marathon Reading of Paradise Lost – 4/26 11:00 a.m.-7:00 p.m. – SW312
- Lavender Celebration and Reception – 4/26 5:00 p.m.-6:30 p.m. – King Hall

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(F) Rhodes Fellowship

FINE ARTS ORAL SESSIONS

Music
11:00 am – 12:20 pm
Hassell 100
Moderator: Carole Blankenship

11:00 – 11:20 Medical Music Therapy: The Orchestra of Healing
Brianna Rempe
Faculty Sponsors: Carole Blankenship, Department of Music, Kiren Khan, Department of Psychology
In this presentation, I will explore the ways in which music is used in medical setting. Music Therapy is a field that has been growing more traction over the years, specifically in the medical world. This presentation aims to demonstrate how music can be a positive alternative to traditional Western medicine. Specifically, I will be exploring music therapy usage inside a hospital setting. I will present various uses of musical intervention in the hospital including stroke patient recovery, cancer patient intervention, and neonatal intensive care unit (NICU) intervention. I will answer questions such as, "Why does music therapy work for patients in the NICU?", "What effect does music therapy have on the families of the patient?", and "Where is the concrete scientific evidence that proves the effectiveness of medical music therapy intervention?". This presentation serves as an educational tool for the community to better understand the importance of music and its healing potential. I will pose questions to the music community, opening the door for further research in the field.

11:20 – 11:40 The Effects of Background Music on Performance in Cognitive Tasks
Tess Starr
Faculty Sponsors: Carole Blankenship, Department of Music, Geoffrey Maddox, Department of Psychology
In 1993, Rauscher and colleagues found that students perform better on a spatial reasoning task after listening to Mozart compared to silence. This research sparked a frenzy of mass media, suggesting that listening to Mozart can raise children's IQ. Rauscher et al. (1993) also sparked a movement of others researching the affect music has on performance on cognitive tasks. Exploring three decades of research, this literature review will unpack several studies focused on better understanding the effect that background music has on learning, specifically considering the affect music has on individuals' performance on tasks ranging from spatial reasoning to reading comprehension, and the ways that different groups of people might interpret the usefulness of music for their learning. Overall, findings on the relationship between music and cognitive functioning indicate a great deal of complexity regarding when and how music is helpful to cognitive functioning. Better understanding the ways that music can help or hinder cognitive performance helps educators to sharpen music as an educational tool.

11:40 – 12:00 Connecting to Specific Communities Through Music: A Deeper Look into How Mixed-Race People Find Identity Through their Engagement with Hip-Hop Music
Tierra Hobbs
Faculty Sponsors: Courtenay Harter and Jacob Sunshine, Department of Music, Earl Wright II, Department of Anthropology and Sociology
Issues relating to social exclusion experienced by mixed-race/mixed-ethnic people are rooted in racism and colorism and resulting from the negative historical impact of slavery in the U.S. For these reasons, this particular population tends to experience racial imposter phenomenon more often in comparison to their monoracial peers, which normally results in identity issues. By using music as a social badge, mixed-race individuals have an easier time fitting into in-groups they desire membership in. Hip-hop music and rap culture are the focus of this paper because throughout history they have been thought of as black and part of the black experience. This general consensus combined with a more detailed look into the idea of conscious rapping and ways that the rap form can be beneficial to mixed-race individuals in their search for identity confirmation is the bulk of the paper as it pertains to using music as a social badge. This presentation follows an extensive literature review from the domains of psychology, music, and sociology and includes details for a mock study that relates to specific rap artists and their lyrics, and how those specific artists can be beneficial to biracial individuals that struggle with racial imposter syndrome.

(F) 12:00 – 12:20 Music and the Arts at The Refugee Empowerment Program
Brianna Rempe, Tierra Hobbs, Raven Baker, and Maddie Hazelrig
Faculty Sponsor: Vanessa Rogers, Department of Music
This year, with the help of a Mellon Health Equity grant and a Lainoff Grant, four fellowship students at Rhodes College created a twice weekly in-person after-school Music and Art Club at the Refugee Empowerment Program for middle school and junior high children. Our goals with the Music Club: to teach children to be musically literate and to help them discover how to express themselves through music. With the Music Club, we promote the REP's (and Rhodes College's) goals of assisting our community, building ties between different groups, and creating a culture of "Health Equity, Human Flourishing, and Well-Being through the Public Humanities". Our presentation addresses the highs (and the lows) of serving our community at the REP during this school year.

<u>Art / Art History / Media Studies</u>
11:00 am – 12:00 pm
Clough 204
Moderator: Claire Smith

11:00 – 11:20 The Evolution and Duplication of Roy Lichtenstein: Modernity to Pop
Emma Benjamin
Faculty Sponsor: David McCarthy, Department of Art and Art History
While Roy Lichtenstein is known today for his contributions to Pop Art and signature cartoon styling, the evolution of Lichtenstein's style is rooted largely in influence and parody of works by Post-Impressionists and Cubists such as Pablo Picasso and Paul Cézanne. Lichtenstein put a modern spin on the works of previous artists, bridging the gap between Abstract Expressionism and Contemporary art. Pop art is rooted in popular culture, and Lichtenstein intentionally blurs

the line between high art and low sources and placing the artworks of previous artists alongside the mechanical subject matter of Pop art, further emphasized by the stylistic choices made by Lichtenstein. By trivializing previous and well-known works of art, Lichtenstein places the pieces outside of their original contexts, treating them as any other material used for Pop art and therefore broadening the exposure of his audience beyond the realm of pop and creating a link between Pop Art and the works of the 19th century. In this paper, I explore the relationship between Lichtenstein's works and those he 'copied' from, delving into the meaning of transformation and parody, while taking into consideration the criticisms made of pop art and the works' relationship to the original sources.

11:20 – 11:40 Preserved Personhood: Rauschenberg and Rosenquist in the Archaeological Record of Postwar American Art History
Izzy Brewer
Faculty Sponsor: David McCarthy, Department of Art and Art History
A general principle summarizes the objective of contemporary archaeological practice: "Archaeology is the study of the past through the study of material remains, not simply the study of material remains." Archaeologists analyze what an object can indicate about a person who can no longer attest to their lived experience. Similarly, in the study of art history, the art object and its visual attributes are paramount to understanding the person who created the work of art, how that work of art affects the viewer who consumes it, and the time at which the work of art was produced. This thesis compares Robert Rauschenberg's Collection of 1954-5 and James Rosenquist's Silver Skies of 1962 through the lens of archaeological principle and assesses how each captures American life in the mid-twentieth century. Though he is not typically considered to be a true Pop artist in comparison to Rosenquist, Rauschenberg's attachment of the physical found objects onto canvas and intentional gestural abstraction of those objects in Collection more effectively preserves the evidence of the artist's hand. Therefore, the artist himself – rather than the viewer – becomes the visible human presence in the archaeological record of art history in the postwar consumerist United States.

11:40 – 12:00 Reconstructing Renaissance Sculptures Through Computer Programs
Mikaela Colina
Faculty Sponsor: Victor Coonin, Department of Art and Art History
Reconstructing destroyed Renaissance and Classical sculptures is crucial for preserving cultural heritage and understanding the artistic techniques and historical contexts of the era. Piecing together these fragments not only restores beauty but also allows us to appreciate the craftsmanship and symbolism embedded within these artworks. Over the 2023-24 school year, the Lainoff Fellowship has allowed Dr. Coonin and me to create concepts of what these sculptures used to look like, where they belonged, and how they functioned. With tools such as Blender, a 3D modelling software, Adobe Photoshop, and models by a University of Memphis student, I have compiled numerous proofs of concept for sculptures like Michelangelo's David Donatello's marble David, as well as other Renaissance and Classical works. The project involves extensive research which includes analyzing a variety of images used for reference, observing similar sculptures to better understand their forms, and exploring which software worked best for editing. Through this project, we expand our knowledge about these sculptures in hopes to replicate their original state and preserve their histories. We are now able to see their true form for the first time since the periods in which they were created.

12:00 – 12:20 Response of Social Media to Differing Sexual and Personal Identities in Professional Athletics

Caroline Kardian

Faculty Sponsor: David Maxson, Department of Media Studies

Responses to an athlete's personal identification and public coming out narrative through social media varies based on gender. There has been little discussion regarding the different perspectives that audiences adopt when looking at a male athlete's identity and sexual orientation versus a female athlete. Research does not discuss how problematic responses on social media to the coming out of female and male athletes is for society. This paper highlights these different responses between the genders. Significantly, social media frames different coming out narratives and the discussion of masculinity versus femininity. Social media and news media push the narrative that in professional sports, men need to be masculine and women need to be feminine. My media analysis is meant to serve as a catalyst for potential more in-depth study and to give people an idea of the complications associated with coming out for professional athletes. Looking at rigid gender binaries, my analysis helps break down socially constructed gender expectations for athletes that are amplified in social media and creates more room for people with a wide array of identities to participate fully in sport. In this paper, I underline how social media polarizes discussions of masculinity and femininity in sports.

Studio Art Thesis Exhibition
11:00 am – 7:00 pm
Clough-Hanson Gallery, Clough Hall
Featured Artists: Shea Goodson and Alice Malone
Sponsored by the Department of Art and Art History

Rhodes Chamber Music Recital
1:00-1:50 pm
Tuthill Performance Hall in Hassell Hall

Songs in Spanish
2:00 – 2:50 pm
Tuthill Performance Hall in Hassell Hall
The voice studios of Dr. Carole Blankenship, Professor Desiree Howe, and Professor Marcus King will present a recital of their students celebrating songs in Spanish. Each piece will highlight composers from Spain and Latin America and showcase the voice and piano. English translations for each piece will be provided. Professor Debbie Smith and Dr. Brian Ray will be the collaborative pianists for this performance. This recital will celebrate the rich history and culture of the Spanish language through song by joining together members of every vocal studio in the Department of Music and highlight collaboration throughout the department.

Media Studies Showcase
2:00 – 2:50 pm
Barret 034
Hosted By: Maddie Allen
Faculty Sponsors: Karl Erickson, Department of Media Studies
Please Join us for a curated screening of short films, video essays, and digital art made in various MST classes throughout the academic school year. Using the visual medium, student creatives communicate powerful, diverse stories and perspectives that crave to be shared.

The Cauthen Competition
3:00 – 4:00 pm
Tuthill Performance Hall in Hassell Hall

HUMANITIES ORAL SESSIONS

Rhodes Historical Review
11:00 am – 12:00 pm
Buckman 200
Moderator: Lindie Harper

11:00 – 11:20 "Finally, I Gave In. I Went Home": Shifting Marriage Dynamics in Film Adaptations of James M. Cain's Fiction
Sam Frank
Faculty Sponsors: Sarah Ifft Decker and Tait Keller, Department of History
In the tumultuous years between the 1929 stock market crash and the dropping of the atomic bombs in 1945, American life fundamentally changed. Major historical events such as the Great Depression and World War II held ramifications for both world leaders and middle-class families. The institution of American marriage was not immune to these external forces. Historians and sociologists have studied changes in marriage during this period, relying on sources such as statistics, surveys, and oral histories. This paper, however, looks for answers through the lens of literature and film. Exploring James M. Cain's fiction from the time of the Great Depression and the film adaptations of his novels which studios produced during and immediately following World War II provides insight into these shifting marriage dynamics. Paying special attention to plot additions, omissions, and continuities between Cain's hardboiled novels and the film noir pictures they became offers insight into the rapidly changing gender and power dynamics of the early to mid-twentieth century. This analysis demonstrates the ways in which marriage functioned as a mechanism of oppression against women and laid the groundwork for modern perceptions of traditional marriage.

11:20 – 11:40 Harris v. McRae's Fatal Impact on Abortion Access
Callie Hollis
Faculty Sponsors: Sarah Ifft Decker and Robert Saxe, Department of History
In the aftermath of the Dobbs decision of 2022, the legalization of abortion fell to the states. However, government funding of legal abortions already varied state-by-state and essentially barred many indigent women from access to safe and legal abortions since 1980. The Hyde Amendment was a one sentence statement declaring that federal Medicaid would no longer fund abortions. Due to its ambiguity, though, the amendment merely set the stage for a United States Supreme Court decision that cemented the restriction on Medicaid funded abortions and handed the decision on funding them to the states: Harris v. McRae (1980). This article compares met and unmet abortion care needs from two years before and after the Hyde Amendment, 1976 to 1979. Those statistics are then compared to the five years preceding Harris v. McRae, 1980 to 1984. Through these analyses, the article showcases the greater fatal impact of the Harris v. McRae decision in comparison to the first Hyde Amendment.

11:40 – 12:00 All Aboard the Mothership: George Clinton's Vision of Freedom and Black Power in Outer Space
Camille Carleton
Faculty Sponsor: Sarah Ifft Decker, Department of History
The 1975 album *Mothership Connection* by Parliament/Funkadelic is a wild, funky ride to space from start to finish. *Mothership Connection* hones its focus on Black communities across America in the wake of the Civil Rights Movement of the 1960s and its immediate aftermath into the 1970s. Through this concept album, George Clinton, lead singer and conductor of the band, creates a symbolic vision of the future that is centered on escaping via the "Mothership," a created vessel of freedom and liberation. Clinton asserts that to enter the Mothership, one must accept the "funk". By identifying funk in this way, I argue that Clinton views "funk" as knowledge, which will enlighten the listener upon acceptance. Through Parliament/Funkadelic's *Mothership Connection*, George Clinton offers a compelling narrative about how the acquisition of funk conceptualized outer space as a unified, free, and temporary form of escape for Black people in the 1970s. In this paper, I will analyze how five of the seven tracks on the *Mothership Connection* album convey these themes of liberation and freedom to ultimately offer Black people a temporary form of escape amidst the disunity of the 1970s.

History
12:30 – 1:30 pm
Buckman 200
Moderator: Emma Benjamin

(F) 12:30 – 12:50 Everyday People: Snapshots of the Black Experience
Daniel Hicks, Merritt Shemwell, and Sarah Dassinger
Faculty Sponsor: Tait Keller, Department of History
Eric Echols, a local teacher and collector, lent his vast collection of 20th-century photos to the Memphis Museum of Science and History for an exhibit on the black experience of the early 20th century. Hundreds of photos ranged in theme from yearbook pictures to candid photos of daily life. During my time as an intern at MoSH, I was responsible for sorting through the photos, separating the military and school photos from the collection, and conducting research based on the photos. The school photos were primarily basic yearbook headshots for students from first to fifth grade. The remainder of the photos were of graduating high school students. Research on these photos was limited because the only available information was often a school name and year. The military photos were also primarily headshots from the Korean War-era US military. These photos were complicated to research, but careful examination of medals and ribbons on the uniforms helped to determine the era of the photos. There was also a small collection of personal photos, which, after extensive research, I determined were taken in action during the Korean War. My photographic research and examination was a perspective-changing experience on all levels.

(F) 12:50 – 1:10 Developing a Vision: Curating Eric Echols's Collection
Merritt Shemwell, Daniel Hicks, and Sarah Dassinger
Faculty Sponsor: Tait Keller, Department of History
This summer, I had the privilege of interning at the Memphis Museum of Science and History through the Lainoff fellowship. During my time at the museum, my primary objective was to contribute to the curation and management of an exhibit centered around the thousands of photographs collected by Memphis' own Eric Echols–a local teacher. While I had other, smaller tasks, our main focus was beginning to curate an exhibit surrounding Echols's collection which included many different responsibilities. Throughout my summer, I looked at thousands of photos of black Americans collected from antique stores and vintage pop-up booths in and around Memphis. Our challenge was to work backwards from only these small snapshots of some strangers life to give context and meaning to each photograph using different kinds of research. We also had to recognize patterns among the photos in order to make the difficult decision of what to include in the exhibit itself. Overall, this internship provided an invaluable learning experience, enhancing my understanding of research and museum work as a whole–specifically the curation of exhibits.

13:10 – 1:30 Uncovering Cuenca: Architecture, Religion, and Language
Sarah Dassinger
Faculty Sponsors: Tait Keller and Michael LaRosa, Department of History
Attending a Rhodes College Maymester in Cuenca Ecuador during Summer 2022 inspired me to return last summer (2023) and investigate questions that stemmed from my experience living there. Cuenca boasts a blend of Indigenous and European cultural influences: women attend Catholic mass dressed in traditional skirts (la Chola Cuencana), people of Spanish ancestry say "indigenous people bring crime" yet participate in their traditions, and everyone speaks a Spanish infused with Kichwa words and intonations. I returned to Cuenca (thanks to the Ruyl Family Fellowship) to investigate the history of these cultural intersections. In order to conduct my research, I frequented museums, visited ruins, went to cathedrals, attended tours, and talked with my host-family members and friends. Through researching, I discovered significant cultural parallels between people who had no prior contact and existed in geographically distinct regions. In this presentation, I intend to demonstrate the tensions and beauty of mixing cultures for the duration of almost five centuries and how ongoing interactions continue to manifest in daily life. I believe researching indigenous cultures is critical both to understanding contemporary urban life in Ecuador and maintaining a cultural record of people and their practices.

Humanities / Politics and Law
2:00 – 3:40 pm
FJ-B
Moderator: Merritt Shemwell

2:00 – 2:20 Anorexia Nervosa Proliferation Alongside the Beauty Ideal: A Modern Sociocultural Model of Anorexia
Maya Underwood
Faculty Sponsor: Rebecca Tuvel, Department of Philosophy
In the 1990s, second wave feminists – most prominently, Susan Bordo – reflected on the culturally influenced nature of anorexia nervosa. Despite such reflections, anorexia is typically

perceived today as a primarily pathological psychological condition. This perception promotes an individualistic view of anorexia onset, symptoms, and treatment that does not adequately account for cultural pressures influencing anorexia. The pathological view is further reinforced through the relegation of anorexia to the realm of medical psychology and through the diagnostic and treatment practices within this realm. The lasting perception of anorexia as wholly pathological indicates a need for updated reflections on the cultural influences on anorexia that more aptly describe the influence of today's modern culture. In my research, I demonstrate how the pathological view of anorexia is reflected in modern medical and cultural understandings. I then show how anorexia incidence has followed the cultural trends of the modern beauty ideal outlined by Heather Widdows in Perfect Me. In doing so, I demonstrate that anorexia has continued to follow cultural trends and, therefore, cannot stem only from individual pathology. Finally, I suggest potential medical and cultural changes that could be made to account for the cultural influence of the beauty ideal on anorexia.

2:20 – 2:40 Beyond Purity: Exploring the Scapegoating of the Vestal Virgins
Claire Smith
Faculty Sponsor: David Sick, Department of Ancient Mediterranean Studies
The Vestal Virgins held a very unique and esteemed role in ancient Roman society and religion. This group of six women were priestesses of the goddess Vesta, conducting sacrifices as well as tending to the sacred flame in her temple. The priestesses were believed to be the embodiment of purity and devotion, a symbol of protection for the Roman state. Therefore, maintaining their virginity and purity was vital; if compromised, the whole community was at risk. Many of these women faced scrutiny and were blamed as scapegoats or pharmakoi in times of conflict, whether external wars or internal societal dilemmas. To resolve the conflict and retain control over these disasters a Vestal would be accused of incestum or stuprum, which is the dishonor of unchastity. The women would be put on trial in front of the Pontifex Maximus and the other pontiffs. If she was declared guilty, she was to be ritually murdered by live burial, provided only minimal supplies to last a week. By reviewing the accounts of the Vestals' trials in primary sources, I have found recurring elements as evidence of scapegoating, elements that show a ritual purification made to cease popular hysteria.

2:40 – 3:00 Gubernatores, Oratores, Vilicique, Oh my!
Michael Zafuto
Faculty Sponsor: David Sick, Department of Ancient Mediterranean Studies
Cicero gets a bad reputation for being too repetitive and a great sleeping aid. However, his reflections on the role of statesmen (gubernatores, rectores, vilici) and orators are vital to our understanding of Roman politics. Cicero describes this education of orators/statesmen using interchangeable metaphors. These exempla and metaphors in Cicero's Republic, Brutus, Orator, and On the Ideal Orator, are addressed to a particular audience: young men of established families in Roman society. In Cicero's view, these young men, contrary to the example of Pompey and Caesar, ought to use oratory and philosophy to pursue the best route for the Roman state. They should not be afraid of war but only use the sword as a last resort if oratory and philosophy have failed. The political context of late Republican Rome explains Cicero's directives. His Rome was a bitterly divided and defined by civil war after civil war. Do those polarizing times sound familiar? I contend that Cicero was naïve to think that the example of a

few would overcome sweeping political changes but that he was correct in investing in the education of future Romans.

3:00 – 3:20 The Duty of the Armed Citizen
Nathan Mobley
Faculty Sponsor: Michael Nelson, Department of Politics and Law
The Second Amendment is a guarantee in the federal Constitution that the natural right of the people to keep and bear arms shall not be infringed. American political philosophy drew upon the tradition of the armed citizen, developed over centuries by the contributions of civic republicans, classical liberals, and Enlightenment philosophers. Americans viewed the militia not only as a necessary component to the security of a free state, but as the whole body of the people. The Second Amendment, thus, was not intended to protect the right of militias to keep and bear arms; the Second Amendment reflects the Founding Fathers' belief in a natural right to change or abolish government destructive to the life, liberty, and property of the people, inherent in which is the duty of armed resistance by citizen-warriors, both most essential and effective to the security of a free state.

3:20 – 3:40 Central Asia in the News
Jack Burt
Faculty Sponsor: Sasha Kostina, Department of Modern Languages and Literatures
Situated between two economic giants, Central Asia has been a battle ground for international relations for the past decade. Moreover, U.S. involvement in the region has made it a three-way race to become Central Asia's staunchest ally. However, who Central Asia will or wants to choose is unclear, as they have done their best to include all three nations- Russia, China, and the U.S.- in their economic programs.

Through content analysis of Central Asian news sources, as well as analysis of Central Asian economic decision making, this research shows/(this symposium will demonstrate?) that in most cases, Central Asian economic relations are rooted purely in economic outcome, and devoid of social, defensive, or political benefit.

<u>Spanish I</u>
11:00 – 12:00 pm
Southwestern LLC
Moderator: Coral Dawley

11:00 – 11:15 Liberating nightlife: drag, transvestism and social transformation in post-Franco Spain
Sydney Williams
Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures
Liberating nightlife: drag, transvestism and social transformation in post-Franco Spain
The role of drag and transvestism within the nightlife of post-Franco Spain serves as a pivotal factor for understanding the profound social and economic transformations during the transition to democracy. By delving into the cultural phenomenon depicted in ""Una Mala Noche Tiene Cualquiera" by Eduardo Mendicutti, I aim to explore gender nonconformity and how it unveils the intricate interplay between identity liberation and Spain's move away from the authoritarian

rule. My analysis will illuminate how expressions of gender fluidity and noncomformity intersected with the broader narrative of Spain's democratic evolution. Moreover, my examination of the socioeconomic landscape reveals the significant impact that drag and transvestism had in shaping and defining the national identity in the post-Franco era. These forms of self-expression not only challenged traditional norms but also catalyzed discussions on LGBTQ+, diversity, and feminist rights. Thus, my exploration of drag and transvestism in post-Franco Spain alongside of my analysis of ""Una Mala Noche Tiene Cualquiera" by Eduardo Mendicutti, I will unveil a multifaceted tapestry wherein cultural, social, and economic threads intertwine to reflect the complexities of a nation in transition.

11:15 – 11:30 The Warning Against Chile's Collective Forgetting in "Sangre en el ojo" by Lina Meruane

Lucia Berkey
Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures

Sangre en el ojo" was written by Lina Meruane, a Chilean author who experienced Pinochet's coup d'etat and dictatorship during her childhood. The narrative is told from the point of view of a Chilean woman who goes blind due to a hemorrhage in her eyes and must navigate the world without sight. Ultimately, she manipulates her boyfriend into giving her his eye for a surgery to restore her vision. When considering the blood that blinds the protagonist, critics agree that it metaphorically represents the bloodshed during the dictatorship, yet they have not explored what this metaphor communicates about Chile. I will argue that the protagonist's lack of mention of the dictatorship and her damaged and twisted personality are a representation of the problems related to memory of the shared national trauma. While her lack of mention demonstrates the repression of this trauma, the protagonist's personality and ultimate act of cruelty represent the negative and unintended manifestations that result from burying the past, both in the individual sense and in the broader historical sense. By allegorically representing Chile and its collective forgetting of the dictatorship, I assert that Meruane's book seeks to warn against the repression and forgetting of the past.

11:30 – 11:45 Cuentos de la Selva, de la selva; la pluraversalidad del medio ambiente

Jackson Thelen
Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures

Horacio Quiroga's Cuentos de la Selva (1918) is an anthology of eight short stories that recount different adventures and tales that occur in the jungle of Misiones, Argentina. The stories feature an array of animal and human characters that can communicate with each other in Spanish. But why can animals communicate with each other and with humans and who is the narrator of these stories? This presentation argues that Quiroga wrote Cuentos de la Selva from the perspective of the jungle itself to portray the pluriversality of nature and the universe. The animals speak Spanish but not like humans use language; rather, they speak of the jungle as an event and are not concerned with thoughts historically relevant to humans (Viveros). Using the contemporary ecocritical "more-than-human" theory, I will argue that Quiroga attempts to highlight the collection of ontological "more-than-human" worlds that exist to create our universe. However, as the jungle is a collective of different entities, it will never be able to holistically represent the

dialogue between its members' through Spanish, simultaneously proving the pluriversality of itself and the distinctions between each of its parts.

11:45 – 12:00 How to Not Tame a Wild Tongue: A form of resistance in educational settings – An analysis of Gloria E. Anzaldúa's Borderlands/La Frontera: The New Mestiza
Hector Tinoco-Herrera
Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures
My study aims to engage with the insights offered by Gloria E. Anzaldúa's work, Borderlands/La Frontera: The New Mestiza, published in 1987. Through this investigation, I will explore the themes of identity, culture, gender, and language that Anzaldúa discusses in her work. She shares her own experiences growing up as a mestiza woman – an individual of mixed heritage – in the borderlands of southern Texas. Anzaldúa describes the struggles that marginalized individuals often face through societal norms. She urges readers to embrace the complexities of their own identities and utilize aspects such as language to resist oppressive systems. A central focus of this presentation will be Anzaldúa's influential chapter, "How to Tame a Wild Tongue", where she advocates for the recognition and celebration of linguistic diversity. I will reflect on Anzaldua's assertion that language, in the form of bilingualism, serves not only as a means of expression but also as a tool for resisting assimilation. Specifically, its relevance in educational settings where diverse identities often intersect and intertwine. Ultimately, my goal is to promote bilingualism's potential in challenging oppressive systems and to advocate for more inclusive educational spaces and policies that embrace and appreciate linguistic diversity.

Spanish II
12:30 – 1:30 pm
Southwestern LLC
Moderator: Malcolm Oliver

12:30 – 12:45 The Afro-Costa Rican Internal Struggle in "Demasiado Peso" by Quince Duncan
Wesley Adams
Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures
This presentation will explore a short story by the Afro-Costa Rican author Quince Duncan called "Demasiado Peso", which focuses on the life of an Afro-Costa Rican man named Brayan. The story emphasizes Brayan's struggles in finding better work opportunities and how poverty affects him on a personal level. The presentation will emphasize how Duncan uses this fictional short story as a critique of the social and economic structures that have been in place in Costa Rica since the country was under Spanish rule. In addition, the story will be analyzed using psychoanalytic and postcolonial criticisms to focus on the individual struggles Brayan deals with in this society. Not only does Brayan feel as if he is an 'Other' within the scope of the entire country, but also within his own community because no one seems to care about his struggle. This presentation argues that an exploration of the inequalities in Costa Rican society through the perspective of Brayan brings light to the idea that it is not the fault of the Afro-Costa Rican community for the unjust situation they are living in and that they should not have to shoulder the responsibility to make change.

12:45 – 1:00 A Linguistic Liberation: Los niños perdidos by Valeria Luiselli as New Form of Interpretation

Liza Ashe

Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures

This paper explores various theories of interpretation and examines how they interact with Valeria Luiselli's 2017 essay, Los niños perdidos. In this text, Luiselli details her own experience as an interpreter in New York Immigration courts. I pay special attention to the linguistic limitations present within the U.S. legal system regarding immigration, noting how Luiselli is subject to these confines as an interpreter and how she breaks free of these restrictions in her own writing. I provide ample context to the immigration crisis and explore how linguistic discrimination has led to the courts' restricting conditions. I also ground Luiselli's call to action in the power of narrative and empathy, and I analyze her rhetoric within her expanded, literary narratives of the stories she hears in court. By analyzing her use of metaphors and other rhetorical devices, I propose that Luiselli's writing serves as its own form of interpretation which is free from the court's limitations. I will ultimately argue that Luiselli's writing serves as an effective interpretation of the stories she hears in court, and that they break linguistic barriers in order to allow for the necessary dignification, individualization, and humanization of this population of immigrants.

1:00 – 1:15 Finding the Wound: How Octavio Paz Views the Mexican Psyche and Stresses Reflection and Solitude as a Step Toward Mexican Brotherhood and Self-realization in The Labyrinth of Solitude

Paola O'Rourke

Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures

Octavio Paz, the winner of the Nobel Prize in Literature in 1990, earned his fame in part due to El Laberinto de la Soledad (1950). In his work, El Laberinto de la Soledad, Paz explores the Mexican act of self-denial. Throughout his book of essays, Paz examines Mexico's traumatic past, its present, dissimulation among Mexicans, religion, and the human condition's effect on the Mexican psyche. He compares the Mexican psyche to a labyrinth, suggesting that Mexicans can either remain idle or engage in self-reflection to uncover their roots and reasons for existence. In this presentation, I will analyze why Paz introduces certain figures to best present self-acceptance as a Mexican. Paz introduces figures like the "pachuco," who is isolated by his own rebellion against North American and Mexican culture and becomes self-negated by duality. Critical of the pachuco character, who creates his own culture rather than addressing his past, Paz claims that Mexicans who know their identity as Mexicans recreate Mexico in their image. Octavio Paz analyzes Mexico holistically to convey why Mexican identity often falls into self-loathing and proposes solitude and self-reflection with the aim of reclaiming agency in one's own identity and national identity as a Mexican people.

1:15 – 1:30 The History of Chile Through the Eyes of Children: The Effect of Media Control on Friendship
Brianna Rempe
Faculty Sponsor: Juanita Bernal Benavides, Department of Modern Languages and Literatures
In this essay I will be exploring the film Machuca. Machuca was released in 2004 and takes places during the presidency of Salvador Allende before Pinochet's dictatorship takes power. The film serves as a coming-of-age film seen through the eyes of two young boys, Pedro Machuca and Gonzalo Infante, who are from vastly different social classes. Throughout the essay I will explore the questions of, why are the boys such good friends?, 'what causes the distance between the boys as the movie progresses?, and what effect does governmental media control have on learned behaviors in the boys? Using psychoanalytic critical theory and psychological phenomenons including false memory and learned behavior I am to propose a new viewing of the film. This new lens allows spectators to see that the learned behaviors of the boys as they mature is what ultimately breaks their friendship. These learned behaviors, adopted from their parents, are influenced by the media, controlled by the government.

German
2:00 – 3:15 pm
Southwestern LLC
Moderator: Bella Slankard and Erin McTigue

2:00 – 2:15 Einstein and Heisenberg: Empiricism and Pure Reason
London Bielicke
Faculty Sponsor: Katy Holihan, Department of Modern Languages and Literatures
Albert Einstein and Werner Heisenberg were pioneering theoretical physicists who altered humanity's understanding of the world. Einstein's theory of relativity challenged Newtonian physics and raised questions about truth: what is real if our perception deceives us? Should we rely on scientific laws if new discoveries can shatter entire belief systems? Einstein's *Physik und Realität* (*Physics and Reality*) and self-reported *Gedankenexperimenten* (thought experiments) reveal his belief in the interconnection between theory and experimentation to develop a holistic worldview. Although Heisenberg challenged Einstein's values throughout his career, later in his career he shifted away from a purely empirical mindset towards the development of his uncertainty principle, as manifest in his speech *Wissenschaftliche und Religiöse Wahrheit* (*Scientific and Religious Truth*). Both Einstein and Heisenberg utilized a holistic worldview to make scientific contributions by combining abstract, philosophical reasoning with empirical evidence, which distinguished them from everyday scientists.

2:15 – 2:30 Nightmares and Automata: Humankind's Travels with the *Doppelgänger* from 1700 to the Present
Palmer Mihalevich
Faculty Sponsor: Katy Holihan, Department of Modern Languages and Literatures
The *Doppelgänger* is a German word that literally translates to "double goer." The word has been used to describe a near twin, or double, in terms of physical appearance. The *Doppelgänger* has had many different lives and meanings in the past three decades in the works of German literature and psychology. The *Doppelgänger* is first mentioned in *Siebenkäs*, a two-part series

released by German author Jean Paul in 1797. In ETA Hoffman's 1815 romantic short story *Der Sandmann*, the Doppelgänger takes fantastic and supernatural form. Sigmund Freud even takes up *Der Sandmann* in his study *The Uncanny*, analyzing the story's *Doppelgängers*, uncanny tone, and unreliable narrator. The 1920 German silent film *Metropolis* modernized the *Doppelgänger*, casting her as a technological cyborg. My study traces the trajectory and manifestations of the *Doppelgänger* from 1700 to the present, considering how humanity has opted to confront the unambiguous identities and uncanny doubles.

2:30 – 2:45 Bach, Mendelssohn, and their Legacies under Fascism
Isaac Pace
Faculty Sponsor: Katy Holihan, Department of Modern Languages and Literatures
German national identity and music are heavily intertwined. Germany is home to marquee names in the world of classic music composition. Johann Sebastian Bach and Felix Mendelssohn are but two of these world-renowned German composers. Both wrote religious (even patriotic) music, but the way in which their respective legacies were co-opted and represented under the Nazi regime long after their deaths was vastly different. Bach was propped up as a model for quintessential German excellence, whereas Mendelssohn was demonized on the basis of his Jewish heritage, despite the striking similarities in both style and source material of their respective music. Mendelssohn was heavily influenced by Bach's work and was even responsible for his revitalization and popularization, but in spite of this and in spite of his conversion to Lutheranism, he was still posited as a "degenerate" musician and enemy of the Nazi state.

2:45 – 3:00 *Vergangenheitsbewältigung*: German Colonial Acquisition and Repatriation of Human Remains
Ella Peterson
Faculty Sponsor: Katy Holihan, Department of Modern Languages and Literatures
Vergangenheitsbewältigung is a German word for coming to terms with the past. Often used in the context of a German national reckoning with crimes committed during the Holocaust, I argue that *Vergangenheitsbewältigung* should also be applied to atrocities committed against the Herero and Nama people of Southwest Africa (modern-day Namibia) under German colonial control. During the colonial period, German colonists stole human remains from these communities under the auspices of "racial science." By way of both their initial theft and modern processes of their repatriation, Germany's handling of human remains reinforces colonial power structures. I propose that Germany's adoption of a non-Eurocentric *Vergangenheitsbewältigung* might address these post-colonial power imbalances and improve repatriation processes.

3:00 – 3:15 From Glass Slippers to Sneakers: The Progression of Feminine Identity across the Centuries
Pascale Foreman
Faculty Sponsor: Katy Holihan, Department of Modern Languages and Literatures
Fairytales and folklore throughout the world communicate specific values and ideals about society and, more specifically, about femininity and womanhood. Many fairytales enjoy multiple iterations, each slightly altered to reflect the values of their respective time and place. The story of *Aschenputtel* (Cinderella) published in the early-19th century by the Brothers Grimm, for example, was later popularized in the 20th century via the Disney animated film. The film

adopted many features of the Grimm's original but also entailed distinct differences reflective of contemporaneous American values regarding femininity and womanhood. The early 2000's version of Cinderella, *Another Cinderella Story*, features the same base-story but, again, with changes that reflect the specific values of American femininity. I argue that each iteration of *Cinderella* provides unique insight into respective conceptions of womanhood and femininity, via close readings of their female figures, each of whom are charged to depict "acceptable" and "unacceptable" ideals of women.

English
11:00 – 12:15 pm
Southwestern 207
Moderator: Janay Kelley

11:00 – 11:15 2010s Trans Internet Discourse, Conventionality, and Individuality in Torrey Peters' "Detransition, Baby"
Jamie Garland
Faculty Sponsor: Gordon Bigelow, Department of English
In the 2010s, transgender people and our allies created online spaces to educate on and discuss transness. The online discourse on trans experiences relied heavily on transmedicalism, which states that being trans means "being born in the wrong body" and implies that a trans person must have a linear transition story consisting of pre-transition, medical transition, and post-transition peace in order to be valid. Detransition, Baby, the 2021 novel by Torrey Peters, provides a different model of transness, one in which transition is nonlinear. One of the protagonists, Ames, lived his life as a trans woman before detransitioning due to social pressures. His story exists simultaneously with that of another protagonist, Reese, a trans woman who chases after conventional motherhood as a way to affirm her gender. This essay shows off how Ames defies 2010s trans internet discourse by comparing his temporally-challenged story both to prominent transmedicalist YouTubers of the time and to prominent queer theorists like Judith Butler, Lee Edelman, and Grace E. Lavery. This article argues that through the non-chronological storytelling and the exploration of multiple, contrasting protagonists, Detransition, Baby shows off the importance of representing complicated transgender stories.

11:15 – 11:30 "It Was a Mood": An Anti-Recuperative Approach to The Awakening
Rachel Grau
Faculty Sponsor: Gordon Bigelow, Department of English
Replete with indelible ambiguity and unresolved tension, The Awakening is a novel that reads you; it is an experience, an impression, a mood. Writing against the tradition of didactic literature and a native speaker of both French and English, Kate Chopin's fascination with the incongruencies of thought, speech, and meaning is at the epicenter of the text as she deftly produces The Awakening's evocative textuality and sensuality to supplant the deficiency of language alone. While Chopin refuses to gratify her audience with unequivocal explanations, the existing body of scholarship on The Awakening demonstrates the ways in which the conventions of literary criticism compel us to ignore inconsistency and deny incertitude in favor of homogeneous, reductive interpretations. Drawing on Anca Parvulescu's theory of "recuperative" modes of reading, my approach to the novel examines how the sensuousness of the text conveys the openness of thought and feeling through an impressionistic assertion of sensation and mood

without compromising their multiplicity through proscriptive language. Enabled by her resistance to linguistic clarity, Chopin artfully weaves together discordant elements to create a synergistic, enigmatic novel that testifies to the richness and inarticulability of the human experience by undermining our expectations of total novelistic coherence.

11:30 – 11:45 Social Reality in Franz Kafka's The Trial
Cristian Perez
Faculty Sponsor: Gordon Bigelow, Department of English
Georg Lukács, Marxist-literary critic, famously critiqued Franz Kafka's work for being an allegory of "transcendental nothingness". By reading Kafka's The Trial through Slavoj, Žižek's The Sublime Object of Ideology, this paper will seek to respond to Lukács and uncover the "imaginary" in social reality. As noted by Žižek himself, Kafka's "subjective distortion" of reality demonstrates "the fantasy which is at work in the midst of social reality itself" (34). At the formal level, Kafka presents this fantastical component of reality through a theatrical construction of scenes and character relations. Kafka's depiction of social reality as a theatrical performance parallels Karl Marx's conception of a commodity's exchange value—both involve a fetishization of symbolic value. Žižek notes in The Sublime Object of Ideology that the fetishization of symbolic value involves an internal symptom—a social contradiction. Thus, by reading Kafka through Žižek's interpretation of Lacan's "The Symptom," The Trial becomes a detective, sociological novel. Through his protagonist, Josef K., Kafka introduces the reader to The Trial's symbolic order, identifies its internal social contradictions (Symptoms), and offers a positive transcendence of these. Therefore, Kafka's The Trial presents a social critique that has gone unprecedented for many.

11:45 – 12:00 Jehannette: an Elegy for the Girl Behind the Warrior Saint
Maggie Kreis
Faculty Sponsor: Lori Garner, Department of English
Jehannette is a poem that exists as a result of my researching the 10th Century Old English elegy form and the life of 15th Century figure Joan of Arc, and then putting the two in conversation with each other. My poem is referential to the medieval elegies—especially "The Wanderer," "The Wife's Lament," and "Deor"—as well as the medieval French "The Trial of Joan of Arc." Each of these serves as a source text for my own work, which is an elegy in the 10th century style that laments the life and death of the 15th-century Joan of Arc. Elegies are poems of loss and longing that, in the 10th Century, most often discuss the passage of time, the transience of earthly things, or the pain of exile. This form aptly replicates the human experience, and I use it here as a vehicle for telling Joan of Arc's story—a version of it that I have not seen told. Joan's story is often framed with a distinct political or religious agenda; my elegy explores not Joan the martyr or saint, but it laments the loss of Joan's girlhood, her mistreatment and her murder, and, here, I weep for her.

12:00 – 12:15 Carter's Hymn: The Parallels between Old English Poetry and Lil Wayne.
Alex Peterson
Faculty Sponsor: Lori Garner, Department of English
The Venerable Bede's 7th-century account of Caedmon's Hymn, a story about a cowherd who through a brief angelic dream-vision is blessed with the "gift of song" (Bede 29), is generally understood as the earliest Old English verse. Previously unmusical and illiterate, Caedmon

spontaneously performed extempore verse in his native tongue of English. Caedmon's composition of the hymn is also one of the first examples of spontaneous poetic inventions, which is a tradition that has succeeded in many forms. The most common and popular example of improvised poetic composition comes in the form of freestyle rap, which unlike other types of verse inspired by a Medieval tradition, is proudly "embraced by younger generations" (Sykäri 132). Thus, the genre and its forethinkers continuously reshape the genre's sound, made evident through the formless and spontaneous usage of freestyle verse. This is expressed greatly through the history and output of rapper Lil Wayne, who freestyles every verse he creates. Comparing Wayne to Caedmon demonstrates the greater importance of improvised verse in both cases and its use as a poetic device. This will also canonize rappers like Wayne too as powerful poets like Caedmon and models for the burgeoning tradition of rap music.

English Honors
12:30 – 1:45 pm
Southwestern 207
Moderator: Maggie Kreis

12:30 – 1:05 The Redhorse: Poetic Self-Retrieval through AI Reconstruction
Niko Baranek
Faculty Sponsor: Caki Wilkinson, Department of English
My in-progress, experimental modern epic poem, "Lisa and the Redhorse and a Long Time Coming," is developing through an evolving, interdependent relationship between my psychological traumatic mutism and a predictive text generator AI. Initially, the goal of the experiment was to invent a formal technique to aid handicapped writing using close AI interpolation, supporting linearity in disorganized language. However, engaging with language as simultaneously material and obstacle created an unforeseen contradiction that inverted the project; instead of compensating for mutism, I began, paradoxically, engaging with mutism itself. Applying structural linguistic theory, I found parallels between algorithmically generated language and psychoanalyst Juliet Mitchell's theories on language formations in the traumatized mind. Finding recognition in the AI-generated language system allowed for conversation between it and my traumatized language system, which was otherwise alienated and unable to communicate. Recognition, a communication and self-concept requirement—as well as the premise for talk therapy—triggered a complex, highly symbolic conceptualization of the mute self to unfold through interaction. It became known as the Redhorse. Through AI-mediated conversation, its story became the long-form poem. By converting the mute self into a symbol and collaboratively building a mythology of its journey into individualism, mutism itself became communicable.

1:10 – 1:45 When Death is Invited to Dinner (Working Title)
Janay Kelley
Faculty Sponsor: Caki Wilkinson, Department of English
Nothing speaks more to the power and purpose of poetry than the elegy. The essence of the form is lamentation: a state of being that marries the inevitable end to the ineffable loss. Everybody dies, and everybody loses, yet no one is ever truly prepared to leave or be the left behind. Inspired by my personal journey with my mother's chronic illness, my honors project

“When Death is Invited to Dinner” is a poetry collection that explores elegy (1) as a commentary on death-life; (2) as statements of without; (3) as resurrections; and (4) as a poetic form of yet.

Africana Studies
2:00 – 3:00 pm
Southwestern 207
Moderator: Peace Abhieyighan

2:00 – 2:20 Into the Madlands
Armon Newsom
Faculty Sponsor: Samson Ndanyi, Department of History
Natal alienation played a fundamental role in the production and maintenance of slaves. Under the colonial context, the native lost sovereignty and dominion over the motherland and sought to reclaim her from the colonial power. On the other hand, under the context of slavery, the slave lost not only the motherland but also their mother. The Middle Passage and dynamics of the plantation robbed the slave of natal ties and claims to their children, parentage, and kinship. In the process, the slave lost lineage and ties to the land as well. This is to say that the slave had no land to reclaim from the colonizer and instead sought to establish land ties anew. This dynamic can be seen in the behaviors of niche groups within enslaved populations. An example of this is the Hebrew Israelite movements seen in American populations. This group argues that Black Americans are one of the 12 tribes of Israel and are God’s true people thus stake claim to the holy land as the motherland. I argue that the beliefs and practices of this group are an intense manifestation of the drive towards establishing land and natal ties for enslaved/formerly enslaved populations.

2:20 – 2:40 "A Letter to Grandma Loretta"- An Homage Black Women's Activism
Trinity Williams
Faculty Sponsor: Samson Ndanyi, Department of History
I am from New Orleans, LA, and am a current Junior. I am Double Majoring in Health Equity and Africana Studies. In addition, I am an active community organizer specializing in racial justice and policing reforms in Memphis.
My research centers on my academic experience as well as my personal background. To begin with, I wrote a letter to my late grandmother to share with her the great icons I’ve learned about in the Africana Studies courses at Rhodes College. My grandmother was a powerhouse for black women movement; she’s the one who instilled in me the important lessons of racial justice, the power of identity expression, and resistance against dehumanizing forces. I am integrating aspects of my grandmother’s wisdom and legacy in my work on and off campus, including the works of other black women in the U.S. The Black women in this study have persevered through adversity to liberate African Americans.

2:40 – 3:00 The Erasure of Africa in US Education
Nakayla Yancey
Faculty Sponsor: Samson Ndanyi, Department of History
As an Africana Studies major and scholar, I have learned about Africa in all its historical foundations. This knowledge has deepened my understanding of the history of Africa in the spheres of education, history, politics, and much more. Unfortunately, Africa’s history hardly

gets the attention it deserves in schools and colleges in the Western world. This paper seeks to examine the erasure of Africa in educational spaces. I will draw from multiple authors who discuss the beauty of Africa's history, rather than the general stereotypes and beliefs that have commonly been held regarding the continent.

Meeman Center for Lifelong Learning
3:30 – 4:30 pm
Southwestern 207
Moderator: LeeAnn Fincher

(F) 3:30 – 3:45 How Lifelong Learning Fosters Community
Campbell Boyd
Faculty Sponsor: Lori Garner, Department of English
The Meeman Center of Lifelong Learning at Rhodes College provides a community for a variety of different people. The goal of these non credit classes is to facilitate learning for adults interested in continuing their education. During my time as a Lifelong Learning Fellow, the social aspect of the classes stands out as a keynote characteristic. The most successful, engaging classes are the ones that foster a community among the students. The classes provide a pathway for the students to share the knowledge that they bring with them. Through this transfer of knowledge, a bond forms between students. I plan on interviewing students from some of the most successful classes that I have been a part of. I also plan on interviewing a couple of the professors who facilitated these classes. These interviews will hopefully shed light on how community is created and how it impacts the individual students. I will incorporate outside information from The Handbook of Adult and Continuing Education, as well as other published research. The goal of my research is to understand how lifelong learning facilitates community and brings people together. Once this is understood, it can be replicated in future lifelong learning classes.

(F) 3:45 – 4:00 Inclusive Lifelong Learning: Decolonizing Adult Education at the Meeman Center
Naisha Chowdhury
Faculty Sponsor: Lori Garner, Department of English
The underrepresentation of minority groups and educational methods in adult learning settings necessitates the decolonization of adult education and advocacy for a global and inclusive approach to acquiring and distributing knowledge. This study investigates the impact of colonial legacies on adult education systems, particularly within the Meeman Center at Rhodes College. Through interviews with professors and Meeman students with diverse backgrounds, perspectives, and experiences, alongside reviews from "The Handbook of Adult and Continuing Education" and participant trends, this research study explains the need for rewriting, rethinking, and reassessing the culture of modern education. Despite Memphis' predominantly African American population, Rhodes College, including the Meeman Center for Lifelong Learning, exhibits significant disparities in student demographics. This inconsistency poses a systematic challenge in addressing the colonial legacy of adult education, which enables the exclusion of marginalized communities. By shedding light on these issues and proposing solutions that support long-term efforts toward inclusivity, this research aims to contribute to local and

nationwide efforts to decolonize education and foster greater equity and diversity in lifelong learning spaces such as the Meeman Center.

(F) 4:00 – 4:15 Psychology in lifelong learning: Benefits, purposes, and inequities.
Dana Potter, Naisha Chowdhury, Sandy Mansour, and Campbell Boyd
Faculty Sponsor: Lori Garner, Department of English
It's important to emphasize that 74% of adults identify as lifelong learners, but only 25% of those individuals take advantage of classes and 10% towards online classes. Lifelong learning is described as an active perseverance of knowledge beyond the average age of learning. The learning process can improve a person's psychological wellbeing in various ways such as self-esteem, memory, thought processes, decreased risk of disorders. However, these benefits experience some caveats. Lifelong learning in formal settings face inequities through various forms of accessibility. Lifelong learning is something that all adults deserve, especially when considering psychological benefits. It is important to address these issues and find solutions to the inequities of lifelong learning so that everyone can benefit from said psychological benefits. In my presentation, I plan to share information I've learned through my observations at the Meeman center, literature supporting claims, and interviews with faculty at Rhodes College. All information gathered will serve as guiding steps towards increasing the opportunities for the Memphis community to benefit from lifelong learning.

(F) 4:15 – 4:30 Lifelong Learning, Neuropsychology, and Social Well-being
Sandy Mansour
Faculty Sponsor: Lori Garner, Department of English
As a 2023-24 Lifelong Learning fellow, I have had the amazing opportunity to explore a diverse variety of continuing education classes at the Meeman Center and Trezevant Senior Residence. In this research presentation, I will dive into the profound impact of lifelong learning on the human brain and cognition. This presentation explores the multifaceted benefits that extend far beyond the conventional classroom, emphasizing the crucial social implications of fostering cognitive engagement among individuals of all ages. Through interviews with professors, administrators, and enthusiastic Meeman students, combined with a wealth of research-based insights, I aim to unravel the neuroscience and cognitive facets of lifelong learning. I hope to demonstrate the physiological and psychological transformations that can occur when individuals, irrespective of their age, immerse themselves in the pursuit of knowledge. There are profound connections between learning and the enhancement of cognitive functions. This presentation seeks to not only showcase the academic outcomes but also shed light on the social fabric that is woven through the act of continuous learning.

NATURAL SCIENCES ORAL SESSIONS

Physics
11:00 – 12:15 pm
FJ – B
Moderator: Grace Nehring

11:00 – 11:15 GoBot Motion and Adaptive Behavior Trees
Lauren Gayle, Emily Scheide, and Geoff Hollinger
Faculty Sponsor: Ann Viano, Department of Physics
The GoBot is an assistive robot meant to encourage motion during children's physical therapy sessions through play via flashing lights, sounds, bubbles, and playing games such as "chase" and "keep away". An increase in the GoBot's capabilities to play would boost its effectiveness in encouraging motion, and as such I worked to implement basic motion-based movements. The motion primitives created were used to create paths for the GoBot to follow and used in in tandem with the already implemented actions. Additionally, the GoBot functions using a behavior tree framework, a framework that allows for actions to be executed and switched between easily based on the sensed environment. This provides a necessary amount of autonomy for the GoBot, as it can function without the need for a domain expert present in a session. That autonomy, however, has the potential to improve, as the behavior tree is static, yet the environment is changing. An adaptive behavior tree could assist with this, as it could edit the tasks available to it based on sensed changes. I conducted a literature survey to see the different manners in which behavior trees are made to be adaptive, their applications, and find gaps in literature.

(F) 11:15 – 11:30 Development of a tissue mimicking phantom and measurement procedure to investigate the effects of varying angles of incidence on ultrasonic backscatter measurements of bone
Emily Bingham and Kate Hazelwood
Faculty Sponsor: Brent Hoffmeister, Department of Physics
There is interest in developing ultrasonic techniques for diagnosing osteoporosis. Many techniques perform measurements at sites such as the heel, hip, and spine where the bone tissue consists of a non-porous outer layer (cortical bone) that surrounds a porous interior region (cancellous bone). The goal of the present study was to develop a tissue mimicking phantom that simulates this configuration and to design a procedure to investigate how ultrasonic measurements are affected by the angle of incidence relative to the cortical surface. Blocks of polymer open cell rigid foam (OCRF) were partially embedded in a thin layer of clear casting resin to create the specimens. The resulting specimens were 40 mm × 40 mm × 20 mm with one 40 mm × 40 mm face embedded in ~3 mm of resin. The ultrasonic measurement procedure used a 3.5 MHz transducer connected to a titling mechanism that allowed measurements to be made at angles ranging from 0 – 30 degrees in 5-degree increments while the transducer was mechanically scanned in a horizontal procedure to acquire backscatter signals from multiple locations on the specimens.

11:30 – 11:45 Evaluating Bone Density with Ultrasound: Leveraging Time-Frequency Analysis and Convolutional Neural Networks for Early Osteoporosis Detection

Hugh Ferguson, Carl Herickhoff, Ann Viano, and Brent Hoffmeister
Faculty Sponsor: Brent Hoffmeister, Department of Physics,

Osteoporosis is a prevalent bone disease with significant implications for a patient's overall health. The early detection of osteoporosis is pivotal for providing timely prevention. This study aims to explore the use of wavelets and the short-time Fourier transform analysis of ultrasonic backscatter signals from bone, along with a convolutional neural network (CNN) to predict bone density. A dataset of ultrasonic signals from 55 bone samples was collected. A wavelet transform was employed to generate scalograms, and the short-time Fourier transform (STFT) was utilized to create spectrograms. A CNN then analyzed these spectrograms and scalograms to predict bone density. Scalograms and spectrograms predicted density with a coefficient of determination of .8622 and .8624 respectively. These results suggest that wavelet and STFT frequency-time representations and CNNs offer comparable and valuable insights into bone density evaluation from ultrasound scans.

11:45 – 12:00 The effects of angle of incidence on two parameters in ultrasonic bone phantom

Kate Hazelwood
Faculty Sponsor: Brent Hoffmeister, Department of Physics

Ultrasonic techniques are being developed to detect changes in bone caused by osteoporosis. Many bones in the body have a porous interior of cancellous bone surrounded by a non-porous layer of cortical bone. Recently, a polymer foam with a thin (~3 mm) non-porous epoxy outer layer was developed to simulate the ultrasonic properties of bone. The material was used to test the effect of transducer angle on two ultrasonic techniques that analyze signals reflected (backscattered) from the porous interior of bone. One technique measured a parameter called AIB which represents the frequency-averaged power in a portion of the signal. The other technique measured a parameter called nMBD which represents the power difference between two portions of the same signal. Measurements were made with and without the epoxy layer present as the incident surface with angles ranging from 0 to 30 degrees. For angles ranging from 0 to 30, AIB had an average error of 28.42%, while nMBD had an average error of 16.17%, indicating that nMBD may be more resistant to changes due to both the cortical layer and transducer angle.

12:00 – 12:15 Benchmarking Quantum Chemistry Circuits with Expressibility

Triet (Tony) Ha, Ellen Chlachidze, Sudatta Hor, Yuan Qiu, and Scott Smart
Faculty Sponsor: Brent Hoffmeister, Department of Physics

Simulating quantum mechanical systems in physics and chemistry are some of the most promising applications of quantum computing. Variational Quantum Eigensolver is a widely known method that utilizes the potential of quantum computers to estimate a quantum system’s lowest energy state. In VQE, a parameterized quantum circuit (PQC) - an ordered set of parameterized quantum gates - is used as a trial state, and the goal is to find appropriate values of the parameters to minimize the system energy. To evaluate the performance of PQCs, one can estimate its expressibility, the quantity demonstrating how well a PQC spans the solution space, by comparing the distribution of states generated by the PQC to the uniform distribution of every possible quantum state. The relationship between the PQC's expressibility and its performance in quantum machine learning has been shown in existing literature, however, its relationship to

quantum chemistry has not been explored thoroughly. In our work, we explore this connection and devise a new strategy of computing expressibility better suited for chemistry applications.

Biology / Chemistry / Physics
12:30 – 1:50 pm
FJ B
Moderator: Hugh Ferguson

12:30 – 12:50 Synthesis of dopamine derivatives to further elucidate biological catecholamine significance and physiological activity
Trinity Liaw and Jennifer Bui
Faculty Sponsor: Larryn Peterson, Department of Chemistry
6-Nitrodopamine has recently been found in various locations of the body, acting as a major mediator of tissue contractility in the rat and human vas deferens and as a positive chronotropic agent in the heart. To aid in further elucidation of the physiological significance of catecholamines and their analogues, this work details the synthesis of the dopamine derivatives 6-cyanodopamine and 6-carboxydopamine, which are synthesized through a series of reactions starting with the commercially available 3,4-dimethoxyphenethylamine. 6-Cyanodopamine was synthesized in six steps with an overall yield of 25.2%. The synthesis of 6-carboxydopamine is currently in progress with three steps toward the final dopamine analogue having been made. When completed and fully characterized, these dopamine derivatives, along with others, will be sent to collaborators where they will be used to determine the biological relevance of catecholamines and serve as standards to quantify them in the body.

12:50 – 1:10 Engineered CHP212 Cell Line for Studying Double-Minute Chromosomes
Bernadette Truong, Ashish Verma, Rupesh Shrestha, Jake Friske, and Hai Dao
Faculty Sponsor: Larryn Peterson, Department of Chemistry
Double minutes (DMs), also known as extrachromosomal DNA, are circular minichromosomal structures observed in half of human cancer types and a third of cancer patient samples. Known to contain amplified oncogenes (e.g., MYC, MYCN) and drug-resistant genes, DMs exhibit remarkable diversity and evolution throughout the cell cycle, affecting important pathways such as gene regulation through enhancer hijacking events and unequal segregation. Notably, their presence is strongly correlated with worse patient prognosis due to heightened tumor aggressiveness and adaptability. While studies from the 1960s have successfully identified DMs, mechanisms of how DMs facilitate and enhance tumor malignancy are still relatively unknown. As such, investigating their formation, behavior, and structure could provide valuable insight into tumorigenesis and help develop novel therapeutic strategies. We endeavored to engineer DMs with DNA tags for structural studies and visualization. To this end, we have successfully conducted a Cas9-mediated knock-in of Tet operons (TetO) tag into DMs' chromosomes of the neuroblastoma CHP212 cell line. To guide our selection and achieve a high percentage of engineered DMs compared to endogenous counterparts, we developed standard and quantitative PCR-based assays. Ongoing work includes exploiting this engineered cell line for cell imaging and profiling DM-associated proteins using chemical labeling.

1:10 – 1:30 Analyzing gene expression associated with variable heterochromatin spreading at single-cell resolution
Kumudie Wiyathunge
Faculty Sponsor: Bayly Wheeler, Department of Biology
Heterochromatin, a condensed form of DNA, silences genes packaged within it. Genes situated near heterochromatin can become silenced from spreading of heterochromatin into the gene's domain. Heterochromatin spreading isn't uniform, resulting in variable gene silencing among genetically identical cells. Our laboratory utilized the ade6+ reporter gene to analyze this variability. The ade6+gene affects yeast colony color; ade6+ expression produces white colonies, while silencing produces red colonies. Positioning ade6+ next to a heterochromatin recruiter results in a spectrum of colony colors—white, red, red with white sectors, and shades of pink, the latter two suggesting partial gene silencing. Resolution of this assay is limited to silencing at the colony level, which comprises millions of cells. This raises questions about gene silencing within individual cells: Do genes within heterochromatin toggle between full activity and complete silencing, or can they exhibit intermediate expression levels? To probe this, we created a plasmid with a fluorescent reporter gene adjacent to a heterochromatin-recruiting sequence. This plasmid will be introduced into yeast, and fluorescence-activated cell sorting will be employed to assess gene expression in single-cells. The outcomes of this study will illuminate the spectrum of expression states that a single gene can manifest when positioned near heterochromatin.

1:30 – 1:50 Reproducibility Study of Human Bone Density in the Femoral Neck Using the Ultrasonic Backscatter Difference Technique
Lauren G. Boughter, Grace I. Nehring, and Blake C. Lawler
Faculty Sponsor: Brent Hoffmeister, Department of Physics
The use of medical ultrasound has become increasingly more common as an imaging and detection device for osteoporosis in patients. Because osteoporosis increases the porosity of bone, bone density decreasing, and patients experience an increased risk of fractures in the femoral neck and often require reconstructive or replacement surgery. Our study aims to determine the reliability and reproducibility of bone density measurements taken in the human femoral neck using the Terason Ultrasound machine. Trials measuring the ultrasonic backscatter signals from the femoral neck are analyzed using dual gate analysis, a process which involves comparing two consecutive sections of the returned ultrasonic wave and analyzing the way that energy dissipates through bone over time. This method of analysis reveals information about the properties of the bone – including density.

<u>Computer Science / Mathematics</u>
11:00 – 12:15 pm
Robertson 110
Moderator: Will Foster

11:00 – 11:15 Texcribe
Mwahhid Majeed, Phuong Anh Nguyen, Brayan Castro, and Alvin Omach
Faculty Sponsor: Sean Kugele, Department of Computer Science
Texcribe presents an elegant approach to modernizing meeting processes, documentation, and comprehension. In today's dynamic business landscape, Texcribe aims to streamline efficiency by automating meeting summarization while bridging the gap between technical and non-

technical stakeholders through language translation and simplification. Key features include real-time and post-meeting summarization using advanced natural language processing (NLP), language translation, and technical jargon translation. The platform integrates with meeting platforms like Zoom and MS Teams, utilizing speech-to-text technology and NLP services to extract key points and translate summaries into multiple languages. Texcribe's algorithm translates technical jargon into layman's terms, ensuring accessibility across team members. Benefits include time savings, improved collaboration, global communication, and enhanced accessibility. Texcribe is a pivotal tool for organizations aiming to optimize meeting efficiency and increase productivity in today's diverse workplaces.

11:15 – 11:30 VEMA- Voice Enabled Museum Assistant
Paola O'Rourke, Kyla Bursey, and Krislyn Dorsey
Faculty Sponsor: Sean Kugele, Department of Computer Science
VEMA is an art detection app intended for blind users to give independence to the art museum experience. VEMA is an app that utilizes the camera app to match images to a database and verbally provide essential information about the artwork.

11:30 – 11:45 8Bistory
Brayden Lauletta, Evan Holland, and Tyler McMillan
Faculty Sponsor: Sean Kugele, Department of Computer Science
Welcome to 8Bistory, a 2D, 8bit history traversal game, where you are fully immersed in the historical events you are experiencing. Whether you are fending off enemies, traveling to new sites, or interacting with historical characters, you have complete control over the events of history. Experience the past events of the world in a brand new way!

(F) 11:45 – 12:00 Integrating O(n)-invariant Functions via the Hilbert Embedding
Lillian Whitesell, Christopher Seaton, and Hans-Christian Herbig
Faculty Sponsor: Christopher Seaton, Department of Mathematics and Statistics
Let G be a collection of n x n invertible complex matrices and define $\mathbf{C}[x_1, ..., x_n]^G$ to be the set of polynomials in n variables that are invariant under G, meaning that they don't change when elements of G are applied to the variables. Suppose G acts on a vector space V and assume that G is either finite or one of the classical groups. Consider the case where G is isomorphic to an orthogonal group and the representation is k copies of its defining representation. This means that it is the subalgebra of $\mathbf{C}[x_1, ..., x_n]$ generated by a finite set of polynomials called a Hilbert basis. Given a Hilbert basis, the Hilbert embedding (a map f: V to $\mathbf{R}^k$) can be defined. This allows us to think of the orbit space as a subset of $\mathbf{R}^k$. My research aims to integrate invariant functions with respect to a group action over the orbit space via the Hilbert embedding. By the Schwarz-Mather Theorem, smooth invariant functions on V can be expressed as smooth functions of the invariant polynomials, and we will discuss progress on how to integrate such functions on the image of the Hilbert embedding.

(F) 12:00 – 12:15 Investigating Spectral Behavior through Digraph Move Sequences
Luke Guidry
Faculty Sponsor: Christopher Seaton, Department of Mathematics and Statistics
In a recent paper Farsi, Proctor, and Seaton answered the question of spectral preservation for families of finite digraphs D under the application of six digraph moves. A digraph D is a finite

collection of vertices connected by a finite collection of directed edges. In this presentation, we examine the question of the effect of some of these digraph moves on specific spectra of a finite digraph D and investigate properties of these spectra under repeated performance of these digraph moves. We seek to answer questions related to the boundedness of these spectra under performance of the digraph moves. We characterize the effects of the sequence of digraph moves (SR) on the Adjacency Spectrum, Binary Adjacency Spectrum, Symmetric Adjacency Spectrum, and Binary Symmetric Adjacency Spectrum of a finite digraph D. We also construct two families of digraphs using this move sequence and give explicit formulae for computing the characteristic polynomials of digraphs within these families. Finally, we will look into the behavior of the Adjacency Spectrum of a finite digraph D under a digraph move sequence denoted as (C^l).

Computer Science I
12:30 – 1:30 pm
Robertson 110
Moderator: John Beuerlein

12:30 – 12:45 TriviYeah!: The Daily Trivia Game
Colby Cook, Charlie An, Hugo Baroody, and Luc Benoist
Faculty Sponsor: Sean Kugele, Department of Computer Science
TriviYeah! Is the future of trivia. Springing from the inspiration of Wordle and your local bar trivia nights coms the innovative app that offers a daily main game and social interaction through a variety of mini-games. The main attraction, TriviYeah!, features a thrilling 5-round experience with themed questions based on the day of the week(e.g., Monday Movies, Sports Saturday, Tuesday Tunes). Players progress through rounds by answering questions correctly, with options to choose subcategories within the daily theme. This customizable approach enhances engagement and creates a sense of uniqueness. Achieving a perfect game, known as a 'TriviYeah!', requires navigating all five rounds successfully. In the end, players receive a visual path course displaying their journey through the rounds, which they can share with friends and family.

12:45 – 1:00 Pandora
Fabricio Farghaly, Diego Lopez, Maria Vega Vasquez, and Payton Carroll
Faculty Sponsor: Sean Kugele, Department of Computer Science
Pandora is a project to create an engaging and unique turn-based, rogue-like game. A roguelike is a subgenre of RPG (role-playing game) video games characterized by a dungeon crawl through procedurally generated levels where player death is permanent and requires game restart. This is to give a unique sense of replayability to roguelike games that other genres can't mimic.

1:00 – 1:15 Rate My Dorm: A Web Application Facilitating Informed Housing Choices for Rhodes College Students
Hayley Herlich, William Olsson, and Tony Zangler
Faculty Sponsor: Sean Kugele, Department of Computer Science
"Rate My Dorm," is a web application designed to empower Rhodes College students in making informed decisions about their living arrangements. The application serves as a comprehensive platform, offering insights into various dormitory options through curated search results and student-written reviews. "Rate My Dorm" integrates user-friendly tools, including filters, to align

search results with individual preferences. Users can contribute to the community by sharing their own dorm experiences through reviews. The application showcases featured dorms and enables users to filter options based on ratings, dorm styles, and proximity to key Rhodes College buildings. This project aims to enhance the overall student living experience by providing a valuable resource for housing decisions.

1:15 – 1:30 CuisineSync: Where Taste Meets Harmony
Welela Burayu, Nedine Abdulahi, Arnab Das, and Jean Bikorimana
Faculty Sponsor: Sean Kugele, Department of Computer Science
CuisineSync revolutionizes group dining with an innovative app designed to streamline the experience. Tired of the perennial indecision that plagues dining outings with friends, CuisineSync offers a solution. Through the platform, users rank their preferred cuisines and establish a budget, setting the stage for a seamless culinary adventure. Leveraging sophisticated machine learning algorithms, CuisineSync synthesizes these individual preferences into tailored recommendations. By analyzing and understanding the collective tastes of the group, the app identifies the optimal dining destinations, ensuring a satisfying experience for all involved. Gone are the days of endless debates and compromises—CuisineSync empowers users to effortlessly discover restaurants that resonate with their shared culinary inclinations and financial constraints. Whether craving sushi, pizza, or Thai cuisine, CuisineSync delivers personalized suggestions, enhancing the joy of communal dining. With its user-friendly interface and intelligent recommendations, CuisineSync is poised to redefine how groups navigate the diverse landscape of dining options, fostering harmony and culinary delight with every meal.

Computer Science II
2:00 – 3:15 pm
Robertson 110
Moderator: Sean Kugele

2:00 – 2:15 RHO-BOT: An AI-Powered Chatbot for Transforming Educational Support at Rhodes College
Marouf Mohammad Paul, Danyal Bukhari, and Logan Collier
Faculty Sponsor: Sean Kugele, Department of Computer Science
RHO-BOT is a chatbot developed for Rhodes College, designed to support students, faculty, and visitors by providing quick and precise answers to their questions. Utilizing the Rasa framework, it combines natural language processing (NLP) and machine learning (ML) to handle inquiries related to academic programs, admissions, and departmental details with ease. Sentiment analysis and a feedback loop are incorporated to gauge user satisfaction and encourage ongoing enhancements. The use of pre-trained models aids in the accurate classification of queries, ensuring responses are contextually relevant. Moreover, the chatbot's ability to perform custom actions and recognize specific entities enables tailored interactions, making it a comprehensive tool for navigating college resources. RHO-BOT represents an innovative step towards leveraging AI in educational settings, aimed at becoming a vital resource for accessible, up-to-date information on campus life.

2:15 – 2:30 uMuse: Museums Made Easy For You
Kiera Lesky, Jackson Hendrix, Jadyn Scott, and Abbie Seale
Faculty Sponsor: Sean Kugele, Department of Computer Science
Keeping track of new museum events and exhibits can be difficult to do, especially if you live somewhere with a lot of local museums. There could be several different websites, magazines, newsletters, and advertisements and it's easy to miss interesting showcases. uMuse solves this problem by scanning the internet for all local museum exhibits and events. Using Beautiful Soup and Selenium for web scraping and parsing HTML and PostgreSQL to organize the data, uMuse can search through several different websites, collect exhibition information, and condense it into one place. uMuse's interface, built via the Django web framework and open-source HTML templates, allows users to easily find any museums that interest them as well as their up-to-date exhibits and current events.

2:30 – 2:45 Locality Aware Work Stealing
Kamil Yousuf
Faculty Sponsor: Brian Larkins, Department of Computer Science
In high-performance computing, work stealing is a form of load balancing which allows a process to efficiently retrieve work from another process when it becomes idle. In systems such as SDC (split with deferred copies), the process from which to steal is chosen randomly, as this was previously determined to provide the highest work yield. However, with the advent and proliferation of multicore systems, there may be an alternative which provides a more efficient means to steal work. Each core in one node may have work which may be stolen by other cores in the same system; by stealing from this core rather than stealing from another node, we reduce communication overhead. In the system we propose, known as locality-aware work stealing (LAWS), we prioritize retrieving work from other cores in the same node rather than selecting a core randomly. We believe that prioritizing the retrieval of work from within the same node can provide significant performance improvements, since internode retrievals will only be made when there is no work available intranode.

2:45 – 3:00 Tap: The Water App
John Beuerlein, Kellar Carson, Charlie Mulholland, and Darya Orgil
Faculty Sponsor: Sean Kugele, Department of Computer Science
Inspired by the shared experience of forgetting to drink enough water every day, we have decided to create an iPhone app that promotes the daily healthy intake of water. We call it Tap. Broadly, Tap has three functions: water intake tracking, fountain locating, and social interaction. By allowing the user to preset the volume of their water bottle, logging water intake becomes a one-tap process. A map of water fountains can be constantly updated by users, with the ability to rate the quality of fountains. The option to "friend" other users creates a sense of comradery and competition around drinking enough water daily. Like Duolingo, Tap is a healthy-habit-forming app, but focuses on drinking water rather than learning a language. We were inspired by Duolingo to make Tap socially integrated because we have observed that a healthy bit of social pressure goes a long way in shaping behaviors. As for Tap's technical implementation, we made the frontend using Xcode, Swift, UIKit, and MapKit. For Tap's backend, we used IntelliJ IDEA, Java SpringBoot, PostGreSQL, and Amazon Web Services for cloud-hosting our database. Thank you for your time, we hope that Tap inspires you to drink enough water each day.

3:00 – 3:15 ReadFx: Optimizing Comprehension of Web Content and Record Management with Natural Language Processing

Meghana Devineni, Zheng Yu Wong, Albert Nguyen, and London Bielicke
Faculty Sponsor: Sean Kugele, Department of Computer Science

ReadFx is a customizable reader and notes chrome extension. The primary goal of ReadFx is to improve the readability of text from webpages using Large Language Models to parse text because past research shows that certain spacing, coloring, and grouping techniques make text more digestible for readers. The Chrome extension will form comprehensive notes and aid understanding by organizing notes into chunks based on the theme of sentences, highlighting key words, and summarizing text. User's have the option to toggle text parsing in the browser and customize spacing and coloring of text. Our team utilized chrome extension developer APIs, large language models in python, Flask API framework, Google cloud hosting, and HTML/CSS/JavaScript for front end development.

SOCIAL SCIENCES ORAL SESSIONS

Humanities / Politics and Law
2:00 – 3:40 pm
FJ-B
Moderator: Merritt Shemwell

3:00 – 3:20 The Duty of the Armed Citizen
Nathan Mobley
Faculty Sponsor: Michael Nelson, Department of Politics and Law
The Second Amendment is a guarantee in the federal Constitution that the natural right of the people to keep and bear arms shall not be infringed. American political philosophy drew upon the tradition of the armed citizen, developed over centuries by the contributions of civic republicans, classical liberals, and Enlightenment philosophers. Americans viewed the militia not only as a necessary component to the security of a free state, but as the whole body of the people. The Second Amendment, thus, was not intended to protect the right of militias to keep and bear arms; the Second Amendment reflects the Founding Fathers' belief in a natural right to change or abolish government destructive to the life, liberty, and property of the people, inherent in which is the duty of armed resistance by citizen-warriors, both most essential and effective to the security of a free state.

Economics I
2:00 – 3:00 pm
Buckman 200
Moderator: John LeMaster

2:00 – 2:15 What factors contribute to future fantasy football production?
Robert Andriole
Faculty Sponsor: Courtney Collins, Department of Economics
Fantasy football is a highly popular, strategic, online game that millions play every year. It is inherent to winning that participants draft the best possible NFL players to their teams. In this paper, I analyze the effects of various statistics from both college and the NFL Combine to determine which statistics are the best predictors of future fantasy football success. By regressing future fantasy production on a wide range of variables, I create models which can be used to accurately predict which players will succeed in fantasy football. The models indicate that the amount of years played in the NFL and the round in which a player was drafted are both great indicators of future fantasy football success, among multiple other variables from college, the NFL Combine, and the NFL.

2:15 – 2:30 How does state government liquor store operation affect liquor price?
Ian Ogilvie
Faculty Sponsor: Courtney Collins, Department of Economics
Liquor market regulation and price control is an important economic and public health policy area. Many states monopolize liquor wholesale to regulate the liquor market. Among these states, many also directly operate liquor stores. How does liquor store operation affect liquor prices in

states that monopolize liquor wholesale? Using an original dataset, I employ OLS regression analysis to investigate this question.

2:30 – 2:45 How Does Gender Composition and Racial Diversity of a Classroom Affect Educational
Caroline Calogero
Faculty Sponsor: Courtney Collins, Department of Economics
Using the nationally representative sample of U.S. lower school students in the ECLS-K study, I analyze the relationship between the gender composition and racial diversity of the classroom and educational attainment in kindergarten, first, third, and fifth grades. Using OLS regressions and controlling for grade level, school, and teacher, I find that there is a statistically significant and positive relationship between the percent of girls in a classroom and an individual's reading and math scores on the ECLS-K standardized test, which assesses grade level-specific learning objectives. The effect of percent girls on reading scores is greater than the effect on math scores. I conclude that this positive effect can be explained by the gender achievement effect, class behavior effect, and gender atmospheric effect. Percent minority students in the classroom has no effect on academic achievement.

2:45 – 3:00 An Analysis of Flu Shots: the Effects of Education on Influenza Vaccine Hesitancy
Mason Romanak
Faculty Sponsor: Courtney Collins, Department of Economics
This paper examines the effect of educational attainment on influenza vaccine hesitancy in the United States. Using a cross section of National Health Interview Survey annual microdata for the years 2020-2022, I employ OLS regression analysis to determine the predicted likelihood of flu vaccination across eight education categories. This paper seeks to separate the effects of education on vaccine hesitancy and vaccine follow-through, utilizing a number of controls to eliminate barriers to vaccination that prevent respondents from vaccinating when they choose to. Regression results indicate positive and significant effects of educational attainment on flu vaccination rates, suggesting that education reform may be an effective treatment for suboptimal vaccine uptake.

Economics II
3:15 – 4:30 pm
Buckman 200
Moderator: John LeMaster

3:15 – 3:30 The Home Court Advantage: Examining the Drivers and Differences in NBA and College
Wyatt Trammell
Faculty Sponsor: Courtney Collins, Department of Economics
Home court advantage is among one of the most researched aspect of competitive sports. For some fans, supporting their home team is similar to a religious experience, but does their dedication actually lead to a significant advantage at home? Employing attendance and box score data from college and NBA, I hope to highlight and examine the differences in home court advantage at the amateur and professional levels. I use a logit model to analyze the effect of

playing at home on wins. I also employ a fixed effects model to examine the variables add the most significant value to a team's home court advantage.

3:30 – 3:45 The Effect of Juvenile Incarceration on an Individual's Future Economic Outcome: Evidence from the National Longitudinal Survey of Youth
Anna Childers
Faculty Sponsor: Courtney Collins, Department of Economics
Examining the impact of juvenile incarceration on future economic prospects and education, I utilize data from the 1979 cohort of the National Longitudinal Survey of Youth to analyze the relationship between time spent in juvenile correctional facilities and economic outcomes. The study indicates a negative relationship between juvenile correction and income, while highlighting a more substantial impact of sentences in adult correctional facilities on earnings. I further reveal that juvenile correction is linked to a decrease in education, and religious affiliation is associated with improved educational attainment. Additionally, the study illustrates workforce disparities for women and people of color, underscoring the importance of specific interventions for those in the juvenile justice system. Further investigation into the long-term effects of juvenile correction and the potential impacts of interactions with gender and race is warranted.
3:45 – 4:00 Measuring the Effects of the Pitch Clock on Major League Baseball Pitchers of Varying Sizes
Jack Raymark
Faculty Sponsor: Courtney Collins, Department of Economics
The pitch clock affects the rate at which pitchers must operate, and can affect their performance as a result. This study specifically explores the impact of the pitch clock on larger pitchers (BMI ≥ 30) to determine if they are more affected by the faster pace of play than other pitchers. I construct a difference in differences model and regress with respect to 8 dependent variables (IP, ERA, WHIP, H9, BB9, SO9, HR9, SOBB) and find significant results for only the IP regressions. I conclude that larger pitchers chose to pitch with high intensity and sacrifice their in-game longevity as a result. There are other implications of the pitch clock that should become evident as data becomes more available. Pitchers and organizations should benefit both in terms of health and efficiency as a result of further research.

4:00 – 4:15 How Does Crime Affect Voting Behavior?
Isabelle Freireich
Faculty Sponsor: Courtney Collins, Department of Economics
Crime is consistently among the top non-economic voting issues in the United States. While crime is a well-documented voting issue in gubernatorial elections, how does the crime rate precisely affect presidential elections? Drawing on data from MIT's Election Lab, the Uniform Crime Reporting database, and the U.S. Census Bureau, I examine patterns of voting between the presidential elections of 2000 and 2016. I use a pooled OLS and a fixed effects model to estimate the effect of crime on the percent of ballots cast for the Republican candidate in their respective election. Results show a statistically significant impact of violent crimes when controlling for county and state level fixed effects.

4:15 – 4:30 A Patrician's Ranking: Value-Added Analysis of U.S. Law Schools
Ravan Hawrami
Faculty Sponsor: Courtney Collins, Department of Economics
The Goliath (U.S. News & World Report) has domineered far too long; he has subjected the Israelites (neurotic prospective law students and their parents) not only to his being, but to his ideas (USN&WR Law Schools Ranking): far too long I must repeat. But no more! King Saul has found his lodestar in the young David (value-added measure of schools). In this fable, the shepherd boy collects his stones (American Bar Association Required School Disclosures), aims (regression and residual analysis), and fires. Will David conquer the Goliath? We shall see.

POSTER SESSION #1

Multi-Sports Forum, Bryan Campus Life Center
1:00 – 2:30 pm
Poster numbers are listed with the title

#1 Gene Expression at Interior Centromeric Repeats in Fission Yeast
Hanna Bengten, Romi Klein, and Bayly Wheeler
Faculty Sponsor: Bayly Wheeler, Department of Biology
The centromere of a chromosome is essential for the proper partitioning of DNA during cell division. In the fission yeast Schizosaccharomyces pombe, centromeres are made up of repetitive DNA sequences. These repeats are packaged into heterochromatin, a condensed form of chromatin that silences gene expression and is essential for proper centromere function. Interestingly, the extent of heterochromatin varies among individual repeats, despite their high sequence identity; peripheral repeats have high levels of heterochromatin, and genes embedded within them are silenced, while inner repeats have lower levels of heterochromatin and genes embedded within them have modest levels of gene expression. The goal of our work is to determine whether gene expression within inner repeats is a binary on-off phenomenon or whether individual cells adopt an intermediate level of gene expression. To distinguish between these two possibilities, we will insert ade6+ and fluorescent reporter genes in the peripheral repeats and measure their gene expression. The expression of these genes can be resolved visually, at the level of the colony or individual cells, which will allow us to determine whether there are cell-to-cell differences in gene expression at the centromere.

#2 Optimizing Course Registration at Rhodes College: A Data-Driven Approach
Ashleigh Edwards, Sanaa Singleton, and Tailyn Tipler
Faculty Sponsor: Catie Welsh, Department of Computer Science
At Rhodes College, course registration is a challenging problem for students, faculty, and staff. Due to Rhodes' small class size, anticipating demand for courses is an issue that students must consider when creating their ideal schedule and faculty/staff must consider when building the course schedule. Currently, Rhodes provides documents that enumerate information about all courses offered in a given semester, course demand separated by class year, and the number of students in each class that were able to successfully enroll in those courses in previous semesters. This information is currently in multiple places and various formats making it difficult to utilize. We combined multiple datasets from previous semesters, and will build a model to classify course offerings as high or low demand based on availability, class rankings, pre-registration numbers, and other attributes. By parsing the trends in this data set, we will produce a set of guidelines to help students plan which classes to strategically place on their ideal and backup schedules on Workday. Our model will also aid department and program chairs when building course schedules in upcoming semesters.

#3 Impact of the Global Pandemic on Stock Market Performance
Brayden Lauletta, Billy Manishimwe, and Dinmukhammed Zhanbyrshy
Faculty Sponsor: Catie Welsh, Department of Computer Science
The COVID-19 pandemic has triggered unprecedented volatility in global financial markets, necessitating a deeper understanding of its impact. It is clear that the pandemic has resulted in

drastic implications that ultimately affect our interpretation and analysis of the global financial market today. This study examines how the pandemic has influenced the stock market performance using a dataset spanning 2020-2024. By selecting this time frame, we are able to completely encompass the time before, during, and after the pandemic. Our focus lies in understanding how the COVID-19 pandemic has affected economic indicators, stock prices and volatility, revealing insights crucial for investors, stakeholders and policymakers. Methodologically, we will employ various classification and model creation techniques on stock price and volume data. Through this approach, we aim to uncover correlations or trends that can shed light on the effects of epidemics on the market.

#4 Analyzing NFL Game Data: Drawing Conclusions for Strategic Betting Decisions
Hugo Baroody, Luc Benoist, and Evan Holland
Faculty Sponsor: Catie Welsh, Department of Computer Science
The National Football League is the most lucrative professional sports league in the United States with a combined net worth of $163 billion. Las Vegas has provided betting options for every game since the NFL and AFL merger in 1966. The persisting lines are the point spread for each individual team, and the expected sum of points scored by both teams. We want to examine if there are any extenuating circumstances and patterns in data that could give a bettor even the slightest edge when picking where to place their money. Due to this being a lucrative endeavor, this problem has been studied extensively. However, we believe that by using more information surrounding these games such as location, time of day, and weather, we might be able to expand on conclusions drawn in the past. It is possible there is no edge to be had, but nevertheless, we are confident that interesting and new conclusions surrounding such a popular sport and industry can be found.

#5 A theorem prover that can talk about itself
Ryan Kennelly
Faculty Sponsor: Matthew Superdock, Department of Computer Science
A theorem prover is a tool that allows the user to write code, and prove properties of that code. For instance, one could create a language within a theorem prover, and prove that some programs in that language don't crash. However this is challenging, even in most modern theorem provers. In this work, we created a theorem prover that is better suited to this task, which we demonstrated by implementing it within itself. We posit that this means it is a good system in which to define and prove properties of programming languages.

#6 Classification Models for COVID-19 prediction
Ryan Kennelly, Mai Tran Quoc Trung, and Cole Kennedy
Faculty Sponsor: Catie Welsh, Department of Computer Science
Fast and accurate diagnosis of easily transmitted diseases such as COVID-19 is important for identifying and treating patients as early as possible. We aim to study the effectiveness of various classification models for disease prediction, by using a COVID-19 dataset from the World Health Organization. Given symptoms, the classification models will be tasked with predicting if a patient has COVID-19 or not. Models will be compared based on their accuracy, precision, recall, and other performance metrics. We will discuss the trade-offs of each model and determine if these models present a feasible option for the detection of COVID-19 based on symptoms. If proven effective, classification models can be used as a secondary way of

diagnosing patients when hospitals are at risk of overcrowding or to save non-affected individuals time and money by checking their symptoms at home.

(F) #7 The Effects of Body Length on Swimming Patterns in Endler's Guppies, Poecilia wingei
Yihan Li and Kelly Diamond
Faculty Sponsor: Kelly Diamond, Department of Biology
Swimming is essential for the survival and reproduction of teleost fishes. Swimming patterns can be influenced by multiple factors, including health status, social status, size, age, environment, or the personality of an individual. In many sexually dimorphic species faster swimming ability and body size has been associated with increased matting success. In this study we quantified how body length of Endler's guppies affects undisturbed swimming patterns. Fish were filmed individually in an undisturbed, open environment and tracked fish position using machine learning tools (DeepLabCut). From the position data, we measured peak velocity, frequency of burst swimming, overall distance traveled, maximum acceleration, frequency of acceleration, and percentage of active swimming. We then tested how each metric varied with fish body length. Our data shows that smaller guppies spent a higher percentage of time swimming and accelerated more frequently compared to larger guppies. This may be due to that it is more energetically costly for larger guppies to swim and thus they perform less active swimming in situations where swimming is unnecessary. Moving forward we plan to examine mate choice preferences in this taxa to see how swimming patterns may relate to mate choice.

#8 Exploring Memphis Youth Crime Statistics Through Data Mining
Amirah Bauder, Yihan Li, and Son Nguyen
Faculty Sponsor: Catie Welsh, Department of Computer Science
Juvenile crime is an important issue in the United States, and particularly in cities like Memphis. In 2022 alone, Memphis witnessed 7,351 crime incidents involving individuals under eighteen. Studying juvenile crime patterns and their local contributing factors is crucial for designing an effective juvenile justice system and creating preventative strategies that address the unique needs of developing young individuals. Our goal is to find possible areas of improvement in the local youth justice system that enable positive influences on the life trajectory of the individuals involved. To accomplish this goal, we will apply classification algorithms to the past five years of juvenile crime data acquired from the Juvenile Court of Memphis & Shelby County. We will build models to predict the impact of legal representation on conviction rates, compare previously identified geographic and social factors related to juvenile crime to patterns in the Memphis and Shelby County area, and determine the relationship between different dispositions and likelihood of reoffending. We aim to provide local evidence-based guidance for intervention strategies and policy decisions, improve the rehabilitation and reeducation programs, and foster an effective and equitable approach to juvenile crime situations in the Memphis and Shelby County area.

#9 Promoting Equitable Development: Identifying the Relative State of Memphis Neighborhoods
Eddie Puebla, Crosby McMahon, and Evan DeVine
Faculty Sponsor: Catie Welsh, Department of Computer Science
Memphis, a city with a rich yet complex history, grapples with longstanding infrastructural deficiencies. These issues are deeply rooted in systemic racist practices that were exacerbated through zoning practices like redlining and racial covenants in the 1930s. Even after the Fair

Housing Act of 1968, the ramifications of these practices perpetuate racially segregated and neglected neighborhoods. Despite the pressing need for assistance, the city government's lack of support exacerbates the challenges of infrastructural weaknesses as well as community engagement. This paper proposes a comprehensive analysis utilizing the Memphis Open 311 database to gain insight into neighborhood conditions. Despite limitations in data categorization, including duplicates and missing values, we leverage service request data to identify clusters of specific issues, illuminating areas with pronounced infrastructural challenges and systemic inequities. Through this analysis, we seek to foster increased community engagement and government involvement, particularly in marginalized communities struggling with inadequate infrastructure and historical neglect. This research aims not only to enhance the understanding of community issues labeled by the 311 data set but also to advocate for tangible interventions to address systemic issues and promote equitable development.

#10 The role of magnesium and manganese transporters in Salmonella Typhimurium during nitric oxide stress

Hai Nguyen and Taylor Albrecht
Faculty Sponsor: Elaine Frawley, Department of Biology

Salmonella is a Gram-negative bacterium that causes diarrheal disease. Mammalian immune cells produce nitric oxide (NO) to defend against bacterial infection, but the mechanisms of NO action are not fully known. Salmonella imports manganese in response to nitrosative stress but later in recovery, efflux also occurs. We used growth assays to determine that Salmonella lacking manganese efflux transporters is no more sensitive to NO than wild-type Salmonella. We also observed that magnesium, an essential cofactor of proteins involved in replication, translation, and metabolism, is initially exported by Salmonella in response to NO but later recovers to baseline levels, suggesting that that Salmonella may need to alter magnesium transport in response to NO stress. We first generated deletion mutants for all possible magnesium transporters and used growth assays to determine which transporters control magnesium homeostasis in Salmonella. We then used growth assays to study whether magnesium transport is required for resistance to NO stress. Finally, we are using combination mutants lacking both magnesium import activity and manganese export activity to explore the idea that Salmonella might require a different ratio of manganese to magnesium under NO stress compared to non-stress growth conditions.

#11 Continued preference for reversed images of self

Jessica Huang, Jordan Suchow, and Jason Haberman
Faculty Sponsor: Jason Haberman, Department of Psychology

Our facial perception is shaped by mirrors and photographs; however, our interaction varies with each medium. Previously (2017), we reported a strong preference for one's mirror reflection, likely mediated by greater exposure to oneself in the mirror. With the surge of social media and prolonged online interactions through platforms like Zoom, it's plausible that people now encounter more non-reversed depictions of themselves. Such exposure might mitigate effects previously observed. We replicated our original methods six years after original data collection. Participants viewed reversed and non-reversed photographs of themselves and adapted (or not) to each in a 2 x 2 design: 1) reversed; 2) non-reversed; 3) adapt to reversed for 45 seconds and judge non-reversed; 4) adapt to the non-reversed image for 45 seconds then judge reversed image. Photographs of participants were taken just before the experiment. Participants rated

likeness and preference for each image, either reversed or non-reversed. Our original results replicated — participants still preferred their mirror-reversed selves over their non-reversal. Preferences significantly declined when judging non-reversal after adaptation to their mirror reflection. Despite the potential increase in familiarity with one's non-reversed self, due to digital exposure, our results indicate no substantial change in self-representation.

(F) #12 Caregiver perspectives on the feasibility and acceptability of nonsedated MRI in children treated for cancer: a survey to inform intervention

Riley Damiano, Anna Shelley, Sid Desai, Nik Vassev, Heather M. Conklin, and Lisa M. Jacola

Faculty Sponsor: Jason Haberman, Department of Psychology

Treatment for childhood cancer often includes MRI scans, many of which are completed with sedation. General anesthesia is a unique risk factor for neurocognitive late effects in childhood cancer survivors (CCS). Parents of 75 CCS completed an online survey to inform planning for a virtual reality (VR) intervention to promote non-sedated MRI. We compared responses between groups with and without prior sedated MRI experience (sedated MRI-yes, n=59; sedated MRI-no, n=16). Compared to the sedated MRI-yes group, the sedated MRI-no group was older at diagnosis (Mean[SD], 5.86[4.89], 12.31[3.46], p<.001) and survey (12.97[6.40], 17.56[4.32], p=.008). Most parents strongly endorsed the need for intervention to promote nonsedated scanning (sedated MRI-yes, 76.3%; no, 81.3%) and conveyed high interest in a VR-based intervention modality (sedated MRI-yes, 67.2%, no, 46.7%), with no significant differences based on sedation group (p=1.000, p=.229). The most frequently rated concern was excessive movement for the sedated MRI-yes group (74.6%) and small space (size of bore) in the sedated MRI-no group (40.0%). Interventions to promote nonsedated MRI scanning are perceived as important by parents of childhood cancer survivors. Specific targets for intervention may vary based on prior sedated MRI experience.

#13 Decoding Molecular Interactions: Facilitating the Design of Therapies for Autoimmune Disorders, Cancer, and Viral Infections

Zeid T. Mustafa and Shana V. Stoddard

Faculty Sponsor: Shana V. Stoddard, Department of Chemistry

Autoimmune disorders, cancers, and viral infections pose significant health challenges globally, requiring effective therapeutic interventions. Current treatments often involve broad immunosuppressants, which can compromise the body's ability to fight off infections. Consequently, there is a growing need for targeted therapies that minimize side effects and maximize efficacy. This project aims to develop an antigen-specific approach for these conditions, utilizing protein-based strategies to prevent harmful interactions. By targeting key epitope sites, identified through computational modeling, and employing mutagenesis techniques, we seek to design molecules capable of disrupting disease-related processes without compromising overall immune function. Ongoing efforts focus on protein expression, purification, and subsequent evaluation of binding capabilities through assays. Successful development of antigen-specific molecules holds promise for advancing safer and more precise treatments across a spectrum of autoimmune, cancerous, and viral conditions, potentially revolutionizing therapeutic approaches in these areas.

(F) #14 Epilepsy Surgery Clinical and Imaging Characteristics in Tuberous Sclerosis Complex
Elizabeth Savard, Sarah Weatherspoon, and Tracee Ridley-Pryor
Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology
Tuberous Sclerosis Complex (TSC) is an autosomal dominant neurocutaneous disorder that impacts multiple organ systems including the brain, heart, kidneys, skin, lungs and eyes. Patients with neurological manifestations of TSC commonly have central nervous system complications including epilepsy in 80-90% of patients. One-third of patients with TSC develop a form of epilepsy known as infantile spasms (IS), and a majority of patients who develop IS develop other types of seizures, commonly focal. Two-thirds of this population will fail to achieve seizure control with medication, developing intractable epilepsy. Epilepsy surgery is a method of treating intractable epilepsy through resection of brain tissue identified as the seizure onset zone. This study, ongoing at Le Bonheur Children's Hospital, utilizes a retrospective chart of patients with TSC who underwent epilepsy surgery for treatment. A total of twenty patients were identified and met inclusion criteria undergoing a total of twenty-seven surgeries including laser ablation and focal resections. Frequency of seizures was measured post operatively at six and twelve months according to Engel Class Outcomes I-IV. Results of this study will be used to understand brain networks underlying seizure generation, investigate pharmacologic anti-seizure treatments, and examine post-surgical seizure outcomes amongst patients diagnosed with epilepsy and TSC.

(F) #15 Hematopoietic Stem Cells from Mice with Sickle Cell Disease and Beta-Thalassemia Display Senescence
Jana Elabiad and Aditya Barve
Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology
Sickle cell disease (SCD) is an inherited anemia caused by mutations in the β-globin gene, resulting in aberrant hemoglobin polymerization driving hemolysis, vasooclusion, and systemic inflammation. Similarly, β-Thalassemia is a hemolytic anemia caused by multiple possible mutations in the HBB gene, resulting in concentrated hemolysis in the bone niche, vasooclusion, and ROS. In the analysis of SCD HSPCs, we saw a loss of histone and ribosome biogenesis and an increase in β-galactosidase, both hallmarks of senescence. With this in mind, we wanted to analyze hematopoietic stem cell phenotypes of senescence in another hemolytic pathology. With the lack of senescent driver, systemic inflammation, we hope to watch HSC frequency, among others, in β- Thal positive 2-month-old mice, and in β- Thal 6-month-old positive mice. So far, HSCs were isolated from β- Thal+ 2-month-old mice with age-matched controls were interrogated for senescence associated with β-galactosidase activity, HSC frequency, CFU's, transcriptome analysis and more. From these assays, we saw an increase in MPP3 and MPP4 frequency in the β- Thal+ 2-month-old mice compared to its age-matched controls. From here, we will run the same assays on β- Thal + 6-month-old mice, and our data may reveal previously unappreciated senescence phenotypes.

(F) #16 Determining the Hematopoietic Role of Various UBTF Isoforms in HSC Fitness.
Grant Burks, Melvin E. Thomas III, and Jeffery M. Klco
Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology
Acute Myeloid Leukemia (AML) is characterized by an increase in the proliferation of immature blast cells. UBTF is a gene essential to ribosomal RNA transcription and has been recently identified to have tandem duplications (TD) in pediatric AML. UBTF-TDs found in AML are

associated with poor patient prognosis. Alterations that encode tandem duplication of UBTF have been observed frequently in recent studies and show resistance to chemotherapies and promote leukemogenesis; however, the role of wild-type UBTF in hematopoiesis and leukemogenesis has been poorly explored. To this aim, we are currently exploring the role of the two main isoforms of UBTF in mice (Ubtf1 and Ubtf2) using a conditional Ubtf knockout (KO) mouse crossed with UBC-cre/ERT2. We will express each isoform individually in hematopoietic stem cells (HSCs) isolated from the BM of these mice and perform CFU assays to determine hematopoietic changes after knocking out the WT locus. New insight into the role of UBTF isoforms could provide innovative therapeutic approaches for better targeting AML in patients.

(F) #17 Increasing Anti-seizure Medication Serum Levels Obtained in the LeBonheur Children's Hospital Emergency Department through Quality Improvement

Hayden Hornsby, Brittani Ireland, Andrew Schroeder, and Tracee Ridley-Pryor
Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

Anti-seizure medication (ASM) serum levels have been regarded as a promising tool in the monitoring of patient drug levels, assessing medication compliance, and guiding treatment plans. Pharmacokinetics are variable in the pediatric population; thus, drug monitoring can be helpful in guiding medication management. The objective of this quality improvement project is to increase the number of epilepsy patients who have ASM serum levels obtained in the LeBonheur Children's Hospital Emergency Department by 20 percent by March 2024. A retrospective data extraction was performed to identify patients with epilepsy who presented to the ED. It was determined if patients were prescribed an ASM and if ASM serum levels were obtained. The Emergency Department was then provided a written flier asking to obtain ASM levels on all patients who present to the ED who are on seizure medications. Education was also provided verbally to ED attendings, fellows, and residents. After six months, the data was extracted again for evaluation. We intend to increase the number of patients who have levels drawn by 20 percent to allow for more timely adjustments in medication, detection of noncompliance, and decreased lab draws in children with epilepsy.

(F) #18 Constructing UBQ::H2B-RFP and UBQ::sfGFP transgenes to tag Arabidopsis protoplasts for rapid screening

Emerson Kleis and Jonathan Fitz Gerald
Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

In agriculture, a significant aspect to plant growth is seed size, a characteristic which is largely determined by the development of the seed endosperm. The seed endosperm, however, is subject to parental genomic imprinting and other epigenetic modes of regulating gene expression. Using natural variants in seed size, we have identified several candidate genes that may play a role in endosperm gene regulation. Unfortunately, the time investment in creating plant transgenic lines (typically about one year) makes it difficult to screen candidates. Utilizing Arabidopsis as a model organism, we are developing a cell culture protocol by which to study our candidate genes. Using seedlings germinated in callus inducing media, we have successfully transformed cultured plant cells and seen related phenotypes in as little as three days. We have completed construction of GFP and RFP cell markers using the GoldenBraid cloning system and are currently testing these markers for their use in fluorescence activated cell sorting. If successful, these constructs will enable us to introduce overexpression constructs of candidate

transcriptional regulators into plant culture to determine their role in gene expression and chromatin maintenance.

(F) #19 Okapis (Okapia johnstoni) display foraging preferences in captivity
Hanna Stuart and Sarah Boyle
Faculty Sponsor: Kelly Diamond, Department of Biology
Okapis (Okapia johnstoni) are endangered ungulates native to the Ituri Rainforest in the Democratic Republic of the Congo. Since the early 1900s, okapi populations have declined from anthropogenic activities, namely deforestation. As a result, little is known about their foraging ecology in the wild and in captivity. To better understand okapi behavior and ecology, this study investigated whether okapis display foraging preferences in captivity. We hypothesized that okapis exhibit foraging preferences, and we predicted that okapis would forage browse more frequently than hay or Mazuri ADF 16 Herbivore Diet (hereafter referred to as grain). At the Memphis Zoo, scan sampling at two-minute intervals was used to record two okapis' foraging behaviors. From May to November 2023, 76 hours of data were collected. Overall, we found a difference between the percentage of behavioral scans that the two okapis foraged browse (70.78% and 77.06%), hay (68.00% and 80.26%), and grain (25.29% and 16.11%) when each food source was available. Both okapis foraged browse and hay more frequently than grain. These results indicate that captive okapis exhibit foraging preferences towards different diet sources. The findings from this study can inform husbandry practices and diet preparation for okapis in captivity.

(F) #20 African elephant (Loxodonta africana) spatial patterns in captivity
Hanna Stuart, Luke Antesberger, Anna Atkins, and Sarah Boyle
Faculty Sponsor: Kelly Diamond, Department of Biology
Behavioral and social interactions between animals in the wild result in varying spatial patterns between conspecifics. Specifically, African elephants (Loxodonta africana) form complex social relationships that drive their spatial preferences as individuals with social bonds typically spend more time in close proximity. However, in captivity, other factors such as husbandry routines and animals' histories can also influence social bonds and spatial patterns. Therefore, we hypothesized that captive African elephants exhibit spatial preferences near conspecifics. Using scan sampling at two-minute intervals, we recorded both the behavior and location of the five elephants at the Memphis Zoo – Kosti, Asali, Gina, Bambi, and Daisy. We collected 62 hours of behavioral and spatial data from the spring through fall of 2023, and we used ArcGIS and R Studio to analyze spatial data when all elephants were outdoors and had access to each other. These findings can help influence husbandry routines and elephant pairings in captivity.

(F) #21 The Effects of Age on Exploratory Behavior in Endler's Guppies (poecilia wingei)
Sarah Heckmann and Kelly Diamond
Faculty Sponsor: Kelly Diamond, Department of Biology
The Effects of Age on Exploratory Behavior in Endler's Guppies (poecilia wingei) Natural Science Poster Exploratory behavior can increase the probability of survival in animals, especially in complex habitats, by increasing an individual's spatial awareness of the environment. This spatial awareness is especially important for small animals, like Endler's guppies (Poecilia wingei), because they can use spatial information to avoid predators, increasing their odds of survival in the wild. The goal of this study was to examine how exploratory

behaviors vary by habitat complexity and by age in a species of freshwater fish. We used machine learning (DeepLabCut) to track the position of 12 adult and 12 juvenile fish in both complex and open artificial habitats and compared movement behaviors between treatments. Preliminary results suggest that juveniles move longer distances but occupy a smaller area, compared to adults, regardless of habitat complexity. This indicates that adults are more exploratory, but juveniles are more active. However, adults were more exploratory in the open control environment, indicating that they could be more timid in a complex environment. This heightened exploratory behavior could suggest that adults may be better suited to survive in the wild but only in open environments because they are more spatially aware and better prepared to avoid predators.

#22 3D Modeling Protocol for Analysis of Canine Skull Morphology: A Standardized Approach Using 3D Slice

Stella Venn and Sophia Kessler
Faculty Sponsor: Kelly Diamond, Department of Biology

Recent advancements in imaging technology have revolutionized access to anatomical data. However, these imaging techniques result in data files composed of hundreds of individual images that require signficant malipulation. We developed a comprehensive protocol for 3D modeling skulls using 3D Slicer software that addresses these challenges and outlines a standardized methodology to create a streamlined data collection process. To demonstrate this protocol, we are comparing skull shapes between dog breeds (Canis lupus familiarise). The protocol begins with the conversion of raw data files into Non-Negative Rigidity Decomposition (NNRD) files. This enables data to be consolidated into a single file, optimizing memory usage. Using the SlicerMorph plugin of 3D Slicer, consistent methodology is used to create 3D segmentations of the individual CT scans. This process includes using thresholding techniques to accurately depict bone structures, remove artifacts, and combine fragmented sections of skull images into single 3D segmentations. Lastly, the protocol converts the segmentations into a Polygon Mess File (PLY) format. This file type allows for comparative analysis of the models to be done in a 3D format. By standardizing the process from raw data conversion to final model generation, this protocol enables digital comparative data analysis of canine skull morphology.

#23 Data Mining to find Dangerous Attributes of Driving

Will Falk, Will Foster, and Jack Morin
Faculty Sponsor: Catie Welsh, Department of Computer Science

On average, there are over 6 million passenger car accidents in the U.S. resulting in over 35,000 fatalities each year. To determine the attributes such as drivers, vehicles, and road conditions that are most influential in car accidents, we will combine several datasets containing car collision information from various cities with car sales data. After cleaning the data, we will cluster it to find major (and hopefully controllable) attributes that are strongly correlated with vehicle accidents. The information gained from this study will provide insight into the most dangerous aspects of driving, which can be used to develop preventative measures such as future road maintenance and safe driving practices. Additionally, our models will provide consumers with information about which makes and styles of cars are more likely to be in a collision. This knowledge could be employed to save lives and protect drivers from injuries, particularly drivers who are more prone to be involved in accidents, such as new drivers.

#24 ß-Subunit Expression Profiles Along the Longitudinal Hippocampal Axis in Kainate Injected Rats

Sam Amsden, Lilly Gillespie, Cate Barclay, Calliope Reeves, and Suzanne Baxter
Faculty Sponsor: Kelly Dougherty, Department of Biology

Temporal Lobe Epilepsy (TLE) is a prevalent neurological disorder that originates in the hippocampus, but aspects of its pathophysiology remain uncertain. Along the longitudinal hippocampal axis, neurons in the dorsal (DHC) and ventral (VHC) hippocampus have distinct electrophysiological properties. Crucial for the propagation of action potentials, voltage-gated sodium channels consist of auxiliary α and β-subunits that modulate the gating of the ion channel pore. The β4 subunit contributes to the resurgent sodium current, allowing the neuron to maintain high-frequency firing. However, the role of the β4-subunit in the neuronal firing phenotype of epileptic seizures in TLE is unknown. By analyzing β4-subunit expression across the longitudinal axis of the rat hippocampus, we might gain insight into the intrinsic excitability mechanisms of TLE. Using a western blot analysis, we found that the β4-subunit exhibits greater expression in the DHC, whereas β2, an alternative subunit to β4, maintains a more consistent expression profile. The initial observations of the β4-subunit suggest a biochemical distinction between cells in the DHC and VHC that may contribute to differences in neuronal firing activity and anti-epileptic drug interactions. Our forthcoming research aims to investigate β-subunit expression in epileptic hippocampal tissue to compare differences in our current samples.

#25 Microglial activation patterns along the longitudinal axis in the CA1 region of the hippocampus in kainate acid injected rats

Pascale Foreman, Tyler Smith, Sophia McGeehan, and Estelle Godeaux
Faculty Sponsor: Kelly Dougherty, Department of Biology

Microglia are the primary macrophages in the central nervous system, which undergo an activation process in response to pathological conditions. Temporal lobe epilepsy (TLE) is one such condition, characterized by severe neuron loss and neuroinflammation in the hippocampus, with distinct variability along the longitudinal axis. The role of microglia in the pathogenesis of TLE is not well understood, prompting our investigation into their activation patterns along the longitudinal hippocampal axis. We use a rat model of TLE induced by kainate acid and fluorescence microscopy to visualize Iba-1 labeled microglia in fixed hippocampal brain sections. We analyze microglial density and morphology in the CA1 region of the hippocampus comparing process number and length, and soma size between the dorsal and ventral hippocampi. Our study has revealed no significant changes in microglial density in the hippocampi of naïve animals, however an initial kainate injected animal shows changes in microglia density as well as morphological changes consistent with microlial activation, encouraging furthing exploration. We hypothesize an increase in microglial density in the dorsal hippocampus as well as morphological changes consistent with microglial activation in experimental animals. Our future research aims to identify the pathogenic mechanisms of TLE through microglial activation.

#26 Increasing Hydrophilicity in Gram-negative Antibacterial Compounds to Circumvent TolC-mediated Efflux

Maria F. Alvaro, Trinity Liaw, Gabriella A. Krisanic, Jacob D. Greenberg, Emma J. Chow, Eleanor A. Fontana, Campbell A. Brown, Elaine Frawley, and Larryn Peterson
Faculty Sponsor: Larryn Peterson, Department of Chemistry

The treatment of infections caused by highly resistant Gram-negative bacteria poses an increasingly concerning challenge, particularly as some strains have developed complete resistance to all clinically available antibiotics. Unfortunately, the progress in developing new compounds with broad-spectrum antibacterial properties has significantly decreased. Previously, certain propargylglycine-based compounds with a biphenyl tail were synthesized to target LpxC and demonstrate antibacterial activity against Escherichia coli. However, this activity was observed only in mutants in which TolC-mediated efflux mechanisms were disabled. To address this limitation and reduce the likelihood of efflux, several analogs have been designed with enhanced hydrophilicity. This alteration is expected to not only mitigate efflux but also potentially enhance the binding affinity of these compounds to the polar region of the LpxC active site, which these compounds aim to inhibit. Consequently, we have successfully synthesized a series of novel compounds, each possessing distinct polar side chains and various hydrophobic tails. Molecular docking techniques were employed to assess their binding affinity within the LpxC active site, determining docking scores and identifying crucial interactions. In this study, we describe the synthesis of these promising antibacterial agents and present the results of bacterial growth experiments.

#27 Examining the impact of HDAC1 silencing on aging and muscle function in Drosophila Melanogaster

Anna Perry and Liam Hunt
Faculty Sponsor: Liam Hunt, Department of Biology

Epigenetic regulation, particularly through histone modifications, is known to play a crucial role in aging. Histone deacetylase 1 (HDAC1) is a key enzyme involved in chromatin remodeling and gene expression regulation. While the influence of HDAC1 on aging has been recognized, its effects on muscle function during the aging process remain unclear. In this study, we aim to find the impact of HDAC1 gene silencing on aging and muscle function in Drosophila melanogaster, which have been manipulated to express double-stranded RNA (dsRNA) for RNA interference (RNAi) targeting HDAC1 in adult muscle cells. We measure the survival and muscle function of these fly variants longitudinally. Survival is assessed by monitoring the lifespan of the flies, and muscle function is assessed using locomotion assays to track the flies' level of mobility throughout the aging process. We will confirm the efficacy of HDAC1 gene silencing using PCR analysis to assess the downregulation of HDAC1 expression in the manipulated fly variants. Anticipated results of this study include insights into the role of HDAC1 in regulating aging and muscle function in Drosophila. Our findings will contribute to the growing body of knowledge on epigenetic regulation and its impact on aging and age-related diseases.

#28 Does MHC-GAL4 induced muscle-specific lamin loss decrease the lifespan and muscle function of adult Drosophila melanogaster?

Evan Reeder and Liam Hunt
Faculty Sponsor: Liam Hunt, Department of Biology

Lamins are proteins associated with the nuclear membrane and chromatin, binding with both to support the structural integrity of the nucleus and regulate gene expression respectively. Loss of function and overexpression of lamins are associated with laminopathies characterized by rapid aging symptoms such as decreased muscle function. Through lamin gene silencing in male fruit flies, we hope to better understand how lamin function is related to muscle function. Because both loss and gain of lamin function developmentally result in lethality, it is important that we induce lamin silencing in adult muscles only. For this, an adult muscle-targeted GAL4 driver is used to trigger an upstream activation sequence (UAS) linked to an RNAi that silences lamin expression. If the lifespan and/or muscle function of these flies is decreased by lamin loss, then this experiment will be a model to examine lamin function in muscle. Preliminary results from a quantitative polymerase chain reaction (qPCR) confirm the effective silencing of lamin transcripts while the investigation of lifespan and muscle function is ongoing. This method shows promising results to explore lamin's regulation of gene expression through modification of chromatin structure as we continue in our analysis.

#29 Investigating Epigenetic Modifiers that regulate muscle development in Drosophila Melanogaster

Hallie Schiff and Liam Hunt
Faculty Sponsor: Liam Hunt, Department of Biology

In order to maintain function of skeletal muscle cells during development and in adult cells, genes need to be expressed at exact timing in an exact pattern in Drosophila Melanogaster (fruit flies). Epigenetic modifiers regulate gene expression through processes like acetylation or deacetylation of histones that can influence gene transcription. HATs, histone acetyl transferases, add an acetyl group to lysine residues on histones, relax chromatin structure and typically promote transcription through this mechanism. Muscle development requires the appropriate pattern of histone acetylation to occur in order for muscle to develop and function properly. How do epigenetic modifiers influence muscle development in flies? We use the GAL4/UAS system in flies to perform RNA interference (RNAi). Mef2-GAL4, a driver that expresses UAS linked transgenes in developing muscle, is used to drive expression of UAS-RNAi to silence a range of genes which are epigenetic modifiers. We qualitatively examine muscle development by inspection of larval morphology and quantitatively determine when gene silencing leads to lethality during development. For example, preliminary results show that HAT1 and Tip60 are necessary for muscle development and silencing precludes adult viability. Using this system, we can identify epigenetic modifiers that are necessary for muscle development.

#30 CRISPR-Cas9 Induced Mutations in Drosophila Melanogaster White Gene and its Influence on Aging and Muscle Function Phenotypes

Keith Adams and Liam Hunt
Faculty Sponsor: Liam Hunt, Department of Biology

In the fruit fly Drosophila Melanogaster, the white gene often serves as an indicator of genetic modifications, resulting in white eye phenotypes when the gene is non-functional compared to the wild-type red eye color when it is functional. Therefore, if any genetic modification has

occurred, for example as a marker of a genomic insertion or rearrangement, we need to know if the corresponding altered eye color phenotype influences other phenotypes studied. CRISPR-Cas9 gene editing was used to produce flies with white gene mutations and analyze aging phenotypes to determine whether manipulations of the white gene influence animal aging. Flies expressing Cas9 were bred with those expressing a guide RNA targeting the white gene. Through breeding and phenotypical assessment, genomic modifications for the white gene were selected, mutants were established and maintained. The nucleotide sequence of the white gene was analyzed by PCR and Sanger Sequencing demonstrating short deletions that could influence eye phenotype. Male flies were separated based on these phenotypes and observed under standard aging conditions to assess lifespan and underwent negative geotaxis assays to evaluate muscle function. These studies demonstrate the feasibility of CRISPR-Cas9 induced mutations and viability of comparing aging phenotypes among flies with variable eye phenotypes.

(F) #31 Differentiation of iARMS cells shows differentiation of P3F-expressing tumor cells
Sashi Mandava. Bradley Stevens, Randolph Larsen, Wood Kimbrough, Matthew Garcia, Jongchan Hwang, Grace Adkins, Jack Hopkins, and Mark Hatley
Faculty Sponsor: Liam Hunt, Department of Biology
Rhabdomyosarcoma (RMS), the most common pediatric soft tissue sarcoma, can be divided into embryonal RMS (ERMS) and alveolar RMS (ARMS). The majority of ARMS tumors harbor chromosomal translocations resulting in the PAX3-FOXO1 (P3F) fusion oncoprotein. Since P3F is the driving mutation of ARMS, we sought to develop a system in which P3F could be targeted. Here, we designed a P3F-FKBP12F36V fusion protein that targets P3F for degradation upon administration of dTAG-13 and dTAGV-1. Using our iPSC system, we show the ability of P3F-FKBP12F36V to generate iARMS-deg cells. We show tumorigenicity of iARMS-deg cells through colony formation and proliferation assays. Interestingly, during our investigations, the iARMS-deg cells seemed to have differentiated. To explore this phenomenon, we tested for the expression of MHC, a muscle cell differentiation marker, and the number of cell fusion events. Using qPCR, we show that expression of MYOG and ACTA1, both muscle cell differentiation markers, increased in differentiated iARMS-deg cells. These results were confirmed with immunoblot. Finally, we show that differentiation of these cells impacts tumorigenicity through a reduction in proliferation and colony formation. Taken together, this data suggests that P3F expressing tumor cells can differentiate, but the mechanism regulating this process remains elusive in these cells.

#32 Histone Acetyltransferases Associated with Muscle-Related Gene Expression and Altered Drosophila Melanogaster Muscle Aging and Ability
Yasmine Pirlepesova, and Liam Hunt
Faculty Sponsor: Liam Hunt, Department of Biology
Histone acetyl transferases (HATs) acetylate lysine residues on histones to alter chromatin structure, resulting in increased DNA transcription. To understand whether HATs influence the regulation of genes relating to muscle function, such as ACT88F and MHC, HAT silencing with the GAL4-UAS system was used. This involved breeding a GAL4 driver line with a UAS interfering RNA line to silence HAT1, Gcn5, and Tip60 specifically in adult muscles of progeny. The results showed that Gcn5 inhibition reduced ACT88F expression, HAT1 inhibition increased both MHC and ACT88F expression, and Tip60 inhibition had no significant effects. Using these results as a baseline, the current experiment investigates the lifespans and climbing ability of

transgenic Drosophila melanogaster. Because HAT1 RNAi flies exhibited increased MHC and ACT88F expression, they are expected to have increased muscle function, which then increases their lifespan and climbing speed. Gcn5 RNAi flies are expected to have reduced muscle function, decreasing lifespan and climbing speed. Finally,Tip60 RNAi flies are expected to have no significant effect on lifespan and climbing speed because silencing Tip60 exhibited little effect on ACT88F and MHC expression. This study aims to show correlation between HAT regulation of muscle-related genes, muscle aging, and function in D. melanogaster.

#33 Position Effect Variegation Phenotype as a Predictive Indicator of Heterochromatin Formation in Drosophila melanogaster Aging Trajectories

Sesley Tedeschi and Liam Hunt
Faculty Sponsor: Liam Hunt, Department of Biology

This study explores the potential predictive role of heterochromatin formation, assessed by Position Effect Variegation (PEV) phenotype, for aging trajectories in Drosophila melanogaster. To address this question, white mottled (wm4) male flies with variegating eye pigment were systematically categorized into high and low pigmentation groups based on PEV phenotype that are associated with different levels of heterochromatin. We confirm the accuracy of categorizing flies through quantitative image analysis of eye phenotypes, revealing a robust method for separation. These separated low and high pigment flies were compared for lifespan and locomotor function during aging and preliminary results suggest possible increases in lifespan for the low pigmentation group. Increased transcription at heterochromatic loci is hypothesized to occur in old-age and whether transcription of the variegating white gene increases with age is being tested by qPCR. Furthermore, the heritability of PEV phenotype variability through multi-generational selection experiments, selecting for high and low pigmentation, and breeding phenotypically similar flies for five generations will be used to examine more extreme cases of PEV phenotypic variability. Overall, we suggest that PEV phenotype at a single gene locus may be predictive of generalized patterns of heterochromatin formation throughout the genome and also predict aging trajectories.

(F) #34 The impact of *MOCOS* deficiency on mercaptopurine cytotoxicity and metabolism in acute lymphoblastic leukemia

Ani Mikoyan, Maud Maillard, Keito Hoshitsuki, and Jun J. Yang
Faculty Sponsor: Mary Miller, Department of Biology

Mercaptopurine, (6-MP) is an anticancer agent widely used to treat acute lymphoblastic leukemia (ALL). As a prodrug, 6-MP undergoes extensive intracellular metabolic activation into thioguanine nucleotides (TGNs), and their incorporation into nucleic acids will eventually trigger apoptosis. In addition to other key enzymes like thiopurine methyl transferase (TPMT) and Nudix 15 (NUDT15), xanthine dehydrogenase (XDH) prevents the accumulation of TGNs by transforming 6-MP into thiouric acid. As a molybdenum-containing hydroxylase, XDH requires molybdenum cofactor (Moco) that is activated by molybdenum cofactor sulfurase (*MOCOS*). We hypothesized that a defect in MOCOS activity would impact XDH ability to catabolize 6-MP and increase thiopurine cytotoxicity, in response to a higher exposure to TGNs. The NCI-H1666 epithelial cell line was used to knock out the *MOCOS* gene. Cell viability assay after 6-MP treatment didn't show a significant change in drug sensitivity between the parental and *MOCOS* deficient cell lines. DNA-TG assay indicated similar DNA-TG cellular concentration between the parental and *MOCOS* deficient cell lines. We are currently waiting to receive new *MOCOS*

gene KO cell lines to further evaluate our hypothesis. These data contribute to understanding the genomics of ALL and drug toxicities associated with common treatments of ALL.

(F) #35 Transposon mutant library creation in Vancomycin-Resistant Enterococcus for identification of genes involved in gut colonization
Joseph Hobeika, Benjamin Treat, Christina Kohler, and Ellie Margolis
Faculty Sponsor: Mary Miller, Department of Biology
Vancomycin-resistant Enterococcus (VRE) colonization is common in hospitals and is associated with invasive infections and poor clinical outcomes. Colonization of VRE in transplant and chemotherapy patients is especially dangerous due to the frequent use of antibiotics. However, little is known about which genes are necessary for VRE colonization. To determine which genes are involved in gut colonization and bacteria competition, we are developing transposon-mutant libraries of clinical VRE. To produce these transposon libraries, we utilize a temperature-sensitive plasmid with a nisin-inducible transposase gene, and p-chlorophenylalanine (PCPA) counterselection. After transforming clinical E. faecium VRE strains, they are grown overnight at the non-permissible temperature in the presence of nisin, to create a library of random-insertion mutants with insertions throughout the bacterial genome. A second overnight step is then performed in the presence of PCPA to eliminate the plasmid from the library. Next, we will evaluate the depth of the library using Illumina-based transposon site sequencing (Tn-seq), and the genes important for VRE colonization will be identified. To accomplish this, VRE Tn-seq libraries are grown along with patient stool culture samples to identify genes needed for VRE colonization of intact stool communities. Individual genes will then be knocked out to confirm phenotype.

#36 Verifying a Quantum Algorithm using a Classical Computer
Mohamed Hassan
Faculty Sponsor: Matthew Superdock, Department of Computer Science
The Deutsch Algorithm is a fundamental quantum algorithm that exemplifies quantum computers' ability to solve problems faster than classical computers. It determines whether a given binary function $f:\{0,1\}\rightarrow\{0,1\}$ is constant (outputs the same value for both inputs) or balanced (outputs different values for each input). The Deutsch Algorithm is closely related to more advanced quantum algorithms like Deutsch-Jozsa Algorithm, Grover's Algorithm, and Shor's Algorithm. In this work, we present the first formalization of the Deutsch Algorithm in Agda, a dependently typed programming language and theorem prover. By encoding the algorithm in Agda, we not only verify its correctness but also lay the groundwork for formal verification of more complex quantum algorithms. This formalization enhances our understanding of quantum algorithms through formal methods and contributes to the development of reliable and secure quantum computing systems.

#37 Using Data Mining to Identify and Address Food Waste
Nalvi Tran, Maria Vega Vazquez, and Albert Nguyen
Faculty Sponsor: Catie Welsh, Department of Computer Science
With world hunger on the rise since 2014, the need to reduce food waste becomes more important with each passing year. Approximately thirteen percent of food is wasted in harvest and retail combined, and seventeen percent of food is wasted among households. Food waste leads to inefficient use of land, water, energy, and labor and it creates food scarcity, which

increases food costs. For these reasons, it is imperative to address food waste and devise solutions to counter it. We will be using the ML Olympiad ZeroWasteEats dataset, which includes country, year the data was collected, loss percent and quantity, activity of the food, and the food supply stage. We aim to identify major factors contributing to food waste by using various data mining algorithms to explore potential correlations between various socioeconomic and environmental factors. We will use this analysis to create data-driven recommendations for reducing food waste and promoting sustainable practices for food industries.

(F) #38 Development and Evaluation of a Mouse DNA Methylation-based Sarcoma Classifier Using Human-mouse Syntenic Probes

Agda Laakso, Quynh Tran, Zahangir Alom, Christopher Derenzo, Lindsay Talbot, and Brent A. Orr

Faculty Sponsor: Phillip Kirlin, Department of Computer Science

Human sarcomas are malignant tumors with distinct biological and clinical traits. Their classification is based on histomorphology and molecular features. DNA methylation-based classification has uncovered novel molecular classes even within histomorphologic sarcoma types. While murine models are commonly used to gain biological insights into human sarcomas, it is challenging to ensure molecular fidelity between mouse models and their corresponding molecular tumor types. This study assessed the potential to classify murine sarcomas with a deep neural network model trained on human sarcoma data using human-mouse syntenic probes. The model was trained using the syntenic probes on a reference dataset of 1077 human sarcomas consisting of 65 known molecular subtypes. The model was validated using 5-fold cross-validation and hold-out testing. The model generalizability was evaluated using Mouse Methylation array data obtained on a panel of mouse sarcoma cell lines. Visualization using the syntenic features of the reference data by t-distributed stochastic neighbor embedding showed clear separation of human methylation classes. Our model achieved 97% and 98% accuracies in cross-validation and hold-out testing of human sarcomas, respectively. Despite the relatively good performance on human tumors, our model failed to generalize to murine tumors.

(F) #39 Investigating the Evolution and Underlying Mechanisms Behind Antibiotic-Resistant Bacteria

Sophia Schieltz, Cydney Johnson, Haley Ecklin, Abigail McKnight, Tyler Simmons, and Jason Rosch

Faculty Sponsor: Qian Shen, Department of Biology

The increasing incidence of infections caused by antibiotic-resistant bacteria plays a major role in clinical treatment failure, exacerbated by Gram-positive pathogens such as Streptococcus pneumoniae that readily acquire clinical resistance. Antibiotic resistance is due, in part, to the existence of transient cell states conferring antibiotic resistance: persistence, or when a small subset of cells enter a dormant state under antibiotic stress; and tolerance, when populations fail to grow under antibiotic stress yet resume growth after antibiotic pressure is removed. Our preliminary transposon sequencing (Tn-Seq) studies identified mutations in S. pneumoniae genes that increase antibiotic tolerance and serve as resistance indicators. These populations can be challenged with an array of antibiotics at the identified MIC (minimum inhibitory concentration) to arrest bacterial growth and demonstrate involved cellular pathways. In this study, we aim to 1) demonstrate how initial tolerant genotypes evolve into resistance phenotypes; 2) determine the impact of resistant genotypes on the induction of stress response pathways; 3) demonstrate how

previously established drug susceptibility can be challenged through selective mutations. This data offers implications for the pathways and alterations in the bacterial metabolic networks that may contribute to antibiotic resistance mechanisms.

(F) #40 De novo CEP85L variant disrupts cortical size
Sophie Burke, Blake Holcomb, Roketa Henry, Peter McKinnon, and Andrew Kodani
Faculty Sponsor: Qian Shen, Department of Biology
Microcephaly is a catastrophic pediatric neurological disorder characterized by intractable seizures and intellectual delays. Patients with microcephaly exhibit a head circumference ≥2 standard deviations below the average for sex and age matched controls. We recently identified an individual with microcephaly harboring a de novo loss-of-function mutation in CEP85L (Centrosome protein 85 like). Analysis of fibroblasts derived from the CEP85L individual revealed a reduction in CEP85L protein levels confirming that the mutation is loss-of-function. To determine if loss of CEP85L is sufficient to cause microcephaly we generated a heterozygous Cep85l mutant mouse. Cep85l mutant mice have reduced cortical thickness at the peak of neurogenesis (embryonic day 14.5). Examination of neuronal progenitor maintenance revealed that neuronal progenitors prematurely differentiated and limited the expansive potential of the developing brain. Since defects in centrosome duplication are associated with premature neuronal differentiation, we examined whether centriole biogenesis was disrupted in the mutant mouse brains. Like other forms of microcephaly, loss of CEP85L disrupted centriole duplication. Our findings demonstrate that CEP85L is critical for neuronal progenitor maintenance and expansion during murine neural development.

(F) #41 Psychosocial Impact of Tourette Syndrome and Chronic Tic Disorder in Children and Adolescents
Aadhya Arkalgud, Robin L. Jack, and Tracee Ridley-Pryor
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology
Tourette syndrome (TS) is a chronic, early-onset neurodevelopmental disorder characterized by the prevalence of several motor tics and at least one phonic tic. Tics are sudden, repetitive movements or sounds that may be challenging to control. In 83% of childhood cases, patients with Tourette Syndrome may present with additional behavioral challenges such as ADHD, mood disorders, impulse control disorders, and personality disorders. While the evidence behind comorbidities, treatment plans, and quality of life is adequate, information about the psychosocial impact of TS and Chronic Tic Disorder (CTD) on schooling is few and far between. This study aims to provide more insight into the psychosocial impact of having TS and CTD to optimize school services for younger patients. A retrospective chart review is currently being conducted for 26 patients using charts from initial Comprehensive Behavioral Intervention for Tics (CBIT) evaluations by a clinical psychologist. Mean age at evaluation thus far is 12.6 ± 0.7. We propose that patients with TS or CTD will have greater needs than patients without TS or CTD, and thus are more likely to need additional support and resources during school. More patient charts are being reviewed, and that data will also be added.

#42 A “stress-is-debilitating” mindset enhances the association between stress-induced negative affect and M&M consumption
Rebecca Klatzkin, Eleanor Gilstrap, Ellie Parker, Zaynah Ward, and Aadhya Arkalgud
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology

Stressors are associated with a shift in preference towards comfort foods, yet there is wide variability in the amount of food consumed under stress. Typically, greater stress-induced negative affect has been associated with eating more comfort food but does not consistently predict greater stress-eating. No study to date has examined how our perceptions of stress (i.e., stress mindset) impacts how stress-induced negative mood triggers comfort food intake. Given that perceiving stress as beneficial lessens the negative impacts of stressors, we predicted that a stronger "stress-is-debilitating" mindset would strengthen the association between stress-induced negative affect and comfort food intake. 39 undergraduate women were evaluated for stress mindset and underwent a laboratory-based mental stress task before tasting four snacks. The moderation model (PROCESS model 1) was significant, $F(4,34) = 3.53$, $p = 0.016$; $R2 = 0.29$. Greater stress-induced negative affect was associated with eating more M&Ms for women with greater "stress-is-debilitating" mindsets ($b = -2.14$, $SE = 0.97$, $p = 0.035$; 95%CI: -4.1 - -0.16). Thus, a stronger "stress-is-enhancing" mindset may protect against greater comfort food intake in the face of stress-induced negative affect. Replications in larger samples may inform obesity-related clinical treatments that target cognitions related to stress and emotion regulation.

#43 Academic and Cognitive Impacts of Sickle Cell Disease in Low-Middle Income Countries
Bari Pinkett, Katherine Nesbitt, Jordan Wrigley, Jennifer Longoria, Jane Hankins, and Andrew Heitzer
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology
Sickle Cell Disease (SCD) is a monogenic blood disorder affecting the production of hemoglobin, a protein that carries oxygen to all vital organs in the body. As a result, insufficient oxygen delivery and cerebrovascular complications often occur which can affect neurocognitive performance. In low-to-middle-income countries (LMIC) where health care and treatment of the disease are harder to access, there is minimal neurocognitive surveillance. To analyze this, a librarian created search terms in studies from Embase, PubMed, Web of Science, Global Health CABI, ERIC, CINAHL, and PsycINFO. Studies that focused on participants with SCD of any genotype with a measure for cognitive/academic outcomes were included while commentaries and editorials were excluded. Two research assistants screened 1,831 abstracts in Covidence, 52 abstracts were chosen for full-text review, and 18 articles were ultimately included for data extraction. Most of the studies were conducted in African and Middle Eastern countries and Brazil. Common measures included the Wechsler Intelligence Scale for Children or Adults. Several of the studies demonstrated that individuals with SCD have lower neurocognitive functioning compared to a non-SCD control group. Many included studies did not adapt cognitive assessment tools to be more culturally appropriate thus future studies may find success in this.

#44 Stressed Out: How in vitro techniques impact primary cells
Gracie Gamache, Melody Allensworth, Justina McEvoy, and Samantha Turk
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology
Using rhabdomyosarcoma, a rare form of soft tissue pediatric cancer, this project aims to investigate the transition of tumor cells from animal models, to 3D organoids, and subsequently 2D plates to gain understanding of stress pathways and create more applicable laboratory experiments while minimizing the use of model organisms. Using model organisms, such as mice, for cancer research, while applicable to humans, takes an extensive amount of resources, so minimizing their use while exploring methods of investigating cancer allows for more

research to be done in labs. By utilizing mouse rhabdomyosarcoma cells, we cultured 3D organoids and transferred them to 2D plates, while analyzing the cells at different time points. Our objective was to gain a deeper understanding of the P53 stress pathway and how it impacts the tumor cells transition to an in vitro setting. Based upon previous research conducted in the lab, we anticipated a spike in stress quickly following the 3D organoid transition, that would level out over time. This suggests that there is something during this transitioning causing an increase in stress, but as time goes on, the cellular stress decreases as cells seem to retain key tumor characteristics.

(F) #45 Understanding the Challenges to Identify Pediatric Cerebral Venous Sinus Thrombosis (CVST) to Reduce Morbidity and Mortality Rates
Kylee Craig, Beth Anne Cavanaugh, and Tracee Ridley-Pryor
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology
Pediatric cerebral venous sinus thrombosis (CVST) is a relatively uncommon type of stroke that occurs in around 18 out of every 1,000,000 pediatric admissions (Moiz et. al., 2021). The condition can present itself in various ways, leading to challenges in diagnosing a patient with CVST. Through a [5-year] retrospective chart review of pediatric CSVTs with papilledema at Le Bonheur Children's Hospital, and by examining the data to understand the challenges of identifying CSVTs with papilledema in children, the study is aimed at identifying the risk factors, diagnostic challenges, and reviewing the treatment course and outcome, to reduce the morbidity and mortality of patients with CSVT. Currently, this project is waiting for IRB approval, so we have not analyzed data or formed conclusions. We predict that the earlier a stroke is detected, and the severity/presence of papilledema will both be significant factors in CVST patient morbidity and mortality rates. Early recognition and treatment of CVST can improve the child's life and minimize permanent neurological damage.

(F) #46 Patient Age and Seizure Hemisphere Influence Language Organization in Epilepsy
Sanjana Mahale and Shalini Narayana
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology
Epileptic activity in the brain has long been associated with reorganization of neural networks responsible for language processing. Transcranial magnetic stimulation (TMS) procedures enable identification of cortical regions involved in speech production, allowing minimization of post-surgical deficits in epileptic patients. 327 patients (M= 16.0 years, SD= 8.85 years) with a unilateral epileptogenic focus that underwent TMS testing at LeBonheur Children's Hospital between 2012-2023 were selected for analysis. Of these, 195 patients had a L-hemisphere focus and 132 patients had a R-hemisphere focus. Data collected from TMS testing included the total number of language errors in each hemisphere and their categorization as performance, semantic, or speech arrest errors. An independent samples t-test revealed a significant difference ($p=0.17$) between the mean number of left hemispheric semantic errors for L-focus patients ($M = 2.20 \pm 2.16$) and R-focus patients ($M = 1.63 \pm 1.82$), suggesting that semantic networks are more concentrated in the left hemisphere. A significant negative correlation between TMS testing age and error rates in both hemispheres was found using a bivariate Pearson correlation (L-hemisphere $r= -.208$, $p<.001$; R-hemisphere $r= -.196$, $p<.001$). This indicates that language networks in older patients are more consolidated, leading to fewer errors elicited relative to total stimulations per hemisphere.

#47 A crowd amplification effect in the perception of social status
Phyu Sin M. Myat, Matthew Weeks, and Jason Haberman
Faculty Sponsor: Jason Haberman, Department of Psychology
Ensemble perception is the ability to perceive the ‘average of sets of objects. By necessity there is a cost to averaging, as detailed information about individuals is lost. Our work is centered on understanding these costs through the lens of social status perception. Social status is a multidimensional construct commonly evaluated on a hierarchical ladder. Our experiments were divided into two phases: 1) observers rated the social status of individuals and 2) observers rated the average social status of the same items presented in ensembles. In Experiment 1, race varied but the ensembles, constructed from individual ratings, were restricted to middling ratings of social status. Results revealed an amplification effect, whereby ensembles were rated higher than the expected average. Interestingly, there was an interaction with race — the social status of groups of black individuals increased more than groups of white individuals. In Experiment 2, sets were of white individuals, but spanned the full range of social status. Results revealed a bidirectional amplification effect —low status sets were rated lower than expected and high-status sets were rated higher than expected. Overall, our results reveal that perceptions of social status are altered when judging people within a crowd versus in isolation.

(F) #48 Examining sleep electrophysiology in ALL and non-CNS cancer survivors
Phyu Sin M. Myat, Andrea Sánchez-Corzo, and Ranganatha Sitaram
Faculty Sponsor: Tanushree Pandit, Department of Biology
Sleep has been shown to be important for cognitive abilities and it has also been previously established that cancer survivors experience sleep disturbances and cognitive impairments which are long term effects of various cancer treatments. Here, we aim to determine abnormality in brain oscillations during sleep across multiple cortical brain regions in ALL and non-CNS cancer survivors, using high-density electroencephalography (HD-EEG).Moreover, a secondary objective is to employ the quantitative EEG recording measures to better understand the relationship between sleep electrophysiological events and cognitive function, specifically memory retention. All participants are survivors of ALL or non-CNS tumors such as abdominal tumors or retinoblastomas, diagnosed more than five years prior to this assessment. The paradigm is as follows: 1) Participants first learn a card matching declarative memory task of colorful everyday objects and animals, 2) wear an EEG net for two hours during an afternoon nap, and 3) complete a card matching recall test. We expect to see abnormal sleep spindle frequency, duration, and amplitude which then correlates with the memory task performance.

(F) #49 Mass Spectrometry Quantification of APOE and Co-Expressed Proteins of 28 Alzheimer’s Patients
Audrey Heidbreder, Zhen Wang, and Junmin Peng
Faculty Sponsor: Tanushree Pandit, Department of Biology
Alzheimer's disease (AD), a neurodegenerative disease which progresses over time, is the primary cause of dementia among the elderly. Among the genetic factors contributing to the risk and progression of AD, apolipoprotein E (APOE) alleles stand out due to their differential impact on disease susceptibility. APOE3, the most common allele in the general population, is considered neutral regarding AD risk. In contrast, APOE2 is associated with reduced risk of developing AD and has a protective effect against the disease's onset. APOE4 is recognized as

the strongest genetic risk factor for sporadic (non-familial) AD. The mechanisms through which APOE4 elevates the risk of AD and how APOE2 exerts its protective influence remain largely unknown.

To enhance our comprehension of the contribution of APOE alleles to Alzheimer's disease (AD), we are conducting a quantitative analysis of APOE in 28 AD patient plasma samples, encompassing APOE2, 3 and 4 genotypes, utilizing mass spectrometry (MS). This analysis will not only verify the APOE genotypic classification of the samples but, more critically, will facilitate the identification of proteins that co-express with APOE. This endeavor aims to uncover potential proteins which may interact synergistically with APOE, thereby elucidating their collective role in the pathophysiology of AD.

(F) #50 Utilizing CRISPR dCas9 VPR System to Increase KANSL1 Expression in Koolen-de Vries Syndrome

Drew Murphy, Esmat Fathi, and Heather C. Mefford
Faculty Sponsor: Tanushree Pandit, Department of Biology

Koolen-de Vries syndrome (KdVS) is a rare neurodevelopmental disorder largely caused by a de novo heterozygous deletion of the KANSL1 gene resulting in decreased protein expression. KdVS is characterized by intellectual disabilities, developmental delays, and congenital anomalies. We hypothesize that increasing the amount of KANSL1 protein by targeting the remaining functional copy of KANSL1 is a potential therapeutic approach for KdVS. Therefore, we utilized a catalytically inactive CRISPR-dCas9-VPR system to increase mRNA transcription and subsequent protein production in a heterozygous KANSL1 knockout (KO) SF126 (human glioblastoma) cell line. We confirmed the presence of the dCas9-VPR system in this cell line using western blotting. We designed five gRNAs targeting different sites of the KANSL1 transcriptional start-site (TSS) and tested the efficiency of each gRNA in the KANSL1 haploinsufficient SF126 cell line stably expressing dCas9-VPR. Our preliminary results show that gRNAs can increase KANSL1 gene expression in this cell line. We are using RT-qPCR to evaluate changes in RNA expression and western blotting to evaluate protein expression. We are planning to continue analysis through RNA-sequencing, and perform further testing in patient-derived iPSCs and 2D/3D neurons. Our result will reveal whether the CRISPR-dCas9-VPR system can be considered targeted therapy for KdVS.

#51 Protein-Protein Interactions of PaxB and Structural Proteins in Aspergillus nidulans

Kathryn Franks, Carson Page, and Terry Hill
Faculty Sponsor: Terry Hill, Department of Biology

This research focuses on protein interactions involved in hyphal growth/development in the filamentous model organism, Aspergillus nidulans. Our specific study investigates the physical interactions between the scaffold protein paxillin B (PaxB) and the structural proteins α-actinin (AcnA), α-tropomyosin (TpmA), and paxillin A (PaxA) during cell growth and division using Bimolecular Fluorescence Complementation (BiFC). This technique involves using genetic engineering to tag proteins of interest with complementary fluorescence-producing markers. In previous work, PaxB was tagged and found to localize at the Spitzenkörper and septation sites, and a deletion strain determined that PaxB plays an essential role in septation but not apical growth. Localization of protein kinase C (PkcA) and the formin SepA was also shown to decrease at septation sites in the absence of PaxB, which provoked interest in the specific interactions between PaxB and other proteins associated with septum formation. The

combination of tagging PaxB and the tagged counterpart protein provided a visible YFP signal between PaxB and the structural proteins at either hyphal tips or septation sites. Our poster will describe methods of engineering strains of PaxB and target proteins tagged with complementary YFP halves at their respective termini, and the results from their interactions involved in Aspergillus nidulans.

#52 Protein-Protein Interactions In The MAPK Pathway of Aspergillus Nidulans
Leon Ashton, David Jackson, and Terry Hill
Faculty Sponsor: Terry Hill, Department of Biology
This research focuses on several proteins involved in hyphal growth and development in the MAPK pathway of the filamentous model organism, Aspergillus nidulans. The current study investigates the influence of the interactions between RomA and RhoA on polarized cell growth and division and the possible interactions between RomA and the receptor proteins WscA,WscB, and Wsc4. Previous work suggests that these proteins might physically interact at hyphal tips and septation sites and that the protein RhoA in its connection with Protein Kinase C orthologues is important to hyphae growth and cell wall integrity. Therefore, to discover the importance of RomA, it was subject to deletions and downshifts using the technique of PCR recombination. Upon deletion of RomA, severe effects were observed with colonies having stunted growth and weakened cell wall integrity. Upon the downshifting of RomA, similar results were shown with impaired hyphae growth. Proteins WscA, and WscB were then observed using GFP tagging. This technique involves genetic engineering to tag proteins of interest with fluorescent-producing markers at ends of the respective protein. Our poster will describe the methods involved in the deletion and downshifting of RomA, the engineering of C-terminally tagged WscA and WscB, and ongoing work using BiFC.

#53 Physical Interactions of Rho-Type GTPases with Protein Kinase C in Aspergillus Nidulans using Yeast Two-Hybrid
Anna Tassou, Meghana Devineni, and Kayla Nguyen
Faculty Sponsor: Terry Hill, Department of Biology
Aspergillus nidulans is the filamentous fungus used as the model organism in our research focusing on aspects of growth and division. The current study emphasizes the roles played by the Protein Kinase C orthologue, PkcA, as it interacts with Rho-Type GTPases. Our current work is attempting to elucidate which Rho-type GTPase complexes with PkcA, using a Gal4-based yeast 2-hybrid system to demonstrate protein-protein interactions in vivo with a positive result indicated by growth on an agar plate lacking histidine. Previous work focused on genetically engineering Rho mutants that lack the CAAX box which is involved in targeting certain proteins to the cell membrane, and making constitutively active Rho mutants so that they are continuously signaling downstream pathways. Given that no positive interactions were confirmed, in our latest work, we successfully generated the cDNA of Rho-type GTPases ModA, RacA, Rho2, Rho4, and RhoA, and PkcA using PCR and site-directed mutagenesis, further confirmed by sequencing. We have been investigating growth using the +/- histidine challenge of the yeast two-hybrid assay and have yet to confirm a positive interaction. Therefore, we have constructed a strain with PkcA in pGBK and carried out autoactivation studies to perform a cDNA library screening.

(F) #54 Comprehensive Analysis of Genetic Alterations in Down Syndrome-Related Acute Megakaryoblastic Leukemia

Meghana Devineni and Xiaotu Ma

Faculty Sponsor: Catie Welsh, Department of Computer Science

Children with Down syndrome (DS) are at an increased risk of developing Acute Megakaryoblastic Leukemia (DS-AML), a subtype of Acute Myeloid Leukemia (AML). In this study, we conducted a comprehensive analysis of 206 DS-AML cases, including whole genome sequencing and RNA sequencing, to characterize the genetic landscape of the disease. Our analysis revealed that GATA1 alterations were present in 97% of cases, with various mutations, including missense, frameshift, nonsense, and silent mutations. We also identified alterations in other genes, such as STAG2, RAD21, and CTCF, which are part of the cohesin complex, as well as novel mutations in genes like IRX1, KANSL1, and TERT, which have not been previously associated with DS-AML. Cases with mutations in the TERT promoter region showed elevated TERT expression, indicating a potential role of TERT in DS-AML pathogenesis. Furthermore, we found that DS-AML cases exhibit complex patterns of chr21 aberrations suggesting a heterogeneous genetic landscape. Clonal heterogeneity in GATA1 mutations, with different patterns of mutations in diagnosis and relapse samples, was observed. Two mechanisms leading to exon 2 skipping in GATA1 were discovered, shedding light on the process of exon skipping in DS-AML. Additionally, exon 3 skipping was observed, a novel finding not previously reported.

POSTER SESSION #2

Multi-Sports Forum, Bryan Campus Life Center
2:45 – 4:15 pm
Poster numbers are listed with the title

#1 Discovering Authority Preferences in the Classroom
Hannah Gamble, Caroline Kilgore, and Caroline Briggs
Faculty Sponsor: Dee Birnbaum, Department of Business
Using Weber's typology, this research investigates students' preferences for classroom teaching styles, focusing on preferences for bureaucratic and charismatic approaches. Through a survey, subjects indicated their teaching method preferences in terms of adherence to the syllabus, classroom structure and decision-making processes. The survey explored their preference toward conventional or innovative educational content, the nature of the student-professor relationship, and preferences for practical application or theoretical concepts. By analyzing these responses, we hope to uncover patterns and correlations between students' academic interests and their preferences in teaching styles to offer some insight for educators and institutions.

#2 Synthesis of Solvatochromic Transition Metal Complexes
Arjun Feist and William Eckenhoff
Faculty Sponsor: William Eckenhoff, Department of Chemistry
Metal-organic frameworks, or MOFs, are compounds made up of repeating inorganic nodal points, connected to one another via organic linkers coordinated to the metal centers. By altering either the metal centers, the organic linkers, or both, the MOFs properties can be greatly changed, and numerous applications for such specifically tuned MOFs have been proposed, including in catalysis, materials science, and for hydrogen production and storage due to their porosity and specific surface areas. One potential route to new applications for novel MOFs is by employing ligands during synthesis that cause the compound to become solvatochromic. Solvatochromism is a property of some compounds that causes them to absorb at different wavelengths while dissolved in different solvents, making them appear different colors to the eye. This phenomenon is caused by solvent effects modifying the coordination geometry such that the metal to ligand charge transfer, the d-d transition, or the π-π^* transition is affected, and it can be used in a variety of new sensor technologies that can be used to detect specific chemicals.

#3 Trace organic analysis of natural rock coatings on prehistoric rock paintings and lichen formation
Ayumi Bonev, Justin DiProfio, Bonnie Kennedy, Saloni Naidu, Huyen Nguyen, Hoang Luu, and Jon Russ
Faculty Sponsor: Jon Russ, Department of Chemistry
Prehistoric rock paintings (pictographs) are found globally, generally inside dry rock shelters and under rock overhangs. Rock surfaces in these protected environments are often covered by a natural rock accretion composed primarily of calcium oxalate (CaC2O4). The oxalate-rich accretions cover or encapsulate the ancient paints, and consequently fix the mineral pigments to the rock substrate as well as protect the paints from surface erosion. Thus, the oxalate accretions help to preserve these artifacts. Additionally, due to the biogenic characteristics of the carbon in the oxalate, the accretion can be radiocarbon dated to estimate the age of pictographs based on

paint/accretion stratigraphy. However, there is a significant gap in our understanding of how oxalate accretions form. Here we report on the trace organic composition of oxalate-rich accretions with the goal of establishing the primary source of the oxalate. We analyzed samples of oxalate-rich accretion samples from Australia, Spain and Texas using gas chromatography-mass spectrometry (GC-MS). Our goals were to determine whether biomarker compounds are present in the coatings that would shed light on the source(s) of the oxalate. Our results suggest that oxalic acid present in atmospheric aerosols could be a primary source of the oxalates.

(F) #4 Infantile Spasms: Standardizing Care through Centers of Excellence
Connor Bronze, Amy Patterson, Brittany Williams, and Tracee Ridley-Pryor
Faculty Sponsor: William Eckenhoff, Department of Chemistry
Infantile Spasms (IS) is a condition characterized as an age-related infantile epilepsy that most frequently presents in the first 3-12 months of life. IS is the most common form of epilepsy present in the infant age group and is characterized by the presence of three findings: physical epileptic spasms, hypsarrhythmia on electroencephalogram (EEG), and developmental delay due to devastating effects on neurological and cognitive functions. Studies have found that earlier recognition of IS and expeditious treatment result in a better prognosis. Two treatments used for the condition include hormonal treatments using adrenocorticotropic hormone (ACTH) and vigabatrin, a GABA-inhibiting anticonvulsant, with studies indicating that dual-therapy is the most effective form of treatment. This study is a retrospective study that utilizes a database consisting of patients at Le Bonheur Children's Research Hospital and analyzes the types of therapy received by patients who were treated through the Le Bonheur Infantile Epilepsy Center. This study shows that patients in the specialized Infantile Epilepsy Center are more likely to receive the preferred dual therapy treatment, subsequently providing greater probability at a better long-term prognosis. Therefore, specialized centers are crucial in combating IS as their presence ensures more effective treatment.

(F) #5 Formations of CoEtPyPDI2+ for Catalytic Mechanisms to produce Hydrogen
Daniel Graham
Faculty Sponsor: William Eckenhoff, Department of Chemistry
The hydrogen producing mechanism of [CoEtPyPDI]2+ has been thoroughly investigated by calculating the Gibbs energy associated with different protonated and reduced species that may form during catalysis using Density Functional Theory (DFT). The Gibbs energies were calculated through reduction potentials and pKas. These myriad of species was then used to explore the many different mechanistic pathways possible.

#6 Production of Hydrogen using Substituted Thiosalen Nickel Complexes
Emma McHale
Faculty Sponsor: William Eckenhoff, Department of Chemistry
A higher demand for clean energy has become more and more prevalent with the increasing population and use of nonrenewable energy sources. Artificial photosynthesis to produce hydrogen gas is a new possibility for a clean energy source. In our lab, we've explored the potential of nickel complexes paired with thiosalen ligands to serve as catalysts in this process. Unsubstituted thiosalen complexes show proton reduction to occur electrocatalytically at ~-2.0 to -2.5V vs Fc+/Fc., however, adding of electron withdrawing substituents can lower the overpotential. The Ni(II) thiosalen (tsalen) and thisalphen (tsalphen) complexes with 4-CF3

groups were synthesized and examined to analyze their effectiveness in hydrogen production. The effect of the Ni (II/I) redox couple had minimal impact on the overpotential of proton reduction even though we observed a reduction in the Ni(II/I) redox couple which is consistent with withdrawing properties of the substituents.

#7 The Effect of Ensemble Perception on Single-Target Judgements in the Context of Social Status

Julia Blackmon and Matthew Weeks
Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble perception is a process whereby summary statistics are derived from a set of relatively similar stimuli, and has often been examined in the context of social status. The cheerleader effect describes a phenomenon wherein targets within an ensemble may be perceived as more attractive in a group than in isolation. Our research focuses on the effect of the perception of an ensemble's social status on the perception of an individual within the ensemble. If an ensemble is perceived as having higher status, will that perception elevate the perceived social status of the target, similarly to how the cheerleader effect operates? Will the contrast between a high social status ensemble and a lower status target lower the perceived status of the target by comparison? We seek to answer this question by presenting participants with visual representations of varying combinations of high and low social status ensembles and targets; first introducing the ensemble and target together, followed by an image of the target alone. We predict that the perception of an ensemble will "bleed over" into the perception of a target within that ensemble, causing participants to view mid-status targets as higher-status when seen in conjunction with a higher status ensemble.

(F) #8 Synthesis of 6-Substituted Catecholamines

Joe Hane, Emma Gruss, Gabriella Krisanic, Kudzai Nyamkondiwa, Joshua Morris, Keri Colabroy, and Larryn Peterson
Faculty Sponsor: Larryn Peterson, Department of Chemistry

Catecholamines are interesting compounds that have been found endogenously in unexpected relationships with the cardiac system and participate in aromatic cleavage with powerful dioxygenase enzymes. Despite these findings, neither the place of catecholamines in the heart nor the substrate tolerance with dioxygenase enzymes has been fully fleshed out. To further investigate the importance of these compounds, a variety of catecholamine analogues are required. We report the synthesis of substituted catecholamines, including 6-bromo and 6-cyano substituted dopamine and L-DOPA and the determination of their physical properties. Additionally, we look towards the synthesis of 6-cyano substituted adrenaline and noradrenaline. These compounds will further the investigation on the general importance of catecholamines with respect to the heart as well as that of the powerful chemistry in the context of dioxygenase enzymes.

#9 Investigation of the Catalyst Ni(^{MePy}PDI)$^{2+}$ as Used for Hydrogen Production

Joshua D. Seider and William Eckenhoff
Faculty Sponsor: William Eckenhoff, Department of Chemistry

With an ever-increasing global population, the need for avant-garde sources of energy continues to advance as well. An alternative source of energy can be found via the implementation of artificial photosynthesis to produce hydrogen gas. Therefore, the development of more active and

robust catalysts is necessary in order to make artificial photosynthesis a viable method of hydrogen generation. Recent studies have shown that metal complexes with redox non-innocent ligands and pendant base groups are highly active for proton reduction. Ni(^{EtPy}PDI)$^{2+}$ has shown to be a promising catalyst by producing hydrogen gas using Ru(bpy)$_3^{2+}$and ascorbic acid generating turnover numbers of 1400. In this project, the ^{EtPy}PDI was replaced with ^{MePy}PDI to synthesize Ni(^{MePy}PDI)$^{2+}$. Replacing the ethyl group with the smaller methyl group should lead to increased compound stability and will be used to test our hypothesis that dissociation of the pyridyl group is key to catalytic activity. The synthesis of Ni(^{MePy}PDI)$^{2+}$ and its catalytic activity compared to Ni(^{EtPy}PDI)$^{2+}$will be discussed.

#10 Exploring L-DOPA Dioxygenase Function through the Synthesis of 6-Substituted Dopamine Analogues

Leah G. Borders, Mia J. Farraday, Ella W. Petit, Lilia F. Fernatt, and Larryn Peterson
Faculty Sponsor: Larryn Peterson, Department of Chemistry

Catecholamines are substrates for aromatic cleavage by powerful dioxygenase enzymes. The enzyme L-DOPA dioxygenase that breaks down dopamine is a member of the vicinal oxygen chelate superfamily, which can cleave aromatic rings in catechols through metal chelation. This process is not well understood due to a lack of diverse substrates. We report the synthesis of 6-substituted dopamine analogues, including 6-bromodopamine, 6-cyanodopamine, and 6-chlorodopamine, and determine their physical properties and purity. Substantial progress in synthesizing these analogues has been achieved in good yields from a commercially available compound 3,4-dimethoxyphenethylamine. This toolkit of catechol derivatives provides access to investigate the understanding of dioxygenases and their use as enzyme substrates, inhibitors, or even in applications such as bioremediation.

#11 Qualitative and Quantitative Analysis of Purity and Composition in Lavender Essential Oils

James Carmouche, Peyton Cely, William Constantine, and Leven Greene
Faculty Sponsor: Kimberly Brien, Department of Chemistry

Essential oils are intended for topical and diffusion uses only, but are often misused as flavor additives. As these oils are not designed for consumption or medicinal purposes, the FDA does not monitor their production. As such, they might contain harmful volatile organic compounds (VOC) that are not suitable for human ingestion. This experiment was conducted to evaluate the purity and composition of essential oils. The purity of a sample from one lavender essential oil brand was analyzed before and after distillation with 1H-NMR. Peaks not present in the distilled lavender essential oil spectra will undergo comparative analysis with pure samples of suspected compounds, which may allow us to detect the presence of VOCs in lavender essential oil. Future analyses will be done via GC-MS, CNMR, and IR.

#12 Generation of Aza-Crown Ethers Using 2,6-bis-hydrazinopyridine

James Carmouche, Peyton Cely, William Constantine, Leven Greene, and Kimberly Brien
Faculty Sponsor: Kimberly Brien, Department of Chemistry

Hydrazinopyridines have remarkable promise as platforms for the construction of new transition metal ligands. The synthesis of 2,6-bis-hydrazinopyridine (BHP) is presently being used in preparation of chelating ligands that are otherwise more difficult to generate through other means. The generation and isolation of BHP occurred through the reaction of 2,6-difluoropyridine with anhydrous hydrazine to generate the crude product, followed by treatment

with NaOH to isolate the BHP. Previous research has implicated BHP as a useful reactant in the preparation of 2,6-bispyrazoylpyridines, but further research has indicated that it may also provide a useful way to generate Nitrogen based azo-ethers (crown ethers) through reaction with 1,2-dibromoethane.

#13 Investigation of Co(^{EtPy}PDI) as a Catalyst for Light-Driven Hydrogen Production
Nicholas Suffern and William Eckenhoff
Faculty Sponsor: William Eckenhoff, Department of Chemistry
As the global population grows, the need for renewable energy grows with it. One source of energy that seems promising is artificial photosynthesis to produce hydrogen gas. The PDI ligand seems to be useful for light-driven hydrogen production because of the pKa and hemi-lability of the pendant base. Research has been done using a Ni(^{EtPy}PDI) complex, and those results showed promise, but looked like they could be improved upon. Using the Co(^{EtPy}PDI) complex, in a solution of $Ru(bpy)_3^{2+}$ and ascorbic acid, generated turnover numbers of up to 1700 during light-driven hydrogen production.

#14 Bonding of LpxC Inhibitors to Zinc Enzyme Mimic
Peyton Crest, William Eckenhoff, and Larryn Peterson
Faculty Sponsor: William Eckenhoff, Department of Chemistry
Many bacteria have the ability to gain resistance to known drugs, calling for the development of new drug targets. Treatment of gram-negative bacterial infections is especially challenging due to the outer membrane, which contains the endotoxin Lipid A. Lipid A is made by a series of enzymatic steps, one of which is catalyzed by LpxC, a zinc-dependent enzyme. To model substrate binding to zinc containing enzymes, Zn(Tp*)Cl (Tp∗ = tris(3,5-dimethyl-1 pyrazolyl)borate) can be used as an inexpensive and easily prepared target. Binding of various potential LpxC inhibitors to zinc enzymes mimics is reported.

#15 Microfluid Titrations using Ceramic Titrators
Saanya Srivastava and Gage Weidman
Faculty Sponsors: Dhammika Muesse and Darlene Loprete, Department of Chemistry
We investigated the use of ceramic reactor wells as microfluid titrators as a semi-quantitative and fast method for chemical analysis. Microliter volumes of selected reagents were reacted in small ceramic reactor wells using appropriate indicators. We noticed a fast and more uniform color change in the reaction bubble in ceramic titrators. We can also use larger reaction bubbles, up to 500 microliters, without breaking or spilling the reaction bubble. In addition, ceramic titrators are easily cleaned and reused, and the method will reduce the chemical waste in teaching labs significantly.

#16 Artificial Photosynthesis through Nickel Complexes with Thiosalen Ligands
Wasif Abdullah and William Eckenhoff
Faculty Sponsor: William Eckenhoff, Department of Chemistry
As our global population grows, our need for clean energy also grows. One new energy source can be found through the use of artificial photosynthesis to produce hydrogen gas. In our lab, we have investigated the effectiveness of nickel complexes with thiosalen ligands acting as a catalyst for the artificial photosynthetic process. While unsubstituted thiosalen complexes show proton reduction to occur electrocatalytically at ~-2.0 to -2.5V vs Fc^+/Fc., addition of electron

withdrawing substituents can lower the overpotential. Ni(II) thiosalen (tsalen) and thiosalphen (tsalphen) complexes with 5-CF_3 and 3-CF_3 groups were synthesized, characterized, and tested for efficacy of hydrogen production. While the substituents did lower the Ni(II/I) redox couple in accordance with their electron withdrawing ability, this effect did not greatly affect the overpotential of proton reduction as we supposed.

#17 Policy Analysis: Universal Prekindergarten
Anna Yates, Grady Bryant, and Hannah Davis
Faculty Sponsor: Laura Kelly, Department of Educational Studies
This policy analysis explores two proposed bills in the Tennessee state legislature (H.B. 1034 and its Senate counterpart S.B. 809) that would require local educational agencies to provide every child with the opportunity to attend a high-quality prekindergarten program. Expanding support for early childhood programs at the state level aligns with national and local trends of funding programs to better children's lifelong outcomes, beginning with early childhood education. Historical precedent for these developments can be seen in the Lanham Act, Great Society programs, and pandemic expansion of the Child Tax Credit. While support for prekindergarten programs has increased, researchers offer differing policy recommendations for expanding such programs. Previous studies have emphasized the importance of play-based, substantially funded, and high-quality programs to ensure both short- and long-term benefits in many areas: academic, social, and behavioral are most cited. Tennessee currently operates with a targeted prekindergarten program, offering some educational options to low-income families. This paper considers the potential impacts of expanding prekindergarten programs from targeted to universal at the state level, finding that the policy should be implemented as potential benefits of expanding prekindergarten offerings would outweigh the costs.

#18 The Liber Reginarum
Alex Buccellato
Faculty Sponsor: Lori Garner, Department of English
The Liber Reginarum is a fictional illuminated manuscript and religious text, which I wrote and illustrated for a larger world building project. Its prose and the events which take place in it are heavily inspired by The Vulgate translation of the Bible, early medieval English saints' lives, and illuminated manuscript pages in Barret Library Special Collections.

In this manuscript, I wanted to imagine what might happen if Mary, or any mortal mother of divinity for that matter, such as Aminah bint Wamb, the mother of Muhammad, had been revered as godly herself. After all, the gods they birthed would not exist without them, which begs the question: should the creator of a god also be considered divine, and what qualifications need to be met in order to be considered so?

In my larger project, the Liber Reginarum manuscript is used to legitimize a powerful theocratic empire ruled by a dynasty of masked queens. They wear the mother of God's visage, hiding behind her divinity and their supposed blood relation to her to justify their imperialist tendencies and other morally questionable actions.

#19 "Truth" Versus "Fact": Paul Kingsnorth's 'The Wake' and the 'Anglo-Saxon Chronicle'
Mary Knight
Faculty Sponsor: Lori Garner, Department of English

Using the dialogue between Paul Kingsnorth's The Wake (2014) and the Anglo-Saxon Chronicle (9th-12th centuries), this essay examines the requirements for a text, medieval or modern, to establish trust, and how the difference between "truth" and "fact" operates in establishing this trust. Also key is what each text claims to do. For example, The Wake operates as a story, perhaps even an oral tradition, because it is written in the (created) language of its era. The Anglo-Saxon Chronicle, despite being more "real," in that it describes verifiable historical events, takes different approaches to the same events, making the narrative less believable because there isn't a consistent story. The essay also discusses the specific grammatical changes Kingsnorth makes to Old English to create his "shadow-tongue," and how those changes first disorient and then add comfort, immersion, and understanding to an infrequently seen historical perspective. Still examining specific wording, the essay argues that not only is this text written in a quasi-Old English dialect, but it "exists" as a lingering oral tradition. Finally, this essay discusses The Wake's direct response to the Anglo-Saxon Chronicle, specifically its treatment of Hereward the Wake and English response to Christianity.

#20 Vasbo's Refeminization of Old English Hild's Story (with Nuances of Lutgard)
Izzy Wollfarth
Faculty Sponsors: Lori Garner and Gordon Bigelow, Department of English
In 731 A.D., Bede, a learned writer of the Anglo-Saxon period wrote a collection of essays entitled, The Ecclesiastical History of the English People, including the life of a renowned female saint and abbess of Anglo-Saxon England, Saint Hild of Whitby. Although Hild is a saint greatly admired within English Christianity, in Bede's version of her story, there is a subversion of Hild's modern influence and a refocus on male power. Although Thomas of Cantimprè's "The Collected Saints' Lives" was written nearly 500 years later, his narrative concerning Lutgardis of Aywières strikes similar chords. Instead of focusing on Lutgard's religious contributions, Thomas frames Lutgard's story around the men who try to sexually assault Lutgard. Judith Bennett and Ruth Karras in their text, "Women, Gender, and Medieval Historians" further describe how medieval women were inherently inferior to men in every sector of their lives, especially under God. Now in the 21st century, the male violence that both Hild and Lutgard experienced draws parallels with Vibeke Vasbo's novel, The Song of Hild. Through a radical retelling of Hild's life, Vasbo's novel elevates both Hild's and Lutgard's voices above the men who once dictated their stories whilst recognizing the prejudice medieval women faced.

#21 The Effects of Nitrogen and Phosphorus on Fatty Acid Abundance in Memphis Park Lakes
Mya Hardee
Faculty Sponsor: Kate Shields, Environmental Studies and Science
Polyunsaturated fatty acid (PUFA) are essential components of animal diets. Organisms cannot synthesize these components on their own, and must acquire them through their diet. The primary source of PUFA is aquatic algae, which is often limited in its growth by either phosphorus or nitrogen, or a combination of both. This study seeks to determine the relationship between nutrients in urban lakes in Memphis Tennessee, and the amount of algae in those lakes. It also seeks to determine if algal weight is correlated with fatty acid concentrations. A weak positive, though not statistically significant, correlation was found between nitrogen levels and algal weight in the lakes. DHA, an especially important PUFA, trended towards a positive relationship with algal weight. Thus, the study provides insight into some trends in the environment regarding nutrients, algal levels, and fatty acid concentrations.

#22 Clash of the Media Portrayals: Analyzing Internal Displacement Patterns in the Ukraine and Palestinian Conflicts

Sana Zein-Sabatto and Ayzia Alexander
Faculty Sponsor: Kate Shields, Environmental Studies and Science

The media plays a pivotal role in shaping public perception and policy responses to conflicts worldwide. This project aims to investigate the divergent portrayal of the Ukraine war and the Palestinian war, focusing on the critical issues of internal displacement. We seek to spatially visualize and analyze the distribution of these conditions in the respective conflict zones using recent data. Using GIS software, we will integrate data from various sources including news articles, reports from humanitarian organizations, and GIS databases. Spatial analysis techniques will be applied to quantify and compare the extent of internal displacement in both regions over time. Through geospatial mapping, we aim to identify spatial patterns, disparities, and potential correlations between media coverage and the realities on the ground. Statistical analysis will further elucidate any significant differences in media portrayal between the Ukraine and Palestinian conflicts regarding these humanitarian indicators. This study contributes to understanding the influence of media narratives on global perceptions of conflicts and their humanitarian consequences, ultimately informing more nuanced and evidence-based policymaking and humanitarian interventions.

#23 Reimagining Feminism Within the Anarchist Movement: The Intellectual Legacy of Luisa Capetillo

Lucy Page
Faculty Sponsor: Elizabeth Pettinaroli, Department of Modern Languages and Literatures

This paper explores the use of analogy in Luisa Capetillo's work "La Mujer en la época moderna". Through a feminist lens, the study delves into the complexities of Capetillo's anarcho-feminist writing and its implications for the anarchist movement. In her 1909 work "La Mujer en la época moderna," Luisa Capetillo challenged both gender roles and social class barriers by challenging oppressive social structures in favor of systems of equality. Luisa Capetillo was an instrumental leader in the Puerto Rican anarchist movement, known for her oratory skills and ability to connect anarchists internationally. Her leadership helped bridge the gap between anarchist theories from elite intellectual circles and the working class of Puerto Rico while adding her theories to the anarchist canon. This essay aims to rhetorically analyze Capetillo's work and contribute to the ongoing discourse on anarcho-feminism. This text reviews existing scholarship, including works by Julio Ramos, on Luisa Capetillo's feminist activism and highlights key debates, theories, and findings. The research employs a qualitative approach to data analysis, specifically utilizing thematic analysis. Through rhetorical examination, the study aims to reveal the connections between feminism and anarchism in Capetillo's writings to shed light on the nuanced aspects of the movement.

#24 The Venezuelan Exodus: A comparative analysis of the Venezuelan diaspora in the United States and Chile

Jazmin Montes
Faculty Sponsor: Elizabeth Pettinaroli, Department of Modern Languages and Literatures

The autocratic governance under President Nicolas Maduro in Venezuela has led to a complex economic and humanitarian crisis that has caused the once prosperous nation to decline and displaced nearly 8 million Venezuelans. The consequences of his governance have extended beyond national borders, as the northern and southern migration flow of Venezuelans flood into countries such as the US and Chile, in pursuit of political and economic stability. US migration policies have recognized Venezuela's situation as a humanitarian crisis, allowing displaced individuals to apply for asylum; Chilean migration policies have made it difficult for displaced Venezuelans to apply for visas or asylum, thereby forcing them to enter and live in the country irregularly. This paper aims to examine the history and context of Venezuela under President Nicolás Maduro and how his regime has displaced its citizens. The analysis will delve into the differences in migration policies impacting the migration flows of the Venezuelan diaspora in the US and Chile. This research contributes to cross-national comparative studies by analyzing the reception context of migrants in the US and Chile, exploring their migration laws, policies, and the realities faced by migrants in each country.

#25 "It's Your Turn!": The Impact of Peer Interactions on Narrative Development
Harper Jones, Anna Rush, and David Hart
Faculty Sponsor: Kiren Khan, Department of Psychology
The present study investigates the role of peer groups in narrative development within classroom settings. While sociocultural and interactionist perspectives emphasize the significance of social scaffolding, there has not been sufficient research completed on the specific impacts of group dynamics on narrative engagement. This study fills this gap by examining how peer group-level factors contribute to language and narrative improvements among children. A four-week summer kindergarten readiness program involving 37 children from predominantly low-income families was conducted, comprising 12 story-sharing circles led by undergraduate research assistants. Two types of circles were compared: friendship circles encouraging peer interaction and listening circles. Three undergraduate students coded children's comments for story relevance, requests for information, elaboration, supportiveness, repetition, and who the comment was directed to (peer or teacher). It is hypothesized that friendship circles will exhibit increased peer interactions, relative to the listening circles, suggesting the formation of a stronger peer group culture in these circles. This study demonstrates the significance of interactions between peer group dynamics and narrative learning processes, offering insights for educational practices and interventions in children who may not meet age-relevant narrative benchmarks.

#26 Hermitian Adjacency Spectra of Digraphs with Morita Equivalent C*-Algebras
Blair Kinsey
Faculty Sponsor: Christopher Seaton, Department of Mathematics and Statistics
A directed graph, or digraph, consists of a set of vertices and edges. These edges all have directions, meaning they point from one vertex to another. The Hermitian Adjacency describes which vertices are connected by an edge and which direction this edge points. There are six specific moves which maintain an interesting property of a digraph–the Morita equivalence class of the matrix's C∗-Algebra. However, all of these moves alter the digraph's Hermitian Adjacency Spectrum–the multiset of eigenvalues of the Hermitian Adjacency Matrix. Thus, we are investigating how this spectrum changes when we perform sequences of these moves and their inverses. Specifically, what happens when we add multiple vertices that emit an edge to the

same pre-existing vertex? What about when we split a single edge into a multitude of edges? How do repeated applications of these moves affect the largest element of the spectrum?

#27 Spatial Econometrics: Modeling Violent Crime
Jeremiah Cook
Faculty Sponsor: Ibrahim Abdelrazeq, Department of Mathematics and Statistics
Spatial econometrics is a field of study that deals with spatial dependence among variables. Pushing past traditional ideas of ordinary least squares regression, where independent variables explain a dependent variable to varying degrees, spatial econometrics uses geographical information systems to map data allowing for correlation between both independent and dependent variables while also adding spatial weights to these variables. For this project, I wanted to give a real-world application of these models. As most of us know, Memphis is infamous for being one of the most dangerous cities in America, and many studies have been completed examining several variables that correlate with high crime areas. My goal for this project was use spatial econometric models to find the least number of variables possible to predict crime rate, while simultaneously reducing the error term in the model and finding the most statistically significant spatial weights. This provides information on what variables correlated to increased crime should be prioritized and where the most impactful areas of this change would be. Upon finding the best model, I aim to demonstrate the powers of spatial econometrics and show how the analysis of spatial dependence can be a useful tool for decision making.

#28 Using Data Analysis and Statistics to Identify Respiratory Health Disparities
Jewelle Stone
Faculty Sponsor: Erin Bodine, Department of Mathematics and Statistics
Health disparities are preventable differences in disease, injury, violence, or opportunities to achieve optimal health. Urban (metro) and suburban (non-metro) areas differ in zoning. Metros may have industrial, commercial, and residential zones in close proximity, while these zones are separate in non-metros. Because of this, exposure to air-borne pollutants, a factor in respiratory diseases, can vary depending on location. Mortality and pollution data from the Centers for Disease Control and Prevention and the Environmental Protection Agency were collected for five respiratory illnesses and three air quality metrics. Statistical analyses were completed to identify and describe (1) disparities in respiratory illness deaths, (2) disparities in pollutant exposure, and (3) correlations between respiratory illness mortality and air quality across metros and non-metros. These topics were investigated in three U.S. states that are geographically distant and have notable metros to obtain results with broad application to the entire country. Initial findings provide insight into inherent health risks due to living area and the reliability of air quality measures as predictors in respiratory health outcomes. Current conclusions suggest a contrast in predictable mortality outcomes between metros and non-metros and point to a consistent trend in health equity - health disparities intertwine with disparities in resources.

#29 The Effect of Small Group Interactions on Opportunities for Student Learning
Lauren Surratt
Faculty Sponsor: Erika Parr, Department of Mathematics and Statistics
Incorporating group work in mathematics education is a common practice to enhance students' comprehension and engagement. Our research investigates the relationship between group

dynamics and mathematical learning, specifically within the context of undergraduate math students working in pairs to complete an “Interpreting Graphs for Calculus" activity. We analyzed 12 videos and corresponding written work using a preliminary analytical framework to explore knowledge and social aspects of group interactions. A diverse spectrum of group interactions surfaced, with some groups demonstrating high collaboration and others favoring independent approaches. Two prominent themes emerged: “pattern recognition” and “willingness to correct.” Pattern recognition involves students validating solutions through pattern identification from previous tasks. Willingness to correct explores the varied comfort levels students have correcting their peers, including missed opportunities for correction. We identified 19 clips of pattern recognition and 42 clips of willingness to correct in the 12 videos. Each clip was analyzed within its respective theme, revealing diverse subcategories. This analysis provides insight into the various ways students interact with one another and with mathematical content. Our research offers insights into the intricate dynamics of mathematical learning within group settings, with potential applications for enhancing mathematics education practices.

#30 Analyzing the importance of campus visits in predicting an applicants decision to enroll.
Oliver Hurst
Faculty Sponsors: Eric Gottlieb, Ibrahim Abdelrazeq, and Christopher Seaton, Department of Mathematics and Statistics
One of the most important statistics for colleges is their yield, or the percentage of accepted students that actually matriculate. Being able to predict their yield allows colleges to best plan for future years. As a result, colleges want to know what variables indicate a higher chance of enrollment. Previous research has demonstrated the importance of campus visits on an applicants decision to enroll. In particular, work done over 20 years ago pointed to campus visits being the most important indicator as to whether or not someone would enroll at Rhodes. These findings informed years of policy at Rhodes. But are campus visits still related to enrollment at Rhodes? This research, motivated by the Office of Admissions, aimed to answer this question by examining enrollment data from the past four years of admissions data. The correlation between campus visits and matriculation was analyzed using logistic regression.

#31 Analysis of Breast Cancer Prediction Using Classification Algorithms.
Sambhavi Lohani and Chathurika Abeykoon
Faculty Sponsor: Chathurika Abeykoon, Department of Mathematics and Statistics
This study aimed to predict the incidence of breast cancer using patient characteristics and routine blood analyses using a statistical model with regression techniques. We used a dataset available in UCL data repository which consisted of 64 women diagnosed with obesity-related cancers and 52 healthy controls were recruited from the Gynecology Department of the University Hospital Centre of Coimbra (Portugal) between 2009 and 2013. Linear regression analysis was done and identified the significant variables. Later a Logistic regression model was modeled to indicate the presence of cancer using the variables age, BMI, fasting blood glucose and resistin levels. Results indicated that higher fasting blood glucose levels were associated with increased odds of obesity-related cancer, with an odds ratio of 1.098 (95% CI: 1.052, 1.146). Additionally, BMI and resistin levels showed significant associations with cancer risk, while age exhibited a negative association. Interaction effects between glucose level and age were explored, with statistically significant findings suggesting complex relationships between

these variables. Finally, we compared the effectiveness of several classification algorithms in cancer patient classification.

#32 Who is Memphis?: Nostalgia, Space and City Identity
Coral Dawley and Mitchell Leander
Faculty Sponsor: Jacob Sunshine, Department of Music
This project explores the relationship between nostalgia, space, and city identity through the soundscapes of estate sales across Memphis. We gathered interviews and stories at estate sales across Memphis, speaking to homeowners, real estate agents, estate liquidation workers, and estate sale company owners. By collecting and organizing together a series of interviews, we developed a small glimpse into how estate sales exist within the larger picture of Memphis. We found they live in the space between that which is familiar and that which is detached. Participants were asked about their memories of a 'former Memphis,' their personal relationship to estate sales, and the culture that develops around the scene. As part of their cataloging, interviews were placed onto a soundmap according to the house the interview was conducted in. As well, audio from interviews were collected and assembled into vignettes, shifting between a nostalgia for older times and an explanation of present-day Memphis. Interviewees discussed fears of a changing and dangerous Memphis, citing a change in what it may mean to be a neighbor and stakeholder within Memphis. Beyond this, they shared what they feel they owe to objects and places of nostalgia and the memories that accompany them.

(F) #33 Reliable Low Earth Orbit Data Transfer - Authentication, Acknowledgements and Redundancy
Jose Pastrana, Anas K. Matar, Marouf Mohammad Paul, Zheng Yu Wong, Kamil Yousuf, Albert Nguyen, Kerry Tang, Hien Chau, Charles Robertson, Bentley Burnham, Brent Hoffmeister, Ann Viano, and Colin Mann
Faculty Sponsor: Jose Pastrana, Department of Physics
An ongoing engineering and research project, RHOK-SAT is a nanosatellite mission to characterize perovskite solar cells in orbit. Its flight software (FSW) is currently being finalized, undergoing extensive integration and testing. The most recent FSW feature additions, meant to increase the reliability of data transfer between the satellite and the ground, include an interrupt-based system that automatically determines data downlinking timeframes, command authentication as a means of prevention against bad actors, an acknowledgment protocol to track received experimental data packets and automatically request dropped ones, and added robustness to the on-board filesystem.

(F) #34 RHOK-SAT Integration: The Circuits and Sensors to Characterize Perovskite Solar Cells in Space
Damian Nguyen, Jasper Scherz, William Butler, Courtland Bai, Ryan McCrory, Ella Luking, Brayden Pallera, Charles Robertson, Bentley Burnham, Brent Hoffmeister, Ann Viano, and Colin Mann
Faculty Sponsor: Jose Pastrana, Department of Physics
RHOK-SAT is a 1U CubeSat with the mission to provide real-world engineering experience to students at Rhodes College. Its scientific goal is to characterize the performance and degradation of perovskites, a novel photovoltaic material, in low Earth orbit. This presentation will detail RHOK-SAT's up-to-date mechanical and electrical payload developments. The payload consists

of 36 experimental perovskite cells, one control CIGS cell, eight measurement microcontroller units, seven temperature sensors, and one sun sensor, all arranged across two printed circuit boards. The sun sensor is developed in-house from a quad-photodiode and a square aperture to determine the angle of incident sunlight on the satellite's payload face, signaling the on-board computer to begin collecting measurements. To prevent perovskite degradation, a switching circuit using multiplexers is being tested to put the cells under a resistive load when they are illuminated but not measured. As the custom components are finalized, the project enters a rapid testing phase that includes sun sensor calibration to account for shadows in its configuration, the characterization of perovskite degradation and self-healing properties, and the evaluation of the multiplexing circuit for correct operation. All tests are being conducted to gradually complete a fully integrated engineering model.

#35 Examining the reproducibility of in vivo bone density measurements at the femoral neck using ultrasonic apparent backscatter techniques

Grace I. Nehring, Lauren G. Boughter, Blake C. Lawler, and Brent Hoffmeister
Faculty Sponsor: Brent Hoffmeister, Department of Physics

The purpose of the study was to investigate the reproducibility of several backscatter parameters from human measurements using the portable Terason Ultrasound System. These parameters have been shown to have potential to be able to detect changes in the density of bone as caused by osteoporosis. Current technologies in these measurements require a separate ultrasound transmitter and receiver and are commonly made at the heel of the foot, so backscatter techniques offer an attractive solution to measuring bone density at other parts of the body. This study specifically addresses the use of the backscatter parameters in the femoral neck, as it is the most common fracture point for people with osteoporosis. The parameters used were the Backscatter Amplitude Decay Constant (BADC), Apparent Integrated Backscatter (AIB), Frequency Slope of Apparent Backscatter (FSAB), and Frequency Intercept of Apparent Backscatter (FIAB), all of which will be defined by the presentation. The study was conducted by taking repeated measurements on the same research students once a week over several weeks using the Terason, which resembles a fetal ultrasound device in probe size and operation. The signals were digitized by the device and analyzed in LabVIEW to produce results.

#36 Understanding Co-Curricular Service Programs: How do alumni understand the Bonner experience and sustain critical hope after graduation?

Leah Sullivan
Faculty Sponsor: Elizabeth Thomas, Department of Psychology

The Bonner Alumni Interview Project examines the experiences of young adults who participated in intensive undergraduate community service while students at Rhodes College. Very little research has examined co-curricular programs, such as the Bonner Program, and how they relate to ongoing identity, skills, interests, and civic engagement of college graduates. This project is a follow-up study to a four-year longitudinal project in which our team collected narratives from Rhodes College Bonner Scholars each semester. Bonners are required to complete over ten hours of community service a week. Our current research includes semi structured interviews with 20 Bonner Scholars who graduated from Rhodes between 2012 and 2020. We have found that alumni report being sustained by a sense of critical hope (Duncan-Andrade, 2009). Themes related to critical hope include material resources that support mental health, tools for navigating imposter syndrome, developing a professional identity, critical

reflection, and an ongoing sense of community. Alumni also report challenges that come from the obligations they feel as part of their identity as a Bonner scholar. Our poster will present findings as well as recommendations for colleges and undergraduate programs to equip students for continued democratic engagement and leadership.

(F) #37 Using Magnetic Particle Trapping and Transport to Investigate Magnetism at the Micro-Scale

Prannoy Lankapalli, Jackson Holley, Iesha Philips, Keith Hoffmeister, and Evan Duet
Faculty Sponsor: Gregory Vieira, Department of Physics

We study the guided transport of fluid-borne micro-scale spherical particles about grids of permalloy disks, driven by varying, weak (<100 Oe) magnetic fields. These microspheres, made of iron oxide encased in polystyrene, are designed for bioseparation of cells, proteins, DNA, and RNA, whereas they can be specifically bound to these targets allowing for field gradients to separate the particles from a mixture. We investigate phenomena that arise during transport of individual particles, for example variation in particle motion with external fields and transition from orderly phased-locked motion to less predictable phase-slipping behavior. We use results from these experiments to guide development of computer models for understanding magnetic characteristics of both the microparticles (i.e. susceptibility) as well as the permalloy disks (i.e. magnetization landscapes). Furthermore, we discuss recent updates to our lab's transport apparatus, including methods for minimizing unwanted surface adhesion and increased magnetic field stability.

#38 Transmural Ultrasonic Characterization of the Human Scalp

Thomas Conroy, Blake C. Lawler, Brent Hoffmeister, and Ann Viano
Faculty Sponsor: Brent K. Hoffmeister, Department of Physics

Transcranial ultrasonic techniques are being developed for both diagnostic and therapeutic biomedical applications. Transcranial ultrasonic waves propagate through scalp, skull, and brain tissue. While the ultrasonic properties of skull and brain tissue have been studied extensively, the properties of scalp are less well known. The goal of the study was to determine if the ultrasonic properties of scalp, specifically speed of sound (SOS) and frequency-slope of attenuation (FSA), varies through the thickness of the tissue. Specimens were prepared from four human cadaveric donors with ultrasonic measurements taken in a water bath at room temperature using a 25 MHz transducer. Preliminary results indicate that the speed of sound is slightly lower (<10%) in the upper region (epidermis and dermis) compared to the lower region (subcutaneous layer). FSA is much greater (>100%) in the upper region compared to the lower region. These results indicate that the ultrasonic properties of scalp are not uniform through the thickness of the tissue and that the attenuating properties of the tissue exhibit a strong transmural dependence.

(F) #39 Community-based Healthy-Aging Initiative: The Unique Relationship between Walking and Psychological Well-Being

Maya Ihling
Faculty Sponsor: Geoffrey Maddox, Department of Psychology

Most American older adults prefer to age in place, meaning that they prefer to remain in their personal residences rather than move to an assisted living facility. Many of the existing programs that aim to support healthy aging, while well-intended, fail to account for the specific preferences and priorities of different individuals and communities. The present research utilized several

online survey platforms to assess older adults' priorities, worries, and a range of factors that contribute to healthy aging in place (e.g., physical health, psychological health, safety of residence/neighborhood, social support, finances, weekly activities). Walking was the most frequently reported activity by older adults in the current dataset, with nearly two-thirds reporting that they walked during a typical week. Existing literature indicates that walking is an activity that supports older adults' physical health, but beyond this, the present findings reflect that walking is related to other components of older adults' lives such as, psychological well-being. Specifically, older adults that reported walking on weekly basis reported significantly higher ratings of psychological well-being. Discussion will consider how walking differs from other forms of exercise in supporting older adults' life satisfaction and well-being.

#40 Community-based Healthy Aging Initiative: An Examination of Self-Reported Cognitive Health and Psychological Well-Being in Relation to Employment Status and Activities in Older Adults

Asya Bray and Frances Himsl-Fenz
Faculty Sponsor: Geoffrey Maddox, Department of Psychology

Older adults typically prefer to age in place (i.e., remain in their residence for as long as possible) rather than moving to an assisted living facility. Recent research has identified four factors likely to contribute to an individual's ability to successfully age in place, including physical health, physical safety, psychological health, and resources. Moreover, abilities associated with successfully aging in place are predicted to differ across communities and groups of older adults. The current study utilized an online survey methodology to assess a range of factors that contribute to successful aging in place (e.g., cognitive health, finances). Furthermore, we assessed the priorities and worries held by our sample. Results suggest that employment status and recreational activities are associated with different outcomes in self-rated cognitive health and psychological well-being. For example, employed participants report higher cognitive abilities than retired participants. Discussion will consider how and why these factors may influence the self-rating of cognition.

#41 Prioritization of Cognitive Health and Personal Resources Differ across White and Underrepresented Older Adults

Claire Price
Faculty Sponsor: Geoffrey Maddox, Department of Psychology

According to the 2010 US Census, the percentage of Americans over 65 years old is growing, and a majority of these individuals express a preference to age in place (i.e., to remain in their current residence as long as possible). There has been an increasing emphasis in research to better support this preference; however, there has been a focus on White samples as they age, neglecting other racial and ethnic communities. Thus, aging programs do not cater to different demographic groups. The current study aims to examine factors that contribute to healthy, community-based aging and to understand the different aging-related priorities and concerns reported by White and Underrepresented groups. The current study utilized an online survey methodology to analyze four factors that can support aging in place (i.e., physical health, physical safety, psychological health, personal resources). Results suggest that many priorities and worries were consistent across groups in the current sample. However, prioritization of cognitive health and personal resources differed. The White group prioritized cognitive health more than the Underrepresented group. Then, the Underrepresented group gave more priority to

personal resources compared to the White group. Discussion will consider possible factors that contribute to differences in priorities.

#42 How Religiosity Implicitly Affects the Mystery Acceptance and Explanation Required for Religious Questions

Morgan Simmons and Deon Young
Faculty Sponsor: Matthew Weeks, Department of Psychology

At an explicit level, scientific questions have a greater need for explanation than religious questions. However, how does an individual's level of religiosity influence the way they require information or accept mystery at an implicit level? This research expands upon previous studies to discover how strongly an individual's level of religiosity impacts how they require information or accept mystery for religious cognitions. Participants will engage in an implicit Propositional Evaluation Paradigm (PEP) task that includes trials regarding religion-based statements to attempt to capture the relational information between their religious beliefs and the explanation required or mystery acceptability for religious cognitions. Following the PEP task, participants will engage in self-report measures to determine their level of religiosity and belief in science. We expect to find that individuals who identify as highly religious accept mystery more readily than those who are less religious, who would need an explanation regarding religion.

#43 An Agent Based Model of Memphis Workforce and Employment Barriers

Abigail Hultquist
Faculty Sponsors: Christopher Seaton and Erin Bodine, Department of Mathematics and Statistics

In Memphis, approximately 21.4% of the population lives below the federal poverty line, and over 23,000 are unemployed. Factors such as limited education, transportation challenges, and childcare issues exacerbate barriers to obtaining sustainable employment. To gain a better understanding of employment barriers and lack of living-wage jobs among Memphians, we developed an agent-based model that simulates the city's workforce dynamics. This model incorporates Memphis specific Census data, including education levels, median income by zip code, and the distribution of both employed individuals and available job opportunities. Each zip code in Memphis is represented as a patch on a grid, and individuals are matched to available jobs based on proximity, educational requirements, and other characteristics. Our aim is to identify which interventions have the greatest impact in alleviating the city's high poverty rates, as well as pinpointing where these interventions would be most effective. Initial findings suggest educational attainment is a large barrier to higher paying jobs, and the high segregation of wealth coupled with inadequate transportation infrastructure restrict access to sustainable employment opportunities for many residents.

(F) #44 An Examination of Peer Influences on Narrative Development in Pre-Kindergarten Story-Sharing Circles

Abigail Hultquist, Addy Mitchell, Kendall Dobie, Liza Ashe, Esther Ballesteros, Olivia Freeman, and Kaitlyn Sowers
Faculty Sponsor: Kiren Khan, Department of Psychology

There is growing evidence that peer relationships and interactions in a classroom context support children's problem solving, creativity, as well as their language development. However, the specific mechanisms through which peer interactions support children's language and narrative

skill development in early childhood is less well understood. The present research examines whether differential narrative gains were observed across two different types of story-sharing circles: one encouraging friendship and peer interactions and the other emphasizing active listening. A total of 37 children (M = 62.35 months, SD = 4.57) participated in a total of 12 story-sharing circles over four weeks. A matched-control design ensured comparable age, gender composition, and baseline language and narrative skills across the two groups. Each circle group of about 5 children was led by a trained research assistant and was prompted to take turns sharing stories about negative emotional experiences. It is hypothesized that greater narrative gains on number of story components included in children's stories will be observed in the friendship circles relative to the active-listening circles across the 12 sessions. Implications of this work on utilizing culturally-sensitive practices such as small-group, story sharing in supporting children's narrative and language skills will be discussed.

#45 Propositional Evaluation of The Moral Foundations and Religiosity
Mark Hastings and Matthew Weeks
Faculty Sponsor: Matthew Weeks, Department of Psychology
This study will explore the relationship between various aspects of religiosity and moral decision-making. Researchers have investigated the explicit connections between the Moral Foundations Questionnaire (J. Graham et al., 2011) and religiosity in the past. Various elements of religiosity, such as Religious Fundamentalism, belief in an authoritarian God, Biblical Literalism, Out-Reaching Faith, and religious identification have all been found to be significant predictors of the Authority and Care foundations of the MFQ. Despite this explicit research, the relation between religiosity and moral foundations at an implicit level using propositional methods has yet to be investigated. The current study aims to investigate the nature of the relationship between religiosity and the moral foundations of authority and harm. Using the Propositional Evaluation Paradigm (PEP), we will design an implicit measure of the Moral Foundations Questionnaire. We predict that biblical literalism, belief in an Authoritarian God, and outreaching faith will be related to people's endorsement of these two foundations. Based on prior explicit literature, we predict that higher levels of biblical literalism and belief in an Authoritarian God will be positively correlated with the endorsement of the Authority Foundation while outreaching faith will be positively correlated with the endorsement of the Harm Foundation.

#46 Mortality Salience and Religious Cognition Regarding "Think vs. Believe" Endorsement
Bella Kieklak, Mark Hastings, and Jack Veenstra
Faculty Sponsor: Matthew Weeks, Department of Psychology
Social cognition research suggests that the usage of "think" and "believe" reflects not only a linguistic choice, but also a difference in cognitive attitudes (Heiphetz et al, 2021). Our research aims to expand the understanding of think/believe cognitions by assessing the relationship between mortality salience and likelihood to implicitly endorse think/believe statements among individuals who vary in religiosity. Previous research has demonstrated that religious and non-religious individuals implicitly endorse supernatural entities at a greater rate when primed with thoughts of death (Jong et al., 2012). A potential explanation for these results lies in worldview defense theory, which posits that individuals more strongly endorse their cultural values, like religion and other related constructs, when confronted with death (Greenberg et al., 1986). The current research would clarify the relationship between mortality salience and think/believe

cognitions via the Propositional Evaluation Paradigm. We would extend the literature by showing that the endorsement of think vs. believe under mortality salience involves more complex cognitive processes, such as belief in the truth of certain religious propositions. We will also assess religiosity, as we predict this will mediate the relationship between the endorsement of the "believe" distinction within religious statements under mortality salience.

#47 Ensemble Perception, Entitativity and Discrimination of Average Socio-Economic Status Between Groups

Mary Gale Godwin, and Elijah Schwartz
Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble perception is a phenomenon that occurs when the visual system rapidly establishes a set of summary statistics for a briefly viewed set of stimuli. Evidence from previous experiments performed by our research team suggests that ensemble perception allows for extraction of summary information about socio-economic status (SES) from groups. The current study aims to examine where the threshold lies at which participants can no longer discriminate between the average socio-economic status of two groups. We constructed ensembles of individuals of comparable perceived socio-economic status using database images and corresponding SES ratings. After viewing two ensembles in succession, they were asked to discriminate if the second ensemble was higher or lower in average socio-economic status than the first. We first performed a pilot study using individual images to examine the SES discrimination threshold first between individuals. We then performed the same experiment using our constructed ensembles. The results of this experiment will provide evidence for the threshold of discrimination for socio-economic status between ensembles. Further experiments will implement an entitativity manipulation in order to examine whether participant perception of ensemble groups as a singular entity affects the discrimination threshold that we obtained from our initial experiment.

#48 The Effect of Individual Religiosity on Endorsement of Implicit Think vs. Believe Cognitions

Mary Gale Godwin, Kaavya Kasetty, and Leah Sullivan
Faculty Sponsor: Matthew Weeks, Department of Psychology

Heiphetz et al. demonstrated generally that "believe" tends to be utilized more in religious connotations in comparison to "think," which could be reflective of different cognitive attitudes (2021). Our research seeks to expand upon these established cognitive attitudes by determining if they differ implicitly based on level of individual religiosity. Müller and Rothermund (2019) established the Propositional Evaluation Paradigm (PEP) to measure implicit beliefs and attitudes, assessing people's endorsement of the statements through their responses. The participants will complete three tasks. First, through the PEP, we will measure the response times to religious statements to assess implicit religious cognition. Then, we will conduct a Post-PEP Survey using the Centrality of Religiosity Scale: a series of 15 questions to gain an understanding of how central religion is to one's personality. Lastly, the participants will respond to a demographic questionnaire asking them their age, gender, income level, race, and religious faith. We predict individuals higher in religiosity will show greater endorsement of believe statements than those lower in religiosity.

#49 "My Mom Threwed My Granny Out the Window": Peer Group Laughter in Children's Story Sharing Circles As an Index of Learning Engagement

Reed Dousevicz, Angelina Le, and Evan Meek
Faculty Sponsor: Kiren Khan, Department of Psychology

This study explores the role of laughter in story sharing circles on narrative development within classroom settings, an area relatively underexplored in existing literature. A four-week summer kindergarten readiness program involving 37 children from predominantly low-income families was conducted, comprising 12 story-sharing circles led by undergraduate research assistants. Two types of circles were compared: one encouraging peer interaction and another emphasizing active listening. Video data was coded by three independent coders to examine differences in group laughter between the two types of circles. It is hypothesized that friendship circles will exhibit higher levels of laughter frequency and duration, suggesting the formation of a stronger peer group culture conducive to narrative development. We also investigated the direction of laughter (peer or facilitator-directed) as well as the context of the laughter to identify which themes elicited the most laughter. We expected that in the circles where more laughter occurred, greater improvements in narrative would be apparent as well over the course of the program. This study sheds light on the nuanced interplay between peer group laughter and narrative learning processes, offering insights for educational practices and interventions.

#50 'I wish mine had thinking words': The Influence of Peer Comments in Supporting Young Children's Narrative Development

Lillian Drucker, Maya Ihling, and Sudiksha Polasa
Faculty Sponsor: Kiren Khan, Department of Psychology

The study at hand investigates the impact of peer group engagement on individual narrative development within the preschool classroom setting, an area relatively underexplored in existing literature. Sociocultural and interactionist perspectives emphasize the influence of adult-guided social scaffolding and adult-directed instruction, while the specific impact of peer group dynamics on learning environments remains less known. The present research fills this gap by examining how interactions that occur at a peer-to-peer level, particularly peer comments made between and after children's stories, contribute to language and narrative gains among children. A four-week summer kindergarten readiness program, Summer Success, was held involving 37 children from predominantly economically-disadvantaged backgrounds. The program was comprised of 12 story-sharing circles led by trained undergraduate research assistants. Two types of circles were compared: Friendship Circles encouraging peer interaction and Listening Circles emphasizing active listening. Video data was coded by three independent coders to examine group differences in peer-to-peer comments, specifically in levels of support, elaboration, and relevancy to the children's stories told. It is hypothesized that friendship circles will exhibit increased peer comments, suggesting the formation of a stronger peer group culture that is conducive to young children's narrative development.

#51 Propositional Relations between Race and Status

Matthew Weeks, Simone Khan, and Anya Lensink
Faculty Sponsor: Matthew Weeks, Department of Psychology

Previous implicit social cognition tools have measured associations between concepts, not propositions, which are how two concepts are related. This experiment's purpose is to see if a propositional correlation can be found between perceptions of race and social status. A survey

asking about participant beliefs regarding welfare is used to further understand these correlations. This is done using Propositional Evaluation Program (PEP) which measures participant responses to different statements that evaluate perceptions of race in conjunction with social status, financial success, and control over one's life. The PEP shows statements one word at a time with either the word "true" or the word "false" shown at the end. Participants are instructed to press one key for true and a different key for false. The PEP determines the type of connection between race and status concepts based on reaction time to responding true or false to the prompts. Theoretically, participants will be quicker to press true to a statement they implicitly agree with, and false to a statement they implicitly disagree with. Based off a preliminary round of data collection, the results indicate that those who identify as conservative and liberal connect racial categories and status differently from each other.

#52 The Effects of Religious Orientation on Think-Believe Cognitions

Georgia Link, Simone Khan, and Austin Rhea
Faculty Sponsor: Matthew Weeks, Department of Psychology

The goal of this research is to establish if there is any effect between religious orientation and endorsement of think vs believe statements. Previous research has established that individuals tend to associate "believe" with religious statements, and "think" with factual statements. This implies that "believe" and "think" belie two different and distinct cognitive attitudes. Religious orientation consists of extrinsic motivation, where people view religion as a means of social and personal benefits, and intrinsic motivation, where people view religion as an internalized meaning system that globally guides you. In our study, participants will complete a Propositional Evaluation Program (PEP), an implicit beliefs test that measures propositions between concepts. The PEP will measure how much religiously oriented individuals endorse religious and factual contexts when congruent with "think" or "believe". We predict that intrinsically oriented individuals will endorse "believe" with religious contexts stronger than extrinsically oriented individuals. This is because intrinsically oriented individuals identify with their faith as a set of principles meant to guide them, thus making religion more salient and comprehensively engaging to them than extrinsically oriented individuals.

(F) #53 Emotional judgments depend on perceived gender

Sheida Mirzaei Domabi, Ellie Leahey, and Jason Haberman
Faculty Sponsor: Jason Haberman, Department of Psychology

Recent studies show that the perceived emotion of a face may be influenced by its perceived gender — female faces are often seen as sadder than they are, while male faces are viewed as angrier. However, a major concern in how these studies are designed is that the stimuli (male and female faces) come from different identities, which introduces a confound: Are the differences in emotional perception driven by differences in gender, or by other unidentified differences between the stimuli. We address this concern by using identical faces across our conditions, and then bias perceived gender by introducing non-face cues (e.g., long hair for female faces). We generated morph sequences of androgynous faces (perceptually between male and female) from sad to angry, then feminized or masculinized them by modifying their hair styles. On a given trial, observers viewed sets of faces followed by an androgynous neutral face, and had to adjust its emotional intensity to match the perceived emotion of the previous set. Results revealed a significant bias toward viewing 'female' faces as sadder than 'male' faces, even though the facial

content was identical. This supports the notion that gender perceptions influence judgments of emotion.

RHODES COLLEGE VENTURE CHALLENGE FINALS

STUDENT COMPETITION
Faculty Sponsor: Eric Mathews, Entrepreneur-in-Residence
The Rhodes College Venture Challenge Finals is the culminating experience of our campus-wide entrepreneurial programs, spotlighting the exceptional talent and innovative spirit of our student body. This event invites faculty, students, alumni, and the broader community to witness the culmination of months of hard work, where the most promising ventures, developed by our brightest minds, are presented to a panel of judges. Finalists will pitch their new business models to a distinguished panel of alumni judges, competing for significant prizes and the opportunity to bring their business dreams to fruition. Beyond the competition, the showcase serves as a vibrant platform for networking, learning, and celebrating the entrepreneurial journey, offering all attendees a glimpse into the future of business innovation driven by Rhodes College's aspiring entrepreneurs.

URBAN STUDIES & HEALTH EQUITY
SENIOR SEMINAR CAPSTONE RESEARCH PROJECTS[1]

Tennessee Abortion Law in Practice: A Content Analysis of Tennessee Hospitals' Policies in a Post-Dobbs World
Chinmayi Alli
Faculty Advisor: Austin Harrison, Department of Urban Studies
The battle for women's rights is exemplified in many ways, but the most telling indicator of women's freedom is reproductive rights. Specifically, the most polarizing and politicized topic of reproductive rights is the right to abortion. During the Trump administration, one of biggest movements from the conservative right-wing group in the United States heavily lobbied against abortion access. This eventually culminated in the 2022 Supreme Court decision Dobbs v. Jackson Women's Health Organization that overturned the decades long ruling in Roe v. Wade, which guaranteed abortion access throughout the United States. Examining the policies that inform the everyday decisions made in clinics and hospitals across the country are especially important because they set the standards for care. However, there has been little research done to examine the actual content of institutional policies, which is the gap this study aims to fill. The data gathered from institutional policies will hopefully indicate which conditions or co-morbidities allow for a medically necessary abortion. However, the opposite might also be true that there could be guidelines that demarcate what does not constitute a medically necessary abortion.

Effects of Medical Weight Bias on Patient Perceptions of the Healthcare System: A TikTok Content Analysis
Kate Atchison
Faculty Advisor: Shaolu Yu, Department of Urban Studies
"Ask your doctor: 'how would you treat me if I was 100 pounds lighter?'" This quote from a TikTok video made by a woman sharing tips on how to advocate for herself as a heavier person

[1] Takes place in days leading up to Symposium

in the doctor's office demonstrates one thing: medicine has a weight problem. Not in the way Ozempic advertisements want you to think, but rather that people in bigger bodies receive worse treatment in healthcare settings because of their weight (Spalholz, 2016; Tomiyama et al., 2018). Research shows that the experience of weight bias in clinical settings is more detrimental to health than being overweight is (Flegal, 2021; Curtis et al, 2005; Orpana et al, 2010). Several studies have worked to demonstrate the negative effects of weight bias in clinics, but their methods lack a qualitative, narrative element that can truly communicate the effects of weight bias (Hatzenbuehler, 2016; Tomiyama et al, 2018; Bertakis, 2005). This study seeks to qualitatively analyze the effects of fatphobia in medical settings by conducting a content analysis of TikTok videos under the hashtags "medical fatphobia", "medical weight bias", "anti-obesity bias in healthcare", and "anti-fat bias in healthcare" on TikTok. The ten most popular videos under each hashtag were analyzed using inductive thematic analysis and coding in order to examine the effects of medical weight bias. Through this content analysis, I seek to better understand the effects of experiencing weight bias in medical settings on one's perception of their health, their providers, and the medical system.

Unveiling the Layers of Systemic Injustice for Black Communities: Evidence from Memphis, TN

Sophia Comrie
Faculty Advisor: Austin Harrison, Department of Urban Studies

This paper aims to highlight and dissect the myriad inequities that Black Memphians currently face due to ingrained racial injustices that hamper equal opportunities for housing, education, and food access. The question that I felt best represents this project is: How have housing segregation, educational inequality, and low food access perpetuated inequity and a lack of opportunities for the Black community in Memphis? I use an intersectional framework to examine these intertwined pieces of racial inequities in America, seeking to address the gap in literature concerning the interdependent reality of these various social inequalities. I am also guiding my analysis with a framework centered on the individualistic and exploitative mentality present in society, providing a lens through which I can examine how these racial inequalities are implemented and executed in our structures and social environment. I am conducting a case study on the Frayser neighborhood in North Memphis to analyze how these broader social inequities are developing within a certain area. I use content analysis of secondary data found online, and have time-bounded these sources from the 1970s to the present. My findings reveal the invasive and enduring nature of racial discrimination for Black communities around America, and display the role of society's individualistic and exploitative mindset in this social occurrence.

Impacts of Increased Gun Violence: Examining the Effects of Mental Health in Memphis Youth

Catherine Cunningham
Faculty Advisor: Austin Harrison, Department of Urban Studies

Historical research has demonstrated that gun legislation exerts no direct influence on gun violence rates in the United States (Murray, 1975), (Seitz, 1972), (Moorhouse & Wanner, 2006). Nevertheless, research supporting such conclusions often fails to account for alternative factors, such as social determinants (economic stability, education, built environment, social and community context, and health care), which have the potential to significantly influence firearm violence within communities. Communities of color have disproportionately experienced

fatalities from firearms, particularly those residing in urban areas (Giffords Law Center, 2023), (Kennedy, et al., 1996). Therefore, it is crucial to understand how both policy and community-based programs influence gun violence within urban settings. This research aims to comprehensively analyze potential solutions to the gun violence epidemic in the United States, focusing on the regions of Boston, Massachusetts, and Memphis, Tennessee, through a comparative exploratory approach. These findings have the capacity to notify city and state policymakers of pertinent issues, prompting the implementation of gun violence intervention strategies, enhancing access to mental health services, and shedding light on the lack of initiatives in specific neighborhoods experiencing elevated rates of gun violence in Memphis, Tennessee.

Faith-Driven Public Health: A Mixed Methods Review of the Impacts of Congregational Health Network in Memphis, TN

Catheryne Cunningham
Faculty Advisor: Austin Harrison, Department of Urban Studies

The public health field has been increasingly aware of the vital role that community, culture, and belief play in individual health outcomes. Religious communities have been in the spotlight as both religiosity and public health became politicized throughout the COVID-19 pandemic. The Congregational Health Network (CHN) in Memphis, TN is a program run out of the Methodist Hospital system, and it works to establish relationships between religious communities and the hospitals, harnessing preexisting trust within said communities to further public health efforts. During the pandemic, CHN partnered with participating congregations to distribute COVID-19 vaccines and tests. Since then, CHN has pivoted towards more community-centered, educational programming. This case study will provide data showcasing the efficacy of recent CHN programming while administrators and employed navigators of the program help provide a well-needed update into the workings and motivations of faith-community based public health work.

Wading Through Inequities: Exploring African American Swimming Disparities in the Southern United States

Nicholas Dillon
Faculty Advisor: Shaolu Yu, Department of Urban Studies

The notion that "Black people can't swim" has transitioned from stereotype to stark reality, evidenced by African Americans experiencing an unintentional drowning rate 1.82 times higher than White people (Moreland et al., 2022). While multiple studies have been conducted to identify the statistics justifying this disparity, there are still ongoing gaps on contemporary factors exacerbating this disparity. Following historical accessibility practices, this research explores the myriad of barriers hindering African Americans' access to the swimming community and culture, contributing to these alarming drowning statistics. This study engages with a diverse cohort of Black and White participants aged 18 years and older, spanning various income levels across the southern states, with a range of 10-50 participants to ensure representation. Employing thematic coding, participants' responses to interview questions will be analyzed for similarities and differences in perceived barriers to swimming accessibility and culture. Informed by previous literature, interview question categories have been broken up into the following themes: swimming ability, family bringing and influence, cultural perceptions and stereotypes, access and infrastructure, community and education, and socioeconomic factors and safety perceptions. Focusing on Memphis, a city deeply entrenched in racial history and

dynamics, this study will also utilize geographical maps to delineate current swimming facilities and operable swim school locations, overlaying them with demographic factors for further analysis. This research holds significant potential to empower African American communities by illuminating the multifaceted importance of swimming culturally, socially, in child development, and for health and safety reasons. By addressing these barriers, we aim to foster greater inclusivity and equity within the swimming community.

A Case Study of the Opening of a Free Health Clinic in South Memphis: Feasibility, public perceptions, and predicted outcomes on public health.

Rebecca Erickson
Faculty Advisor: Austin Harrison, Department of Urban Studies

This paper will delve into a case study of the opening of a free health clinic in South Memphis – a region of the city that has low access to healthcare services. The decision to establish a free clinic in South Memphis specifically will be justified by analyzing the existing healthcare infrastructure as well as rates of health insurance coverage. The investigation will illuminate the intricacies of this initiative, and document the process of what it takes to open a free clinic. Also, this report will discuss how community needs were identified through interviews and focus groups in order to provide the most needed health services, and to closely involve neighborhood residents in the start- up process. Lastly, the study will predict the potential outcomes on the public's health using existing data from other free clinic operations. By documenting the beginning stages of this free clinic, this report seeks to understand and explain the various challenges and benefits that arise in order to shed light on the feasibility and impact of this type of healthcare intervention. This case study aims to contribute valuable insights to the discussion surrounding community based healthcare initiatives, offering knowledge and recommendations to other organizations to build off of.

Online Benefit Applications for SNAP: Distressed Populations in Memphis

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Within the realm of social services, there have been attempts to improve accessibility by implementing online applications. This attempted improvement has impacted systems such as healthcare, transportation, education, the justice system, and most importantly in this research the Supplemental Nutrition Assistance Program. Creating mandatory interactions with social services in an online setting creates a disparity and can even harm distressed populations such as those who are homeless. The SNAP application has recently undergone a transfer to online applications which has made the process more difficult for those who do not own a computer or have wifi. The purpose of this research is to record the experiences of people who apply for SNAP online as well as those working at non-profits who assist in the application process. By recording these experiences the research will investigate the connection that non-profit organizations have to public services as well as cultural insights. This research done on SNAP in Memphis can be applied to many public services provided in that social services are imitating improvement by implementing online services. It is the goal of this research to make SNAP aware of general attitudes and personal stories surrounding their application process and user services.

Gender Bias in the Workplace: Comparison of K-12 Maternal Leave Policies

Regan Gray
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Navigating the professional landscape as a woman in the United States poses many challenges despite the United States having made great strides toward gender equality. In order to convey the depth of this issue, I will incorporate the persisting hurdles women experience in the workplace, exploring issues such as discrimination, unequal standards, and limited career advancement opportunities. My research specifically focuses on the impact of pregnancy on female teachers in academia and while many studies found that K-12 teachers are predominantly female, they are still vastly underrepresented in administrative and other leadership roles

Unraveling the Mind: Mental Wellbeing of Crisis Line Volunteers

Emma Gruss
Faculty Advisor: Shaolu Yu, Department of Urban Studies

Crisis lines around the nation depend on volunteers to provide suicide prevention efforts to those in crisis and emotional distress. Most call centers rely heavily on volunteers for call-taking to have the service available 24/7. While the effectiveness of crisis lines is widely studied, the mental health impact on volunteers has been understudied. This study explores the mental health impact of crisis line volunteers through a multi-method design in Memphis, Tennessee, including survey, interview, and observation. Surveys are conducted to measure mental health impacts and inquisition of their thoughts on the topic. Volunteer participants are interviewed discussing various duties of volunteers and impacts on their mental health. Additionally, observations are utilized at the crisis center in Memphis to document volunteer interactions with each other and the environment around them.

Perinatal Mental Health of Uninsured Women: A Case Study on Clinical Intervention Design

Adeline Harton
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Perinatal mental health disorders occur during pregnancy and up to twelve months postpartum affecting an estimated one in five pregnant women (Darwin et al., 2022). The largest predictor of perinatal mental illness is shown to be the type and quality of health insurance a woman has (K. Noonan et al., 2010). The present case study investigates the process of designing and implementing an effective and sustainable intervention in a state-wide medical system in Arkansas. The primary goal of the intervention program is to improve perinatal mental health outcomes for uninsured or underinsured pregnant women in Arkansas. By synthesizing previous research to inform the invention design, observing the process of formulation and implementation, and conducting semi-structured interviews with professionals this case study will gather evidence to support the need for the intervention along with strengths and weaknesses for intervention strategies to inform future processes.

Impacts of Dormitory Design on Student Health

Grant Head
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The idea of university and college dormitories as “temporary” housing has heavily influenced the designs behind dorms as well as how students interact with their “temporary” home (Lawless 2012). This framework of “temporary” design is necessary to understand the choices of designers

and institutions to understand their positions. However, it is also an important feature to remember when attempting to compare dormitory design standards to non-university setting high-density living, such as apartments. The impacts of many types of many residential buildings on occupant health have been well studied, however, the "temporary" aspect of dorm design prevents this research from applying to most dorm styles. My research seeks to identify health-based trends, including physical and mental health as well as personal comfort, across the various dorm designs found on Rhodes College campus. By better understanding the impacts of dorm design on student health, colleges and universities can make appropriate changes to improve student outcomes, both in personal areas, like health, and educational areas, like grades and campus involvement (Kowalski 2022). I expect my research to highlight the negative effects of viewing dorms as "temporary" housing including: the need for increased personalization; increased privacy (bedroom and bathroom); increased comfort (including thermostat control and more lighting options); and an all-around updated and more modern design in older buildings. My results will not pin-point every upgrade the college should make, but it will serve to represent the more desired features by the students (particularity dorm type) as well as highlight the biggest design flaws across the campus housing system.

Understanding Student Volunteers at Rhodes
Oliver Hurst
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Volunteering is often promoted by higher education and Rhodes College is no exception. With programs like the Laurence F. Kinney Program and the Bonner Center, Rhodes often encourages student participation in volunteering throughout the city of Memphis. While this volunteering is tracked, there is little understanding of why the general student body volunteers and what they gain from it. Volunteering offers an opportunity to feel a better sense of community in Memphis, but can also increase feelings of white saviorism, especially in the context of an affluent, white college in a majority black city. This work aims to understand why Rhodes students volunteer through the lens of the Volunteer Functions Inventory and how that volunteering affects them and their perceptions of Memphis.

Transportation Access in Relation to Healthcare in Memphis, TN.
Brooklyn Johnson
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Among the many social determinants of health, transportation access has a large effect on a person's health outcome. Over 3.5 million Americans per year do not receive medical care due to a lack of transportation. Access to transportation can have a major effect on healthcare outcomes. The goal of this project is to highlight the healthcare access disparities pertaining to transportation in Memphis, TN. For this research, public transportation routes as well as the locations of medical facilities: hospitals, urgent care centers, and doctors offices will be analyzed using ArcGIS.

Developing a Universal Pre-Kindergarten Framework in Shelby County, Tennessee
Elise Keller
Faculty Advisor: Austin Harrison, Department of Urban Studies
Pre-Kindergarten (Pre-K) programs have emerged as a critical focal point, supported by a growing body of research showcasing their numerous benefits. This literature review synthesizes

existing research to underscore the importance of Pre-K education, particularly in the context of Tennessee's Voluntary Pre-K program (TN-VPK) and its potential transition to a universal Pre-K system, with a specific focus on Shelby County.

This paper highlights the multifaceted advantages of Pre-K education, spanning academic, behavioral, and societal outcomes, and emphasizes the need for standardized quality metrics and data collection frameworks to ensure program efficacy and equitable access. Key findings reveal the positive impact of Pre-K participation on academic readiness, emotional development, and community welfare, underscoring the urgency for comprehensive standards and metrics. Addressing the current lack of standardized quality assessments, the review emphasizes the necessity of inclusive, informed standards and teacher qualifications to enhance program quality.

The Undocumented Narrative: Health Experiences of Undocumented Immigrants in Memphis, TN and Houston, TX

Maylin Lainez
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There are 46 million immigrants living in the U.S. and about 11.2 million have an undocumented status. The stigma and stereotypes revolving around an undocumented status can result in individuals living on the margins of their communities. Legal status is utilized as a tool to exclude undocumented individuals from benefits such as health insurance and work authorization. The undocumented population's health is influenced by the social, economic, and political effects of their immigration status. The constraints of an undocumented status lead to health obstacles that perpetuate a system of inequity. While there is plenty of research on the effects of acculturation on the health of immigrants, there is limited discussion about the intersection of legal status and immigrant health. Thus, this research highlights the way an undocumented status shapes health experiences by exploring the health barriers it causes. Confidential semi-structured interviews were conducted for undocumented immigrants to narrate their health experiences before, during, and after they migrated to the United States. This study also illuminates the wide range of health-preserving traditions practiced by the undocumented population in the face of structural barriers. This research uses El Nuevo South cities of Memphis, TN, and Houston, TX.

A Search for Spirituality in Memphis Secular Rap Music and Videos

Ali Liddel
Faculty Advisor: Shaolu Yu, Department of Urban Studies

Black deviant culture is typically equated with vices, premature death, and sickness. Memphis hip-hop is bound to low-income Black neighborhoods, which are afflicted by institutional racism and real-life violence. Media depictions (news, interviews) of rap culture are conflicted between criticizing the glorification of stereotypes, while equating it to the unfortunate outcomes of some mainstream rappers (Atkinson 2023; Pierre 2023; Green 2023). Individual/collective identities and spaces of creative resistance have been hijacked by intense commodification and commercialization from slavery to now (Judy 1994; Crossley 2005). This research study intends to use content analysis to examine the theme of spirituality in Memphis hip-hop lyric reflected in mourning, liberation, and/or spiritual warfare (Winters 2013). There are two main questions: How is the spiritual atmosphere of Memphis African American neighborhoods presented in hip-hop lyrics and music videos? How is the role of spiritual forces depicted in hip-

hop music and lyrics? Also, this research finds that the role of faith in music videos illustrates a breakdown of boundaries between the sacred profane spaces This analysis of rap music lyrics and videos seeks to emphasize the role of faith-based institutions and individual/collective spirituality in the formation of place and place identity of low-income Memphis neighborhoods.

Exploring the Potential of Universal Primary Health Care: A Comparative Study of Healthcare Models in the United States and Chile

Jazmin Montes
Faculty Advisor: Austin Harrison, Department of Urban Studies

This research examines the efficacy of the universal primary care model in addressing the issue of unaffordable access to healthcare in the United States. Despite substantial investment in healthcare and expansion of insurance coverage, the nation faces worsening health indicators and persistent challenges in providing affordable services. Both uninsured and insured individuals encounter coverage gaps and inadequate insurance provisions, perpetuating a cycle of "financial toxicity". Health policies in the US have contributed to the decline of the primary healthcare system, consequently limiting patient access to affordable healthcare. As a result, safety-net clinics have become crucial components of the U.S. healthcare system, providing free to low-cost services to those falling into the healthcare gap. Utilizing ethnographic research, this study investigates two primary care clinics exemplifying holistic healthcare: Church Health in Memphis, TN, and CESFAM clinics in Chile. Church Health, a faith-based nonprofit community clinic, provides comprehensive, holistic care to the working poor, funded through grants and philanthropy. Similarly, CESFAM clinics in Chile offer universal, comprehensive, holistic care funded through a national tax, ensuring access to all Chileans. This comparative case study argues that healthcare models like Church Health closely resemble the universal primary care system in Chile. It suggests that prioritizing primary care in U.S. healthcare reforms could facilitate the expansion of clinics similar to Church Health, providing quality, patient-centered, and affordable healthcare on a broader, universal scale. Such reforms would help bridge the healthcare gap in the United States, addressing the challenges posed by unaffordable medical services.

The Impact of Transportation Access on the Mobility of Rhodes College Students in Memphis

Lucy Page
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Transportation plays a significant role in the lives of college students on a daily basis. Some urban areas lack sufficient public transportation, resulting in great levels of transportation inequity in the area. In this study, an online survey was conducted among undergraduate students at Rhodes, located in Memphis, Tennessee. The objective of this research is to investigate the impact of transportation accessibility on the mobility of Rhodes College students in Memphis. The study findings may be of interest to the administrators at Rhodes College and the entire community at the school, as well as city planners who want to better understand mobility in Memphis. This research could help other liberal arts schools, especially those in urban areas, to recognize the transportation challenges faced by their students.

Disentangling Healthcare Access, Transportation, and Residential Segregation in Memphis, TN

Connor Sheehan
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The research delves into the persistent issue of healthcare accessibility in American cities, with a focus on Memphis and the disparities faced by communities compared to others. The practice of redlining emerges as a critical factor influencing accessibility, especially concerning healthcare services. Memphis is highlighted as a case study due to the history of racial inequality and segregation, drawing attention to the intricate relationship between redlining and accessibility via public transit to healthcare facilities, both private and public. Historically, discriminatory practices have had enduring effects on marginalized communities that have a lasting impact due to inadequate public transit infrastructure in place. My research aims to unravel and sift through the complexities of Memphis neighborhoods, providing a contextual understanding of how redlining directly impacts the accessibility of public transit to healthcare services and how it yields health disparities among communities.

Advancing Sustainable Transportation in Memphis through Insights from Comparable Southern Cities

Justin Thompson
Faculty Advisor: Shaolu Yu, Department of Urban Studies

Ask yourself the question: how can my city improve? When thinking of ways to improve urban livability, investing in sustainable transportation is often the first on the list. Memphis, like many cities, faces challenges related to limited mobility options. This research offers a geographically specific and contextually relevant exploration, emphasizing practical lessons learned and tailored recommendations for Memphis. The research adopts a holistic approach, considering social, economic, and cultural factors, contributing a nuanced perspective to the sustainable transportation discourse. For this study, data collection involves gathering documents, reports, articles, and relevant publications pertaining to sustainable transportation initiatives in Memphis and comparable southern cities. This includes official city plans, transportation policies, academic studies, community feedback, and media coverage. Overall, this research aims to examine both positive and adverse effects to provide a comprehensive understanding of the impact these initiatives may have on urban livability encompassing environmental, social, economic, and urban planning factors, such as changes in air quality, community well-being, economic growth, and the overall sustainability of transportation systems. By exploring these implications, the research seeks to inform decision-makers, urban planners, and stakeholders about the potential consequences of adopting sustainable transportation practices in Memphis and similar cities.

The Price Gap Between the Manufacturing Cost and the Selling Price of Medical Tools and Equipment

Maximiliaan Van Cauwelaert-de Wyels
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Ever wonder why medical bills are absurdly expensive? This study delves into the complex question of why there exists a significant price disparity between the manufacturing and selling prices of medical tools. The qualitative analysis identifies four primary factors contributing to this gap: government roles, medical tool lifespans, financial considerations, and "ill" intentions within the for-profit healthcare system. These four categories were developed throughout my

research to find similarities between sources. Government regulations play a crucial role in ensuring the safety and efficacy of medical tools, exemplified by cases such as Medtronic's product safety lapses. Additionally, supply chain dynamics and environmental impacts further complicate pricing dynamics, with regulations emphasizing the importance of clinical evidence and cost-effectiveness. The lifespan of medical devices, explored through life cycle assessments, reveals the environmental footprint of the healthcare industry, driven by trends toward single-use products. Financial considerations, including regulatory requirements and value-based purchasing, highlight the economic complexities faced by manufacturers. Moreover, the presence of "ill" intentions in the for-profit healthcare system accentuates challenges in balancing profit motives with the provision of quality, affordable medical services. Potential solutions may involve improved regulatory practices, environmentally conscious manufacturing, and efforts to align profit motives with accessible and high-quality healthcare services.

Examining the Influence of Historic Redlining on Racial Disparities in Neighborhood-Level Health Outcomes

Bennett Vaughan
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This research delves into the persistent impact of historical redlining on contemporary racial health disparities in Memphis, TN, with a focus on environmental injustice as a potential mediator. Historically, redlining, and other discriminatory policies led to the racial segregation of neighborhoods, resulting in profound disparities in wealth and disinvestment. These systemic inequities have perpetuated environmental exposure disparities, positioning redlining as a significant contributor to environmental injustice in U.S. cities. Through an examination of associations between historical redlining and present-day environmental exposures, this study aims to elucidate the underlying mechanisms driving racial health disparities in Memphis. Leveraging data from the 1930s HOLC maps and contemporary environmental databases, spatial and statistical analyses will be conducted to explore the relationship between redlining, current environmental conditions, and demographic factors. Spatial analyses will visualize the spatial distribution of HOLC risk grades, demographics, and environmental indicators, illuminating patterns and disparities. Statistical analyses, including linear regression and beta regression models, will assess the relationships between HOLC grades and environmental indicators while controlling for relevant variables. By adopting this comprehensive approach, the study aims to uncover the intricate pathways through which historical injustices persistently shape health outcomes in Memphis, shedding light on potential avenues for intervention and policy reform.

Rhodes College

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