



2022 Conference Program

April 8, 2022

While we may be smaller and just representing Butler University this year, the research that the undergraduate students have completed is remarkable. *Thank you* faculty and students for your dedication to undergraduate research and creative activity!

Presenters! Please check in at Irwin Library for your nametag!

2022 URC Schedule	
Oral Presentations	Poster Presentations
Location: Various	Location: 1 st and 3 rd Floors, Irwin Library
Session 1: 12:30 – 1:30 PM	3:00 – 4:00 PM
Break: 1:30 – 1:45 PM	Group A: 3:00 – 3:30 PM
Session 2: 1:45 – 2:45 PM	Group B: 3:30 – 4:00 PM
Break: 2:45 – 3:00 PM	Break: 4:00 -4:30 PM
Keynote Speaker	
Dr. Anna Krylov	
Professor of Chemistry, University of Southern California Visiting Phi Beta Kappa Scholar	
Molecules and Light: A Story of Life, Death, and Our Quest for Knowledge	
Atherton Union, Reilly Room	
4:30 PM	

Conference Director: Anne M. Wilson

Conference Coordinator: Melissa Friedman

The URC Conference Organizers would like to thank the staff members from University Events, Facilities, Registration and Records, and the University Library for their valuable contributions.

Please join us for the Undergraduate Research Conference Keynote

Dr. Anna Krylov
University of Southern California

Molecules and light: A story of life, death, and our quest for knowledge

April 8, 2022

4:30 pm

Reilly Room

Interactions between molecules and light are essential to life on Earth. They play a key role in the natural and artificial harvesting of solar energy that powers our planet. On the other hand, light can damage living organisms and materials by producing reactive open-shell species. Interactions between molecules and light enable us to study the world around us, whether we are using ordinary visual perception to see objects on a macroscopic scale, spectroscopy to examine objects on a microscopic scale or far out in space, or interrogating processes in live organisms with atomic-level resolution. This lecture will discuss molecular-level picture of light-induced processes and highlight the role of computational chemistry in developing better bioimaging probes.

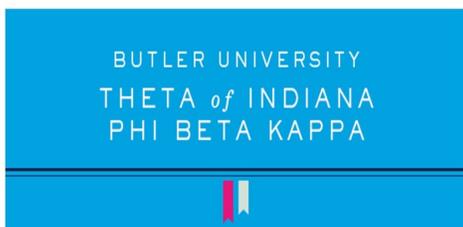


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Moderator: **Elise Edwards**

Presenter(s): Andrew Hauber

12:30 PM

Faculty mentor: Elise Edwards

Exploring Japanese Pop Culture Fandom in the United States

Despite being a globally dominant media industry, Japanese popular culture's place in American culture is, in many ways, contradictory: It is simultaneously mainstream and niche; It is progressive and regressive; And it is both intensely Japanese and culturally ambiguous. It is within these contradictions that fans of Japanese pop culture must navigate its media landscape. This is further complicated by the fact that many of these fans have no experience with Japan (outside of media consumption), and thus they do not have the cultural context to fully understand the content they are consuming. Jpop's complex western identity has bred a fan culture (fandom) that itself is equally complex and contradictory. It is one that allows for deeply niche shared experiences between its members yet is heavily fragmented by gatekeeping. It also, like many fandoms, is highly participatory – despite it (in the U.S.) being far removed from its country of origin. In this presentation, I will be examining the Japanese pop culture (colloquially referred to as the Otaku) fandom in the United States to better understand how it functions in an American cultural context.

Presenter(s): Erin Mahan

12:45 PM

Faculty mentor: Elise Edwards

Is The Ivory Tower Made of Glass?: Examining Work Experiences of Women Faculty at Butler University

Women face many inequalities in the workplace in the United States. In the working world of higher education, women academics face disparities regarding their compensation, promotion, and treatment compared to their men counterparts. In order to create a more equal work environment, it is important to recognize the factors that play into gender inequality within the workplace. For this project, I used ethnographic interviews, existing literature on the topic, and a survey to examine the experiences of women faculty at Butler University and how gender has affected their work experience. The guiding research question for this study is: "What are the structural, cultural, and situational factors that affect women faculty's experience at Butler University?" While my project focuses broadly on women as an identifying group, it also requires that I attend to the intersectionality of individuals' experiences as issues such as race, ethnicity, sexual orientation and disabilities are also factors shaping women's lives at work. My hope is to use the information from this study to draw attention to the experiences that women faculty have related to their gender and potentially facilitate change starting at Butler University. In this presentation I will discuss some of the structural, cultural, and situational

factors that shape the experiences of women faculty at Butler University and create gender inequities. I will present specifically on the gendered issues of tenure, equality of pay, difference in types of work, and familial obligations as these seem to be the most prominent findings from my research at Butler.

Presenter(s): Emily Paff

1:00 PM

Faculty mentor: Elise Edwards

Redpillng Normies: An Ethnography of Alt-Right 4chan Discourse

The alt-right is an ever-growing presence in American society yet little is known about their strategies for political organizing and engaging and growing their following. Through the popularization of the internet, individuals' ability to access far-right ideology and form communities around it has become increasingly easy. While there have been many attempts to limit alt-right rhetoric online, no such attempts have been made on 4chan.org. That paired with the level of anonymity present on the platform has allowed alt-right rhetoric to flourish with no repercussions. This project takes an ethnographic approach to examine redpill discourse on 4chan's /pol/ board to better understand group behavior.

Presenter(s): Katrina Sandefer

1:15 PM

Faculty mentor: Tom Mould

Bird's Eye View: The Construction of Identity and Community via Social Media of Cirque du Soleil Performers

Cirque du Soleil reinvented and reinvigorated the demand for circus arts over the past four decades since its founding in 1984. With the popularity of social media on the rise, Cirque du Soleil performers have been using these platforms to share their experiences and give an inside look into their communities. Not only are they sharing their experience of Cirque du Soleil, they are sharing their experience of circus arts generally, revealing how circus arts have allowed them to shape their identity. Previous research focuses on why individuals join Cirque du Soleil but has done little to evaluate how performers construct a shared community ethos while crafting distinct personal identities. This research looked into both within the context of interactions with their large fan base on social media.

I analyzed videos posted by Cirque du Soleil performers on TikTok, looking specifically at how performers construct and convey their community and personal identities over social media and how they might complement or conflict with one another. By looking at common characteristics of the community, as well as how performers interact with their fan base in the comment sections of their videos, I gained insight into different aspects of identity construction and negotiation on social media.

Moderator: **Tom Mould**

Presenter(s): Kynneddy Masheck

1:45 PM

Faculty mentor: Tom Mould

A Folkloric Exploration of Russetid: The Ritual Norwegian Transition to Adulthood

Russefeiring (Russ celebration), the Norwegian celebration of high school graduation, is a coming of age rite of passage for contemporary Norwegian youth. Past research has suggested that Russetid (the time of Russ) features the intensified use of alcohol to construct the liminal ritual space and to facilitate social equality, allowing russ to explore their identities with low stakes. However, qualitative interviews with 8 Norwegian young adults suggests that russetid functions to uphold cultural conceptualizations regarding social class, gender, and alcohol use and is not an institution which facilitates equality or social experimentation/self expression. Students self-police each other based on the aforementioned stigmas through physical violence, peer pressure, and harassment.

Russetid's cultural significance comes from its reflection of important Norwegian cultural values. The interviews conducted emphasized the importance of social class, secularism, sexuality, patriotism, nationalistic pride, and gender roles in Norwegian society. Russetid teaches these values through an intensified ritual performance, enculturating russ into the culture of Norwegian adulthood, establishing a concept of Norwegian identity, and creating a homogenized population with a collective system of beliefs regarding the aforementioned themes. The aspect of alcohol use is particularly important in Norwegian culture and Russetid. Excessive alcohol consumption introduces the drinking culture of Norwegian adults to Russetid participants who are newly of drinking age. Taken in its entirety, the Norwegian tradition of Russetid offers a powerful window into both shared and contested values of Norwegian adulthood.

Presenter(s): Ericela Sahagun

2:00 PM

Faculty mentor: Tom Mould

Hispanic Hoosiers: Ethnonym use among the Hispanic population in the Midwest

This study expands on previous research on one dimension of ethnic identity construction within the Hispanic community by considering ethnonym usage. A majority of the research on Hispanic identity in the U.S. has been conducted in the western region of the country. However, regional differences with varying concentrations of Hispanic populations can have a huge impact on ethnic identity and by extension, ethnonym adoption and usage.

For many, ethnonyms are symbols of who a person is, how they perceive themselves, and how they want the world to perceive them. Previous studies have acknowledged the relationship between ethnic identity and ethnonym choice, yet fails to address the specific factors that impact ethnonym choice, codeswitching, and how different terms index different identities.

Using both quantitative and qualitative methods that included an anonymous online survey followed by interviews with Hispanic college students throughout the state of Indiana, data revealed more familiarity and usage of terms such as Hispanic and Latino in comparison to Chicano and Latinx. Both the survey and interviews spoke on family and regional influence, community, generational differences, biculturalism, legal status, societal pressures, Spanish language retention, and pressures. For some, identifying with Hispanic is preferred due to its greater usage and familiarity in the state of Indiana than other ethnonyms. However, usage of Latinx is generally expected in specific environments, like academia, in order to practice inclusivity. Nonetheless, individuals demonstrated that adopted ethnonyms acted as symbols of both resistance and expression of cultural identity.

Presenter(s): Braxton Martorano

2:15 PM

Cameron Ellison

Emily Fales

Faculty mentor: Tom Mould

Shaping Perspectives: Collection and sharing of personal narratives to build racial allyship

Researched background information and techniques to apply narratives gathered by minority and majority students regarding their experiences as Butler students. Then, share personal narratives as educational and informative tools to implement into Butler University orientation and student presentations/workshops in the coming years and beyond as an attempt to set the standard of Butler's social climate and to build greater racial allyship.

The process to the research and presentations are based on anthropological techniques of active perspective taking, moral reframing theory, and social norms theory to soundly apply narratives to shift perspectives. Claims have been developed based on the interviewing of 16 Butler students and the stories they shared.

Moderator: **Peter Wang**

Presenter(s): Caroline Duncan
Faculty mentor: Gautam Rao

12:30 PM

Straight to the (Needle) Point

When I was young, I would create when I wanted to. Time was abundant back then, I had time for pearler beads and lanyard keychains. A closet in my hallway was filled with how-to booklets and an ever-accumulating stock of half used art supplies.

What no one tells you as you grow up, is that those urges you feel when you're a kid are what your soul yearns for before you learn to ignore it. It's your soul telling you how to feel fulfilled.

As a Sophomore at Butler, I realized two things, seemingly unrelated. The first, I wasn't enjoying going to school the way I used to. The second, I hadn't opened that art closet in 6 years.

What I had thought was a meaningless hobby, an unproductive use of my time because it couldn't be put on a resume, I would come to find, is actually a priceless coping mechanism for dealing with everything that does go on the resume.

Throughout my two years at the Butler Arts Program, I've learned more about how to distinguish the important things in life, than I have in my prior 19 years of life.

To me, tufting isn't just an arrangement of yarn and cloth- it's the materialization of several hours of activity. It's the difference between feeling like I wasted an entire day, and having something tangible to prove that I didn't.

Presenter(s): Jannelyn Santos
Faculty mentor: Gautam Rao

12:45 PM

Reclamation - A story of owning my identity and passion

I have always been very proud of my identity and heritage. As a Filipino-American growing up in Indianapolis, however, it has always been difficult for me to find and connect with people who are like me. As a result I often suppressed myself up until college. Freshman year came around and I decided to make the change by throwing myself into a Filipino Student Association (FSA)—at a school I had never stepped foot in, and a place where I didn't know a single person. Ever since, I have been thankful for the connections and memories I have made at the student organization and my decision to be courageous and go after things I desire.

By the beginning of my Junior year, I also chose to go after my artistic passions, which were always suppressed by my own facade that being a STEM major was absolute and non-negotiable. But then I had a conversation with my Lola (grandmother in Tagalog). She had a pencil in hand as she drew the last petal of a magnolia flower onto a napkin; she told me she wished she had gone to school for the arts.

Presenter(s): Chrislyn Marrs
Faculty mentor: Gautam Rao

1:00 PM

City Living with Country Cooking: Botanical Decor Posters inspired by Farm to Table Recipes

Farmer's Markets provide communities with fresh, healthy produce that can be used to make a variety of recipes. In this project, I will make botanical posters that display fruits and vegetables which that can be found at any local farmer's market. The fruits and vegetables on each poster will create a vegetarian recipe which will be written at the bottom of the poster. The inspiration behind these posters is based on my love for illustrative art, home decor, and sustainable food practices.

Growing up on a farm instilled habits of growing organic food and using produce to cook many different meals. Since moving to the city I have fallen out of this practice. However, recently I have started buying from farmer's markets again and using the products to make meals. Since practicing more farm-to-table habits I have found this food helps me feel healthier and have more energy. I want to share this through my artwork in hopes to raise awareness for farmer's markets and the benefits of eating organic.

Each poster is done on mixed media paper and using gouache to paint the different produce. Once the gouache dries I will go back in with fine-tipped pens to give the produce detail. I have chosen recipes that I have made and require mainly vegetables or fruits to make. My hope for these posters is to be used as home decor for kitchens or dining rooms while also providing an easy, healthy recipe that anyone can make.

Presenter(s): Brookelynn George
Faculty mentor: Wendy Meaden

1:15 PM

Light Design and Its Essence of Storytelling

Light design is an essential part of any bit of storytelling, whether it be film or theatre. I am going to discuss how my lighting design for We Are Proud to Present, aided in both making the actors on stage comfortable while making the audience uncomfortable. I will also be going into detail about how best to approach designing a show and the artistic process it takes while highlighting some lighting choices that others have made in professional projects like films and theatre.

Moderator: **Gautam Rao**

Presenter(s): Josephina Levin

1:45 PM

Faculty mentor: Gautam Rao

The World 2

My presentation is an extended roll of canvas that tells two stories, one literally framing the other. It explores the creation of a new world in a combination of different mediums and meditates on the content of a world made to sate desire.

Presenter(s): Olivia Heinecke

2:00 PM

Faculty mentor: Steve Nyktas

The Heart of the Problem

We are cautioned constantly about various harmful diseases. However, the deadliest disease tends to be overlooked. Heart disease takes the lives of more than half a million people in the United States every year, yet there is a lack of discussion to address the epidemic at hand (Hill). This is largely due to the “blame the victim” stigma surrounding the generally preventable range of complications. While 80% of cardiovascular disease is avoidable, not every individual has the means of achieving a lifestyle necessary in averting the conditions and their symptoms. For this creative art project, I want to encourage education and dialogue on heart disease and its corresponding preventative inequalities through traditional art media, drawing and painting, as well as art installation displayed in a gallery setting.

Presenter(s): Anna George

2:15 PM

Faculty mentor: Gautam Rao

Monochromatic Backgrounds

My senior thesis is painting objects with monochromatic backgrounds. For me it's hard focusing on one subject for long periods of time because my mind constantly races. If I painted multiple portraits, or multiple landscapes, I would eventually get tired of the repetition. The main reason I am so passionate about the monochromatic backgrounds is because I get to jump around with the subject matter. What ties everything together is the style of paintings and not the subject. I am working solely in oils which is a media I started experimenting with after the death of my grandmother. Before her death, I primarily worked in acrylics. My grandmother is the one who taught me how to paint. After her passing my aunts and uncles went through her stuff, and

they all felt like I should have her paints, brushes, and palette knives. In honor of her I started experimenting with oils, and found a deep love for it.

When it comes to the subjects, I like creating lonely characters. Not every character or painting will have a depressing note, but some of them do. My first painting for my thesis is a naked lonely alien, and my second is a crying raincloud. The monochromatic background makes all the paintings readable as a group.

Presenter(s): Jamie Tarman
Faculty mentor: Gautam Rao

2:30 PM

For the Love of Cats

Through a series of interviews, photo shoots, and digital paintings, I plan to get to the bottom of why cats are far more than just pets. My love for cats began in July of 2007 when I brought home a yellow kitten that I named Butters. He was my companion for 13 years. To the moment he took his last breath in my arms in January of 2021, there was no doubt that we belonged to each other and our bond would be forever unmatched.

To honor the love Butters and I had for each other, I sought out cat owners who talk about their cats like they are their children. Why are cat people so crazy about their cats? Well, it might have to do with their intuitive nature, unique personalities, and unabashed loyalty to the person they claim. The photoshoots of these beloved pets have assured me of this. The digital paintings that are created from the reference photos of the cats help to capture the one of a kind nature within each of the little creatures. This series, with its bright colors and lighthearted stories, is intended to spread the joy that our cats have brought into our lives.

Presenter(s): Mia Nunokawa
Faculty mentor: Brian Weidner

2:45 PM

Comparison of Japanese and American Band Programs and How They Define and Achieve Success

Japan maintains thriving school band programs famous for their technical proficiency and musicianship. Despite their international fame, the processes the bands go through to achieve technical proficiency and musicianship remain largely undiscussed. This research compares how Japanese and American school band programs define and achieve success. This comparative study investigates philosophical differences between American and Japanese band programs: structure and the purpose of the band programs, director identity, the role of the audience, and student autonomy. The result was attained by interviewing Japanese and American band directors and analyzing their interview responses.

Moderator: **Bryan Foltice**

Presenter(s): Makayla Masse

12:30 PM

Faculty mentor: Jane Siegler

Nearshoring the Semiconductor Supply Chain: Analysis of Risks and Capabilities

Should the U.S. nearshore semiconductor manufacturing? If so, which part of manufacturing should be nearshored? How will this address the current risks and capabilities of this industry's supply chain? This presentation seeks to address these questions through an analysis of 45 semiconductor companies and their applicable company reports as well as interviews conducted with those who have worked in the industry. Following the supply chain issues of Covid-19 and the U.S. 's statements about hoping to invest in semiconductor infrastructure, this topic has never been more important to explore.

Presenter(s): Michael Parker

12:45 PM

Faculty mentor: Bryan Foltice

Economic Implications of State-Wide Covid-19 Response Aggressiveness

There is a breadth of literature examining the impact crises have on different local economies/industries. COVID-19 is a unique crisis in that it transverses time and spatial boundaries; its start and end are unclear and its effects last over a period of time.

We examined industry comeback from COVID-19 across all states, based on taxable sales, unemployment, and GDP data. We factored in each states aggressiveness rating (how strict was each states response-masks, business closures, etc.), along with their average working age, percentage of white residents, population density, and population with a bachelors degree to see which factors mostly strongly correlated to shifts in the aforementioned variables (GDP, taxable sales, etc.). We did this by running a regression analysis and finding P-values that were statistically significant.

Overall, our research presents some of the first findings regarding the economic impact of COVID and adds to the existing crisis and economic resilience literature.

Presenter(s): Nicholas Hughes
Faculty mentor: Bryan Foltice

1:00 PM

Planning for Debt: An Analysis of Drivers of Financial Knowledge on Personal Debt Strategy

This study has analyzed four significantly impactful drivers of financial knowledge (numeracy, cognitive ability, financial literacy, and anxiety towards math & finance) as they pertain to individual understandings of student loan schemes as well as an individuals' preconceived strategy to repay their debt. The goal was to link the aforementioned drivers of financial knowledge with a participants preconceived debt repayment strategy. Overall, the research revealed no statistically significant links between the sample population and planning for debt, however, it does reveal more drivers of financial literacy than previously studied.

Presenter(s): Logan Harris
Faculty mentor: Jane Siegler

1:15 PM

A Century Old Law and its Impact on US Logistics Bottlenecks on Covid-19 Age

The Jones Act of 1920 regulates maritime commerce in the United States and requires all goods moving between two US points to be American-built, owned, crewed, and flagged. The law was presented right after WWI as a plan to ensure adequate domestic shipbuilding capacity and a ready supply of merchant mariners to be available in times of war or other national emergencies (Grabow et al, 2018). However, a century later, this law has become an innovation and logistics bottleneck, as US coastal ports are overfilled due to truck driver shortage, increased demand in consumer products, and worldwide supply chain constraints. This research compares over 100 ports in the US and Europe inland ports with over 6,000 data points collected from the Bureau of Transportation Statistics and Eurostat covering 13 variables (cargo type, trade type, units of measurement, port name, port ranking, channel depth, country, region, state, year, volume, coastal port, and access to waterways). The goal is to understand the possible benefits of allowing foreign ships into US inland waterways.

Moderator: **Mark Macbeth**

Presenter(s): Jessica Kersey

1:45 PM

Faculty mentor: Geoffery Hoops

An Exploration of the Substrate Specificity and Catalytic Triad of the Serine Hydrolase, BS2

The BS2 enzyme, stemming from *Bacillus Subtilis*, can be used in cell biology research to monitor protein to protein interactions that occur within a cell when used with a kinetic assay to create a fluorescent signal. BS2 is a serine hydrolase with a relatively unknown substrate specificity. This experimental study was focused on comparing how different fluorogenic substrates react with the wild-type BS2 enzyme, and an insight to how the catalytic triad functions. The experiments were performed using a kinetic assay, analyzing the Michaelis-Menten Curve, and then comparing the k_{cat}/K_m values of the hydrolysis reaction for each of the fluorogenic substrates. The catalytic triad activity was analyzed through mutagenesis to each catalytic residue (Ser189, His399, E310) and analyzing how the activity of the enzyme was altered. This study allowed for a better understanding of BS2's substrate specificity and how the catalytic triad functions in the enzyme to create the catalytic activity. In the future this could allow for a potentially more efficient probe for protein interactions can be determined.

Presenter(s): Josephine Fieger

2:00 PM

Faculty mentor: Carl DeAmicis

Investigation into Renewable Chemistry: Synthesis of Amides using Bio-based Solvent Cyrene

Amides are found in proteins and polymers. They have been shown to promote tissue healing due to their biocompatible relationship with monocytes, leukocytes, and platelets. Amides are synthesized by condensation of a carboxylic acid and an amine, using an amide coupling reagent as an activator (DIC, EDC, or HATU) and a dipolar aprotic solvent such as DMF. However, DMF has been shown to be toxic to the liver. This research study compared amide synthesis yield in DMF and a bio-based solvent, Cyrene. Cyrene is a dipolar aprotic solvent that has the benefits of being biodegradable and inexpensive as it is derived from pine trees.

Presenter(s): Ben Rempfer
Faculty mentor: Gonzalo Ordoñez

2:15 PM

Manipulating Quasi-Bound States in a Photonic Crystal with Periodic Impurities to Store Quantum Information

We analytically model a one-dimensional lattice with periodic impurities representing a photonic crystal. We then investigate bound states in the continuum by computing the transmission coefficient and the reflection coefficient. It turns out that when there are more impurities in our system there exist more wave numbers where the particles in our system become essentially trapped. Due to this window of wavenumbers, in theory, quantum information could be encoded in our system by constructing differently shaped wave packets that are bound by the tuning of parameters in our system.

Presenter(s): Kaitlyn Roberts
Faculty mentor: Geoffrey Hoops

2:30 PM

Probing the substrate specificity of variants of Isoleucine 276 of the TM0077 enzyme from *Thermotoga maritima*

Enzymes, serving as natural catalysts for biochemical reactions, exhibit some degree of substrate specificity. To lower substrate specificity and increase catalytic potential, enzymes can be mutated by changing the amino acids in their active site. In the present study, the TM0077 enzyme isolated from *Thermotoga maritima* was mutated at its Isoleucine 276 residue to produce variants with differing catalytic flexibility. The variant enzymes were grown in *E. coli* cells and purified using Nickel-affinity chromatography. For analysis, scanning fluorimetry and Michaelis-Menten kinetics were used to determine the relative efficiency with which the variant enzymes could utilize a bank of different chemical substrates.

Moderator: **Lynn Kvapil**

Presenter(s): Elisha Fieffer

12:30 PM

Faculty mentor: Lynne Kvapil

Understanding the Unknown Through an Etruscan Duck Askos

In a world fascinated with ancient artifacts and the concept of originality, does the possibility of a piece being fake mean it is worthless? After my research this past fall with a special artifact that the Classics Lab received from Newfields, there is proof that value does not come solely from its originality. Having a replica or handmade piece offers the same educational value as having an original, including experiences originals cannot offer, such as defined images and hands on capabilities. The artifact that I discovered this with was a duck shaped vase with mysterious origins and details that I worked to put together. Since Newfields has no record of the piece outside of it entering their collection from storage in 1993, there is a wide range of uncertainty when considering who owned the object, who made it, where it was from, and when it was made. With there being a number of unanswered, and may never be answered, questions, I turned to the object itself to see what it could tell me about its story without something else's authority speaking for it. The artifact offers individual clues that lead to the exploration of a culture absorbed by the Ancient Romans, the Etruscans. I can now confidently claim this artifact as a handmade Etruscan style Duck Askos, but I cannot claim the piece as ancient. The askos holds knowledge that still needs to be analyzed as it is original to its own time, and speaks to a more distant period.

Presenter(s): Alex Brinkman

12:45 PM

Faculty mentor: Christopher Bungard

Herodotus' Account of Cyrus' Massagetaean Campaign: Unpredictability and the Limit of Human Ambition

This project represents a chapter of a year-long senior thesis in which I consider the idea that Herodotus' Histories are organized around the moralistic theme that various factors in the world limit human activity and can help to explain the downfall of those who arrogantly refuse to acknowledge or abide by them. This section addresses the fate of the Persian king Cyrus, arguing that his death in battle demonstrates that one such limit is placed upon unjust greed and ambition. First, I survey the ways in which the events of Cyrus' early reign and Herodotus' account of his motivations characterize him as a hubristic individual who is driven by overconfidence to pursue further acts of aggression. The majority of the chapter, however, is devoted to analyzing the warnings given to the king by his advisor Croesus and by his enemy, the Massagetaean queen Tomyris. I suggest that while both speeches are in accordance with

important Herodotean virtues such as “minding your own business” and accepting the uncertain nature of the future, Croesus offers good advice but Tomyris gives the best possible advice by requesting that Cyrus give up his invasion altogether. Finally, reflecting upon the outcome of the battle against the Massagetae, I conclude that Cyrus’ decision to fight on the opposing side of the river Araxes and thus to transgress a geographic border is symbolic of his broader violations of human limitations and serves to foreshadow the more blatant aggression exhibited by Xerxes at the climax of the Histories.

Presenter(s): Elisha Fieffer
Faculty mentor: Lynn Kvapil

1:00 PM

The Classical Divinity of the 1940’s Femme Fatales

In a rapidly changing world, American society was witnessing its hopes and fears playing out on the silver screen during the Golden Age of Hollywood in the 1930’s and ‘40s. The growth of the film industry had come to weave together narratives of interests and narratives of necessity in order to maintain societal order in an uncertain interwar period. The expectations for the people were shifting as men were called back and forth between wars and women were between the factories and the home. The rise of Femmes Fatales, or deadly, seductive women, developed as a response to these changes as they appear to lust for masculine power. These stories of “lost” women played as a moral guiding point for the men they enticed, becoming central to the man’s development over their own. These narratives pull into question the irreversible societal consequences of women leaving their “acceptable” places. Film was not the first method to question the placement and morality of women. For centuries, stories and myths across cultures have shared interpretations for how order operates. Classical mythology in particular has a base in educating its people about respectable norms and power dynamics that provided examples of behavior. While Classical goddesses are powerful, respectable deities, there were also stories that demonstrated the faults of their feminine powers. The dangerous women seen on the screen relay similar messaging to these deities as a Classical morality panic settled in on the Interwar United States.

Moderator: **Tonya Bergeson**

Presenter(s): Payton Gallowitch

1:45 PM

Faculty mentor: Melissa Etzler

“Conformity through the Simulacrum in Vivarium (2019) and The Truman Show (1998)”

Settling down through marriage, owning a house, and raising children persists as an expectation and even life goal: to do this means success and happiness. Lorcan Finnegan’s film Vivarium mocks these societal expectations through science fiction and the presentation of a skewed mold of the nuclear family. The protagonist couple is entrapped within an isolated tract housing development (the vivarium) and forced to conform to the traditional lifestyle and raise a child that is not their own. Once the child matures, the couple is “released” (killed). The viewer must ask to what extent they too are under the bell jar of the vivarium, and are likewise ultimately alive only to fulfill an ideal of suburban life to provide for the next generation and raise children who will continue the cycle. Our lives are then not summative of our experiences or relationships, but rather how well we were able to provide for the perpetuation of one type of society. I compare this to The Truman Show, a simulacrum of real life, with the protagonist unaware that his entire life is a reality television show in which he is controlled by the director. Truman escapes from his own vivarium, but the viewer doesn’t see what comes next. Truman, like Vivarium’s couple, has one

Presenter(s): Ali Mohamed

2:00 PM

Faculty mentor: Melissa Etzler

The Double Souls of Black Folk: Du Bois and the Social Commentary in Get Out

The Double Souls of Black Folk: Du Bois and the Social Commentary in Peele’s Get Out

Jordan Peele’s Get Out (2017) is an award-winning psychological horror film that follows Chris, a young African American visiting the family of his white girlfriend Rose. The film’s success is in part due to its effectiveness as a horror movie, but more importantly because of its social commentary on modern race relations in America. I explore this compelling commentary through the lens of W.E.B. Du Bois’ theory of double consciousness and his concept of the “veil”. Du Bois was an African American sociologist and philosopher who challenged and protested many of the popular views on race at the turn of the century. His theory of double consciousness (1903) explains the way in which Black people are forced to constantly view themselves in two ways: how they view themselves, and how society views them as a Black person. I explore how Get Out visually depicts this theory through Chris’ experience. Another theme of Get Out is “subtle” racism, which is shown extensively through Chris’ interactions with

Rose's family. I explore this form of racism in *Get Out* by utilizing Du Bois' theory of the veil, a metaphorical barrier that prevents white people from viewing Black people beyond the color of their skin. Finally, I explore another key aspect of the film, which is the fetishization of the Black body. *Get Out* is a film that has been extensively analyzed, yet I hope to further this analysis through the connection to Du Bois' work.

Presenter(s): Seth Owings

2:15 PM

Faculty mentor: Melissa Etzler

The Umbrella Man: An Investigation of *Breaking Bad*'s most Inexplicable Character

The *Breaking Bad* episode "Negro y Azul" (2.7) opens with a music video featuring the eponymous narcocorrido song. In the video, there is a brief shot of the band playing and behind them is the camper in which protagonist Walter White cooks his meth. Heisenberg, Walt's identity in the drug world, stands to the right of the camper, and an unidentified man holding a black umbrella on the left. The man holding the umbrella has never been seen in the show before and is never seen again. I explore what creator Vince Gilligan was alluding to in the shot. One explanation is that it is an allusion to the tragic assassination of John F. Kennedy. This is made relevant by the lyrics in the song that discuss the Mexican Cartel who plan to assassinate Walt for disrupting the Albuquerque drug market. The next allusion I explore is Roald Dahl's short story named "The Umbrella Man." The story shares many themes with *Breaking Bad* such as using a character that is misjudged from his appearance. Finally, Neville Chamberlain is explored as a symbol to explain the umbrella man, as Chamberlain commonly carried an umbrella with him and was associated with the prop. His role in WWII also reflects the same struggles that Walt faces in his role as a drug dealer. There are many ways to interpret the umbrella man and I argue the reason for why Gilligan chose to briefly, but obviously, include the character.

Presenter(s): Gabrielle Allen

2:30 PM

Faculty mentor: Abbey Levenshus

Shaping Ethics: How relevant parties position demographic-based targeting to vulnerable populations

This presentation will be of my honors thesis, which examines how relevant parties position the ethics of online demographic-based targeting to vulnerable populations. Relevant parties fell into four categories: professional organizations, government organizations, major platforms, and activist groups. As advertising technology has rapidly evolved, relevant parties are in a unique position to shape the ethics of new technologies like demographic-based targeting. Over the past few years, harmful uses of the technology to discriminate against vulnerable populations have emerged, causing relevant parties to further grapple with this issue.

In this study, Reichert's (2006) definition of vulnerable groups found in her book chapter "Human Rights and Vulnerable Groups" was used. This definition states, "certain population groups often encounter discriminatory treatment or need special attention to avoid potential exploitation." A thematic analysis of the data collected was conducted to determine the varying stances taken by each relevant party. Five stances emerged from this analysis representing how relevant parties positioned the issue: supports non-discriminatory demographic-based targeting, supports consensual demographic-based targeting, supports legal demographic-based targeting, neutral stance, and opposes demographic-based targeting. These stances were used to answer the research question and to further examine the ethics of this issue.

Moderator: **Carol Reeves**

Presenter(s): Peyton Fox

12:30 PM

Faculty mentor: Melissa Etzler

'To Forge a New Race': Eugenics and Colonialism in Silvia Moreno-Garcia Mexican Gothic

In the book *Mexican Gothic* by Silvia Moreno-Garcia, the main character Noemí Taboada must check up on a cousin who lives in a mysterious mansion called High Place with her Englishman husband and his white family, in which there seems to be a dangerous level of incest to maintain the purity of the family's blood. The family, the Doyles, were colonizers who believed in such topics like eugenics, as evidenced by multiple references to books on this topic located in the home. One topic that eugenics connects with is the promotion of a perpetuation of white power and privilege over generations, as exemplified in the Doyle family. The next connection I examine is eugenics encouraging the degrading of women of color. In the book, the Doyle family picks Noemí, a young Mexican woman to bear babies for the family. As eugenics developed, women of color are more subject to being selected because of their desirable traits. Finally, the development of eugenics connects directly with colonialism. The Doyle family are colonizers who take over a town in Mexico to exploit the land for its resources but still ironically see parts of the land itself as degenerate. Silvia Moreno-Garcia's thesis for her master's degree focused on eugenics and I examine how eugenics is used as the foundation in the text inspired by 1950s-Mexico to raise problematic global issues which continue into the 21st century.

Presenter(s): Emily Klemptner

12:45 PM

Faculty mentor: Carol Reeves

The Gendered Rhetoric of Women on the 2020 Debate Stage

My presentation will examine the influence of gender expectations on political rhetoric. This focus will extend most closely towards 2020 presidential candidates Kamala Harris and Elizabeth Warren and their respective rhetorical performances on the debate stages. I will discuss the importance of audience expectations, critical reception, and rhetorical strategies employed by these women throughout the presentation.

Presenter(s): Emma Beavins
Faculty mentor: Ania Spyra

1:00 PM

'Round the Roundabout: What it means to make "progress" in central Indiana

I grew up in Franklin, Indiana, and at the time I believed we represented a quintessential Midwest: think cornfields, bean fields, county fair. Yet, as I grew older and Franklin entered its post-Great Recession economic resurgence, I realized that Franklin was a place very different than I first imagined. As redevelopment and reconstruction began, the very face of the town became unrecognizable, characterized by the town planners' aspiration towards the northern suburbs of Indianapolis — think roundabouts, broad medians with trees, quirky forced street art. Our 1960s heyday town was reaching its peak yet again, a former glory restored. In 2019, we were named the best town in Indiana. And I, I'm slightly ashamed to say, was a part of it.

Franklin and other Indianapolis suburbs' strides towards "progress" manifest in the (re)construction of land and have wide-reaching consequences on daily life, the environment, and personal identity. Some of the richest areas of the state not only have structurally impeded the progress of other racial and economic groups, but also hide this power behind glossy trails and parks and coffee shops. The suburbs have become that to which Indiana towns aspire — but what does it mean to reproduce this culture?

Moderator: **Carol Reeves**

Presenter(s): Ellen Flowers

1:45 PM

Faculty mentor: Kristen Swenson

The Rhetoric Surrounding Breast Cancer in "Ologies" Podcast

This rhetorical analysis examines Ologies podcast episode "Surgical Oncology (BREAST CANCER) with Dr. Donna-Marie Manasseh" to answer the question of why we accept unnaturally high rates of incidence of breast cancer in America. "Surgical Oncology" was treated as a reflection of the dominant discourse around breast cancer, which allowed criticism from Marxist and gender perspectives. The average American diet is high in inflammatory foods, which makes it more difficult for our bodies to fight cancer cells when they are created. However, the logical solution of avoiding these foods in favor of healthy foods free of preservatives is flawed because many people with lower incomes do not have access to whole foods free of pesticides and preservatives, leaving them with no choice but the highly accessible inflammatory foods. Hustle culture also puts our body in a constant state of stress, making it difficult for the body's immune system to fight cancer cells. However, inflammatory foods and hustle culture are impossible to escape, leaving Americans with no choice but to sacrifice health in exchange for productivity. In conclusion, I found from my analysis that in Ologies episode "Surgical Oncology", there is an ideology that we accept high rates of breast cancer in America because of the ideal that it's okay for us to sacrifice a holistically healthy lifestyle to be an active participant of our capitalist society. As a result, we are prone to stress-induced illnesses such as cancer, but we accept this consequence in order to continue living the hustle lifestyle.

Presenter(s): Arie Likhtman

2:00 PM

Faculty mentor: Kristen Swenson

Sisyphus and Ferb: Phineas and Ferb and the Subversion of Capitalist Labor Narratives

My presentation will focus on the children's cartoon "Phineas and Ferb", and specifically how the show can be seen as a critique of modern capitalism. The rhetorical analysis methods include cluster criticism, as well as linguistic and juxtaposition analysis. The imagery of the show is also analyzed in order to argue that Phineas and Ferb relies on the concepts of repetitive narrative form and surrealist imagery. My research focuses on radical imagination as a means of rebelling against traditional concepts of productivity and labor.

Moderator: **Robin Turner**

Presenter(s): Alexandria (Ali) Kerby

12:30 PM

Faculty mentor: Melissa Etzler

From Madness to Medicine: How Nazi Medical Experimentation Morphed into Today's Medical Field

It is no secret that many of our current scientific and medical advancements stem from a long history of research, trials, and experimentation, but not much is known about the origins of our routine practices. The Holocaust enabled Nazi doctors to explore countless victims in search of the ultimate answer to the Jewish question. The answer: to alleviate the burden that those deemed “unworthy of life” placed on the greater society. The mass extermination practices which highlight the atrocities of the Holocaust are the end result of constant scientific developments disguised as medicine. Tiergarten 4 (T4) serves as the beginning of the euthanasia project, a secret initiative which strived to perfect the science behind extermination. This project quickly grew from a science experiment into a plague that invaded psychiatric asylums, pediatric wards, and eventually evolved into the main method of extermination in Nazi concentration camps. In the years following the conclusion of the war, the world turned its face from the horrors associated with the Holocaust. Tactics, regimens, and beliefs established throughout the Nazi regime were abandoned and disregarded as inhumane - except for those discovered through the robust scientific experiments disguised in the name of medicine. How did we progress from dumping Zyklon B pellets into gas chambers to giving patients doses of anesthesia to be sedated for procedures? This paper analyzes the slow progression from madness to medicine, uncovering how Nazi medical experimentation slowly morphed into routine practices acknowledged in the medical field today.

Presenter(s): Drake Olson

12:45 PM

Faculty mentor: Zachary Scarlett

Serbia to Xinjiang; a Comparative Analysis of Genocidal Regimes

This presentation is focused on trying to strengthen our understanding of genocide as a social phenomena by analyzing the Bosnian genocide of the 1990s and the ongoing genocide of Uyghur muslims in the Xinjiang province of China. Rather than seeking to give a causal explanation of genocide and ethnic cleansing, I ask the more pointed question “are there patterns present at the societal level that signal the potentiality of genocide in a given cultural context?” Through this thesis, I argue that there are certain patterns which precede historical instances of genocide and show how these antecedent factors contribute to creating the potentiality for genocide in those societies.

Presenter(s): Maya Peterson-Womack
Faculty mentor: Robin Turner

1:00 PM

LGBT+ Communities in France and the Ivory Coast: From Colonization to Coronavirus

The history of the world often includes the story of colonization. When France colonized the Ivory Coast in Africa, France ensured that both countries' histories would include colonization. From the 1830s to 1960, the Ivorians lived under laws made by French authorities (Boddy-Evans 2019). I am interested in seeing if colonization and the passing of time affects the way that people think about the LGBT+ community. A look at homosexual laws in its colonies suggests that France had a reputation of being more tolerant of LGBT+ individuals than other colonizing countries (Mohammed 2020, 170). This suggests that if a different country colonized the Ivory Coast, that the opinions of LGBT+ individuals could be drastically different. I read several primary and secondary sources from within and about LGBT+ communities in both France and the Ivory Coast. The takeaway from my research is that the trajectory of beliefs about the LGBT+ community is not linear, which reflects the fact that the group itself consists of several groups of identities. Time changes many things, including the beliefs of LGBT+ people. This research is important because the Ivory Coast is not the only country that France colonized; thus, the research here could mirror that of other former French colonies. In other words, more than just Ivorian LGBT+ individuals experience this rollercoaster of ups and downs where their rights and lives are concerned.

Moderator: **Shaha Patwary**

Presenter(s): Scott Sinclair

12:45 PM

Faculty mentor: Mohammad Patwary

An Examination of the Statistics and Risk Management Concepts Behind Geographic Rating Area Factors, Medical Loss Ratio Rebates, and the Actuarial Value of Metal Tiers in the Patient Protection and Affordable Care Act of 2010

Following the completion of my eight-month long internship at Anthem in 2021, I recognized the need to know more about the political and economic forces that make a clear and consistent impact on the nature of the health insurance market, as new state and federal laws are perpetually reshaping the health insurance market and industry. The Affordable Care Act (ACA) is the overarching federal law that has impacted the intricacies of the health insurance market for more than a decade. In short, this thesis is intended to grow out of my previous internship experience as well as my previous academic work in terms of specific terminology and data analysis methods in statistics. There are two research questions that are to be answered using regression methods. First, “How have the following three provisions of the Affordable Care Act (ACA) impacted the health insurance market from a statistics and risk management standpoint: the introduction of rating area factors for adjustment of premiums, medical loss ratio (MLR) rebates, and the creation of benefit tiers/categories (i.e. bronze, silver, gold, platinum)?” Second, “How do these specific provisions of the Affordable Care Act impact the more well-known provisions of the legislation from a statistics and risk management perspective?”

Presenter(s): Chloe Makdad

1:00 PM

Faculty mentor: Jonathan Sorenson

On Selecting an Algorithm for Counting y -smooth Integers up to x

Quantum computers are quickly becoming a reality, threatening the security of existing cryptography methods. Thus, it is increasingly important to investigate post-quantum cryptosystems. One such example is the CRS algorithm. CRS introduces an additional complex multiplication action to an existing cryptosystem to enhance its security. Key generation in CRS requires the generation of smooth numbers, preferably at random. This can be done by computing or estimating the number of y -smooth numbers less than x . There are several methods to estimate this, with the most efficient one using the Dickman-de Bruijn function. However, the Dickman-de Bruijn function is only valid when y is sufficiently large; when y is smaller than the cutoff point, the use of a slower method is required. Similarly, when y is

sufficiently small, Ennola's Theorem provides highly accurate estimates, though its accuracy quickly diminishes when y becomes too large. In this project, we hope to find tighter bounds on both the cutoff point of the Dickman-de Bruijn function and the upper bound on Ennola's theorem to better inform the choice of algorithm used to estimate the number of y -smooth numbers less than x .

Moderator: **Amber Russell**

Presenter(s): Cathal O'Sullivan
Aryn Stahl

1:45 PM

Faculty mentor: Jonathan Sorenson

The Generation of Sums of Squared Continuous Primes

In this talk, we present an algorithm to find numbers that are the sums of consecutive squares of primes. For example, $5^2+7^2+11^2 = 195$, or $37^2+41^2+43^2+47^2 = 7108$. These numbers were introduced in a paper, Sums of Consecutive Prime Squares (J. Tongsomporn, S. Wananiyakul, J. Steuding, 2022), where they found all such numbers up to 5000. We were able to find all such numbers up to ten trillion, far exceeding this previous work. In our talk we will describe our algorithm, give a brief runtime analysis, and share the results of our computation.

The design of the algorithm is influenced by the solution to the maximum contiguous subsequence sum problem. First, a list of prime numbers is generated under a given limit. Second, a list of partial sums (of squares of primes) is generated where a value in the list is the sum of itself and all the partial sums before it. Third, the algorithm computes the values that the partial sums missed. Lastly, all values are sorted. These steps all run in $O(n\log(n))$ time or less, the largest of which being the sorting process.

Presenter(s): Eric Nofziger

2:00 PM

Faculty mentor: Amber Russell

Studying Extended Sets from Young Tableaux

A partition of a positive integer n is any way to add positive integers to obtain n . These partitions can be represented by a diagram where each summand corresponds to a row of boxes and the boxes are then left justified and arranged from largest row to smallest row. These Young diagrams can then be labeled with the numbers 1 through n to form Young tableaux. These combinatorial objects related to the partitions of an integer then have various applications in representation theory. In recent work of Graham–Precup–Russell, an association has been made between a given row-strict tableau and three disjoint sets I , J , and K , also called extended sets. In this project, we begin to classify which extended sets correlate to a valid row-strict or standard tableau. We are able to identify several global properties of these valid sets, and we further find an algorithm that produces a valid tableau given only the extended sets in special cases.

Moderator: **Susan Adams**

Presenter(s): Lindsey Schreiber

12:30 PM

Faculty mentor: Trish Devine

A Survey to Determine the Relationship Between Health Literacy and Vaccine Hesitancy in College Students at Butler University

The prolonged pandemic has proven the need for vaccines to protect the public against COVID-19. The goal of immunity across populations has been hindered by vaccine refusal and vaccine hesitancy. Finding the root of this hesitancy could be critical in increasing vaccination, which is needed to alleviate the strain that Coronavirus has had on the world. A Qualtrics skip logic survey was created that collected demographic information, vaccine status, vaccine influences, vaccine concerns, and The Newest Vital Sign, a health literacy assessment. The purpose of this study was to find a relationship between health literacy and vaccine hesitancy in order to validate the need for further health education. The secondary objective was to find the sources of this hesitancy in the form of concerns and influences. This study had a strong response rate of 80.1%, and included 361 respondents. This study did not find a statistically significant relationship between health literacy and vaccine hesitancy. The study found that those who are vaccinated and those who are not have statistically different levels of concern for safety, efficacy, and side effects. Influence from peers, the Butler mandate, public health, and work also had statistically different levels of effect for these individuals. Safety and understanding how the vaccine works were indicated as predictors of vaccinations. Influence from peers and the government were also found to be predictors of vaccination. These findings can help universities understand student's hesitancy and help them focus further efforts in the appropriate lens.

Presenter(s): Georgia Coffman

12:45 PM

Faculty mentor: Amy Peak

The Effect Of COVID-19 On Substance Use And Mental Health On A College Campus

In this research the authors surveyed a university population to determine the impact COVID-19 has had on substance use and mental health. Current research provides significant data indicating worsening mental health and substance use. This paper looks at how applicable those trends are to a small, private university in Indianapolis, Indiana. The data included 261 respondents composed of students, faculty, and staff of the university. The results reveal college students, faculty, and staff experienced statistically significant increases in feelings of unhappiness, depression, loneliness, hopelessness, agitation, and irritability during the

pandemic compared to pre-pandemic. Data analysis of survey responses reveals COVID-19 had a negative impact on mental health and substance use and decreased the frequency of sharing e-cigarette devices.

Presenter(s): Amelia Brandt
Faculty mentor: Sudip Das

1:00 PM

Exosomes: a biogenic nanovesicle for anticancer drug delivery

Recent interest in nanomedicine has exploded, especially since the FDA approval of the first mRNA-based vaccines, which have been used to fight the COVID-19 pandemic. mRNA and other fragile small molecule biologics have been investigated as potential therapeutics since the 1990s. However, the safe and effective delivery of these delicate molecules into the human body remains an obstacle to medicine. The large-scale success of the mRNA vaccines would not be possible without the nanotechnology used to encapsulate, protect, and allow uptake into the body's cells. However, liposomes and lipid nanoparticles are not easy to synthesize or load with pharmaceuticals. Mass production is still a limiting factor, and these nanoparticles are often patented by pharmaceutical companies.

Exosomes are present in all biological fluids, utilized by organisms as nature's long-distance communication and transport system for molecules like RNA and DNA. Exosome research is still in its infancy, but there have been promising studies on their use for drug delivery. Their ability to be absorbed by the gut and transported through the blood-brain-barrier is especially of interest. One proposed economical source of exosomes is from unpasteurized cow milk. In our research at Butler University, we have constructed a cost-effective exosome isolation protocol and developed methods of verifying presence and purity of exosomes in samples. Our goal is to load the exosomes with paclitaxel, a drug commonly used in certain brain cancers. We plan to test the efficacy of this formulation on glioblastoma in cell cultures and, later, in live animals.

Moderator: **Jennifer Kowalski**

Presenter(s): Joseph Kirkpatrick

1:45 PM

Faculty mentor: John Hertig

Applying various industry best practices to prevent occupational exposure to hazardous drugs in healthcare

Hazardous drugs (HDs) have many therapeutic applications in healthcare, but with their benefits come drawbacks. Much has been studied and documented over the past several decades about the adverse effects of HDs, particularly for those with indirect, occupational exposure. This occupational exposure may come primarily from inadvertent dermal contact with drug material and residue, and is observed both in individuals who handle HDs directly, including pharmacists and pharmacy technicians who compound and prepare the drugs, as well as in individuals with the potential for exposure at all stages of the drug's "life cycle," including preparation, administration, transport, and waste management. Among various regulatory and scientific measures put in place to ensure protection against occupational HD exposure is the relatively recent implementation of USP's newest chapter <800>.

Other industries - beyond healthcare, pharmacy, and HDs - have their own pertinent hazards and mitigation strategies to prevent the adverse effects of occupational exposure. Exposure hazards like radiation (used both in and out of healthcare settings) and other hazardous chemicals, such as pesticides, have constructed their own unique ecosystems of occupational exposure prevention; healthcare and pharmacy may benefit from considering the parallels between these fields in order to assess and improve the effectiveness of existing protective measures.

Presenter(s): Nick Ganly

2:00 PM

Faculty mentor: Kendra Damer

An assessment of HPV vaccination rates and a quest to capture college student perceptions and barriers to HPV vaccination

Background: Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States, being most prevalent in young adults, and has the possibility to lead to several potentially serious complications most notably, cervical and oropharyngeal cancer. Although the HPV vaccine, GARDASIL 9, is safe, effective, and readily available, vaccination rates are still below benchmarks and national goals.

Objectives: The primary objective of this study was to analyze the HPV vaccination rates among first-year students matriculated at Butler University from fall 2019 and fall 2020. Secondary objectives include analyzing the students' knowledge and perceptions of HPV and its vaccine in order to identify any barriers to HPV vaccination among the student population.

Methods: A retrospective medical chart review of the 2019 and 2020 matriculating students to assess HPV vaccination rates. The second phase of the study involved administration of a Qualtrics survey to current Butler University undergraduate students to assess knowledge and perception of HPV and its vaccine in order to identify any barriers to vaccination.

Results: Data analyzed from the retrospective chart review demonstrated that overall, 65.6% of the 2019 cohort and 52.2% of the 2020 cohort had completed an HPV vaccination series prior to coming to Butler University. Data analyzed from our survey uncovered barriers related to education, location, and gender. The researchers' future plan is to communicate the results to Health Services leadership, plan for education opportunities, and the possibility of a future vaccination clinic.

Presenter(s): Chloe Kotrba

2:45 PM

Faculty mentor: C. Patience Masamha

Inducing Alternative Forms of Cell Death in Multi-Drug Resistant Ovarian Cancer Cells

Ovarian cancer is one of the deadliest gynecologic cancers for women today. In 2021, an estimated 21,410 new cases of ovarian cancer were diagnosed in the US and 13,770 of these women will not survive the disease. This malignancy's low survival rate is attributed to late diagnoses and the cancer's tendency to recur after chemotherapy treatment due to acquired drug resistance. The standard of treatment for this disease has been combination chemotherapy using a taxane together with a platinum compound (carboplatin or cisplatin). Cisplatin works by inducing the programmed cellular death mechanism apoptosis. However, cisplatin resistance has emerged in recent years. Therefore, inducing alternate forms of cell death in these cancer cells has been considered for new treatment therapies. Erastin is a novel drug that has been shown to induce ferroptosis, an iron-dependent method of cell death that is independent of apoptosis. The objective of this research was to determine if erastin induced cellular death via ferroptosis in ovarian cancer cells and to determine if erastin sensitizes cisplatin resistant cells to ferroptosis. This research used an OVCAR-3 cisplatin drug resistant cell line that is often used as an in vitro model of high grade serous ovarian carcinoma. Cells were treated with cisplatin and erastin alone, and in combination to test the drug's efficacy at inducing cellular death. Ferredoxin, an agent that inhibits ferroptosis, was used as a negative control to ensure the cell death taking place during these experiments was in fact ferroptosis. MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) cell proliferation assays were used to determine the effects of the treatments. Our results suggest that erastin is a potential therapeutic agent in the treatment of multi-drug resistant ovarian cancer cells. Using erastin in combination with cisplatin may improve patient outcomes, in addition to lowering

the cisplatin treatment dose for patients in order to minimize adverse effects associated with this medication. Ferroptosis is a new area of study that should be further exploited to develop innovative treatment regimens for ovarian cancer.

1) Cancer Facts and Figures 2021. American Cancer Society website. Accessed March 9, 2021. <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2021/cancer-facts-and-figures-2021.pdf>

2) Zhou H-H, Chen X, Cai L-Y, et al. Erastin Reverses ABCB1-Mediated Docetaxel Resistance in Ovarian Cancer. *Frontiers in Oncology*. 2019;9(1398):1-10.doi: 10.3389/fonc.2019.01398

Moderator: **Fabi Alceste**

Presenter(s): Abiodun Akinseye

12:30 PM

Faculty mentor: Fabiana Alceste

Art, Race, and the Carceral System: Perceptions of Criminality in Artful Expression

Prior research suggests that rap music is viewed as more “criminal” than other musical genres and juries are more likely to attribute criminal stereotypes to rappers, in part due to the racial assumptions of guilt and innocence. There is a trend of rap lyrics being presented in court as a form of confession evidence against rappers. To our knowledge, there exists no such trend with other art forms, such as stand-up comedy. This interdisciplinary study utilizes a mixed-methods approach to research, using both content analysis and experimental methods to develop an understanding of themes presented within creative endeavors such as music and comedy. Using content analysis, this research will analyze themes of criminality and deviance presented in rap and rock lyrics in the years with the highest and lowest crime rates. The experiment will explore differences in the public’s perceptions of hip-hop’s criminality and compare it to perceptions of another creative endeavor, comedy. The experiment will also examine the effects of performer race, art form, and crime stereotypicality on attributions and perceptions of guilt and innocence. The results of this study will be used to interrogate the rising trend in using hip-hop lyrics as evidence of criminality and to question the relationship between this practice and First Amendment protections in the justice system

Presenter(s): Nicole Hagen

12:45 PM

Marissa Ward

Faculty mentor: Tara Lineweaver

“What’s That? Can You Speak Up?” Treating Cerumen Impaction Does Not Improve How Older Adults with Dementia Respond to Personalized Music Playlists

Listening to music may improve affect, behavior, and cognition in elderly patients with dementia (Gerdner 2000, Sung & Chang 2005, Sung et al., 2010, Raglio et al. 2013). Recent research (Lineweaver et al., 2021) also suggests that individualized music can also improve sundowning symptoms (i.e., the tendency of adults with dementia to show worsening symptoms as the day progresses). We evaluated whether treating cerumen impaction (ear wax) in older adults with dementia in order to improve their hearing also affects their positive responses to music. 22 residents of a local nursing home and 7 adults enrolled in an adult-day-services program participated. All had at least partial cerumen impaction and mild to severe dementia. Following a baseline period, approximately half were randomly assigned to receive treatment of their cerumen (n = 14). The other half (n = 15) underwent treatment after the

study ended. All listened to music for approximately 30 minutes at least weekly throughout the study. We documented confusion, restlessness, disengagement, agitation, aggression, repetitiveness, and unresponsiveness before and after each music session. Although treating cerumen impaction did not affect outcomes, our results support past research revealing improvements in dementia-related symptoms in response to personalized music playlists. In the current study, confusion, disengagement, unresponsiveness and repetitiveness were the most common sundowning symptoms. Additionally, confusion and repetitiveness improved more than other symptoms in response to music listening. Our results suggest that these cognitive aspects of sundowning may be most amenable to personalized music playlist interventions for older adults with dementia.

Presenter(s): Ashrey Burley

1:00 PM

Allison Devedjian

Faculty mentor: Tara Lineweaver

EPA--It's Not What You Think: Introducing The Emotional Prosody Assessment

Recognizing emotion through both facial expressions and tone of voice is a pivotal component of social behaviors (Argaud et al., 2018). Although several tests are designed to measure emotion recognition through faces, there are few standardized measures designed to assess emotion recognition through prosody. The current study evaluated the reliability and validity of a new emotional prosody recognition measure, the Emotional Prosody Assessment (EPA). 137 college students completed the EPA, an online assessment of their ability to recognize emotional prosody in neutrally-worded audio clips. The EPA included 30 examples of semantically neutral sentences (Castro & Lima, 2010) spoken aloud using one of six different emotional tones of voice (happy, sad, angry, disgusted, surprised, and afraid). Participants identified the emotion portrayed in the audio clip. As a comparison task, participants also viewed 30 photographs from the Radboud database (Langner et al., 2010) depicting the same six primary emotions. We found that the EPA had good internal consistency (Cronbach's $\alpha=.728$). without suffering from significant floor or ceiling effects (interquartile range=21-25 of 30). Some emotions were easier for participants to identify through tone of voice than others, $F(5,130)=40.67$, $p<.001$, $\eta^2=.61$. Participants were better able to recognize emotion through facial expressions than through tone of voice $F(1,134)=121.96$, $p<.001$, $\eta^2=.48$). Finally, EPA scores significantly correlated with but did not duplicate scores on an emotional facial recognition measure ($r=.320$, $p<.001$). Further exploration of the EPA with larger and more diverse groups will help further elucidate the utility of this new measure for assessing prosodic emotion recognition.

Presenter(s): Margaret Stopa
Jacqueline Randall
Faculty mentor: Tara Lineweaver

1:15 PM

Want to “Study Smarter?” Attending a Study Skills Presentation May Help

The “Study Smarter, Not Harder” study tips presentation teaches students eight tips designed to increase the effectiveness and efficiency of their study habits. Previously, we compared the effectiveness of teaching study habits to college students via the presentation versus via an article. Students who read the article were better at discriminating effective from non-effective approaches than presentation attendees. One difference between the two was the explicit inclusion of what not to do in the article. The present study investigated the effectiveness of a revised “Study Smarter, Not Harder” presentation that explicitly outlined both effective (“tips”) and ineffective (“non-tips”) study approaches. Over 1,000 first-year students attended the “Study Smarter, Not Harder” presentation. Students’ current study habits were assessed before the presentation, and the study habits they planned to employ in the future were assessed after the presentation. 849 first-year students submitted complete questionnaires. 272 of these students also answered a brief online questionnaire in December about their current approach to studying. Results indicated that attending a presentation about study tips enhanced first-year students’ understanding of effective academic strategies and improved their planned approach to their own study habits. Although some benefits were lost across the course of their first semester, attendees were more balanced in their use of tips and non-tips four months later than they had been prior to the presentation. They were also more balanced in their study habits than a group of 43 first-year students who had not attended the presentation to learn how to “Study Smarter.”

Moderator: **Mandy Hall**

Presenter(s): Becca Greenberg

12:30 PM

Faculty mentor: Mandy Hall

A Moody Memory: The Impact of Affective State on Source Memory and Reality Monitoring

Many researchers have studied the impact mood has on various cognitive processes, but few have analyzed how it affects source memory and internal-external reality monitoring processes. Numerous findings indicate that sad moods are likely to yield better memory than happy moods due to different information processing techniques, suggesting that sad mood could improve source memory and reality monitoring as well. After being induced into either a happy or sad mood, participants were presented with a list of 30 noun-verb-noun phrases where the second noun was either generated for them by the computer or they were asked to fill it in themselves. They were then given the first noun from each phrase and asked to fill in the correct second noun it was previously paired with before making a source judgement about whether it was originally self-generated or computer-generated. Results indicated a main effect of mood where happy mood yielded slightly better memory than the negative mood and a main effect of memory type where reality monitoring scores exceeded those of item memory. Some research on how happy mood enhances cognitive processes can explain these findings and self-generation effects help explain why reality monitoring scores were higher than item memory scores. Overall, happy mood was found to moderately enhance memory accuracy, but further research is still necessary to determine how it affects internal-external reality monitoring.

Presenter(s): Kai Bates-Diop

12:45 PM

Faculty mentor: Brian Day

Usability of Print and Digital Academic Technologies

This study examines usability differences between digital and print technology for enrolling in college courses. Research regarding this topic indicates that people trust technologies that are not always user friendly. In other research, undergraduate participants reported moderate levels of computer-related anxiety, regardless of their high usage rates. In our experiment, participants will experience print and digital media conditions while enrolling in a course. To understand why individuals still engage with technology, an experimental approach will be taken to examine the differences between print and digital technologies for completing the same task. A within-subjects design will allow individual differences among participants to be seen after they complete the same task. Comfort, speed, number of errors, and other dependent variables will be assessed. Our study will be high in ecological validity because participants will have familiarity with the enrollment task for our experiment. Due to their high

familiarity, we expect participants to prefer the digital technology, yet make fewer errors with the print technology. Our results will also contribute to the overall discussion towards the differences in the usability of print vs. digital media. We predict our results will also reveal that users are more comfortable using digital media for enrollment, despite the fact that this medium results in more errors and takes longer to complete the task. These findings will further illuminate the importance that technology plays in modern society, in that we now have to use said technology, regardless of the drawbacks in its overall usability.

Moderator: **Karina Hamamouche**

Presenter(s): Camille Weiss

1:45 PM

Faculty mentor: Bob Patget

Student, Interrupted: You're not Crazy, It's Just the Pandemic That's Making You Feel Distant

The current study explored the effect of COVID-19 on student feeling's of belongingness. Retrospective data of college students' feelings of belongingness were compared across several years pre- and post- pandemic. An interrupted time series analysis showed students tested post COVID were significantly lower on all measures of belongingness.

Presenter(s): Hillary Reed

2:00 PM

Allie Carmichael

Kylie Stickel

Faculty mentor: Brian Day

Impact of Exposure Duration and Response Type on Affordance Perception

The study of affordance perception is a benchmark for understanding human behavior (Gibson, 1979). An "affordance" is an opportunity for action that an environment offers an individual related to the capabilities of the actor (Chemero, 2003). An area with little attention is how individuals perceive affordances over brief periods of exposure, and if affordances are what actors perceive upon initial exposure to a visual scene. Grill-Specter & Kanwisher (2005) argued that categorical information about an object is available as soon as the object can be detected. Instead, we hypothesize that participants will perceive action-oriented aspects of objects and scenes over very brief exposures and make more categorical-related identifications with longer exposures. A power analysis indicates that 70 participants are required for the proposed investigation. To test our hypothesis, in experiment one, each participant will view a randomized series of 60 images presented on a computer. Each image will contain one object set against a white background, and the image will appear on the participant's command and disappear after a particular duration of time (either 0.1, 0.25, 1.0, or 3.0 seconds). Duration of exposure will be manipulated between participants. Participants will verbally list as many actions (i.e., sit on, grasp, etc.) or identifications as they can in relation to the object before seeing the next image. Type of response (either action-oriented or not) and accuracy of participant responses will be judged by three independent reviewers. In experiment two, participants will be presented with 30 images of rich visual scenes (i.e., the interior of a car, an outdoor park, etc.). Image durations will remain the same as experiment one and will be manipulated between participants. As soon as the image disappears, participants will be prompted with a forced-

choice response containing 1. a color identification from the scene or 2. a possible action that could be done within the scene. Participants will point to the type of response that immediately comes to mind after each image. For experiment one, responses will be transcribed, coded, and analyzed to find the average number of responses per image, as well as the accuracy of each response. Correlations between duration of exposure and number of responses, between duration of exposure and percentage of accurate responses, and between the location of image and type of response (action-oriented or not) will be calculated. For experiment two, a binomial logistical regression will be computed on the forced-choice data to see if exposure duration predicts response type. We expect these findings to show that exposure for longer durations is advantageous to perceive more stimulus information, but not necessarily more action-oriented information. Instead, we expect to find that the human perception-action system is attuned to immediately detecting action-relevant aspects of objects and scenes, leading participants to report that they can take an action more readily than reporting information about identification of the visual scene. We expect to find that the human perceptual system quickly detects what opportunities for action are available for objects and in a visual scene, and then consciously cognates and identifies other features afterward.

Presenter(s): Addison Hensley

2:15 PM

Meet Patel

Analise Richcreek

Mckenzie Green

Faculty mentor: Brian Day

Object Exploration

The function-generalization-hypothesis states that exploratory processes will generalize between functionally similar actions just as calibration transfers between similar actions. We hypothesize that practicing writing with different utensils will result in transfer of training for balancing different objects on one's finger. To conduct our study, 68 participants are required and will be undergraduate students from a university participant pool. Our experiment will utilize a transfer-of-training paradigm to investigate whether exploration of one writing task improves an actor's ability on another balancing task, and a mixed design will be used for participants to complete these tasks. Some individuals will balance only serving as the control condition, while others will alternate grasping and balancing. One experimental group will be able to see the object they are balancing, while others will balance using haptics. Primary dependent variables include type of grasp used, size of fingers and hand, number of attempts and task completion time. Our primary independent variable is type of task (either grasping or balancing) and our secondary independent variable is presence of vision while balancing. Amongst other analyses, a 2 (task type) x 2 (presence of transfer) x 2 (vision) MANOVA will be calculated on time taken to complete the balancing task and number of attempts to complete the task. We expect a significant interaction between task type and the presence of transfer in decreasing task difficulty, indexed by time and number of attempts. Expected results will help

us understand the generalization of affordances between exploratory behaviors and functionally similar tasks.

Moderator: **Tara Lineweaver**

Presenter(s): Stephanie Smith

1:45 PM

Abbey Collins

Faculty mentor: Tara Lineweaver

We're Alone Together: The Effects of Virtual versus Hybrid Learning Environments on College Students' Perceived Isolation and Social Support

In response to COVID-19, many classrooms shifted from an in-person to a virtual or hybrid format. The current study examined how different classroom settings impacted levels of stress, burnout, and social isolation in college students, how the COVID-19 pandemic impacted students' perceived social support systems, and how these factors related to each other. 144 undergraduate students completed an online survey. Students who were fully virtual reported feeling less social support from their non-classmate peers. Additionally, first-year students who were fully virtual reported a significantly greater sense of isolation than their first-year peers in hybrid settings. Correlational analyses revealed that social support from professors negatively correlated with all measures of burnout, stress, and isolation amongst students. Classmate and peer social support each also negatively correlated with several outcome measures. Students taking a greater number of in-person classes reported more support from classmates and peers, but not from professors. Finally, more advanced students reported more support from classmates than students earlier in their academic trajectory. These results reveal the especially deleterious effect that fully virtual educational settings can have on the mental well-being of first-year college students. More positively, all types of social support reduced psychological distress, but that from professors was the most universal predictor of better academic and psychological well-being. This illustrates the importance of the professor/student relationship in educational settings, particularly during times of crisis.

Presenter(s): Justin Contreras

2:00 PM

Faculty mentor: Tara Lineweaver

"Why Am I So Tired?" The Effect of Zoom-Related Nonverbal Behaviors on College Students' Zoom Fatigue

We investigated the relationship between four nonverbal Zoom-related behaviors (excessive close-up eye gaze, high cognitive loads, constant self-evaluation, and reduced mobility) and Zoom fatigue in college students. 145 undergraduate students indicated their number of Zoom classes, the time between these classes, and class length during the 2020-2021 academic year. Next, they reported the frequency with which they exhibited specific nonverbal behaviors during Zoom classes. Finally, they completed the Zoom Exhaustion and Fatigue Scale, reporting

the intensity and types of fatigue they experienced after a day of videoconferencing. In ascending order, students reported engaging in exaggerated expressions, excessive close eye contact, self-evaluation, and reduced mobility. When we examined types of fatigue, social and visual fatigue were significantly less common than emotional fatigue, which was significantly less common than motivational fatigue. General fatigue was significantly more common than all other types. In correlational analyses, the number of Zoom classes positively and significantly correlated with several types of fatigue. Additionally, the reduced mobility and excessive close-up eye contact associated with Zooming positively correlated with most fatigue dimensions. Together, results indicate that the reduced mobility and increased self-evaluation associated with Zooming are the most commonly reported outcomes in college students taking virtual courses and the largest contributors to the fatigue they experience after a full day of virtual classes. Incorporating breaks during classes when students are encouraged to move and allowing students to turn off their cameras (or recommending they turn off their mirror image) may decrease students' fatigue in future virtual classroom settings.

Presenter(s): Natalie Simpson
Faculty mentor: Tara Lineweaver

2:15 PM

The Effects of COVID-19 Induced Stress, Anxiety and Depression on the Eating Behavior of College Women

Increases in the prevalence of disordered eating patterns have been linked to distress and poor mental well-being. Additionally, COVID-19 has been linked to both depressive and anxious symptomatology, along with increased feelings of distress (Fitzpatrick et al., 2020). Because disordered eating is prevalent among college-aged women, this study sought to determine how depression, anxiety and stress affected eating behaviors of college women in the context of the COVID-19 pandemic. 179 women at Butler University, aged 18-24, gave informed consent before completing a questionnaire pertaining to their demographics, their stress surrounding COVID, and their weight change since March 2020. The next set of questionnaires asked about their anxiety, stress and depression, as well as their eating behaviors, first at the time they completed the survey (September-December 2021) and next during the COVID-19 lockdown period (March-August 2020). Depression, anxiety and stress were significantly higher during COVID-19 than during the fall of 2021, but college-aged women reported more restraint in their eating at the time of the study. No overall differences emerged in uncontrolled or emotional eating across the two time points. In correlational analyses, depression and anxiety during COVID-19 correlated with both uncontrolled and emotional eating (depression also correlated with cognitive restraint). Although change in stress across time did not predict changes in disordered eating, improvements in depression and anxiety from Spring 2020 to Fall 2021 correlated with less emotional eating across time. Together, these findings reinforce past research showing that college-aged women are a particularly vulnerable population during times of crisis.

Presenter(s): Rachel Henderson
Zoe Strepek
Faculty mentor: Tara Lineweaver

2:30 PM

When Humility Fails: Young, but not Older, Adults High in Humility Report “Good” Memory Abilities

Item framing on Memory Self-Efficacy (MSE) questionnaires may influence young adults' self-reported memory self-perceptions (Lineweaver & Brolsma, 2014). In one past study, young adults rated their memory more harshly on positively- than on negatively- or neutrally-worded items, and responses to negatively-worded items best captured actual memory abilities. Current mood also played a role in MSE, but only when items were framed negatively. The current study built on this prior research to determine if depression and humility play a differential role in MSE for young and older adults. Forty-four undergraduate students and forty-six community-dwelling older adults participated in this study. Participants completed the Center for Epidemiological Studies-Depression scale, the Humility Inventory 15, and a memory self-efficacy questionnaire that contained 27 items from the Memory Assessment Clinics-Self-Report scale, worded positively, neutrally, or negatively. We found that depression related more broadly to MSE than previously suggested by Lineweaver and Brolsma (2014) and that item-wording may not be an effective mechanism to reduce the influence of depression on memory self-perceptions for either young or older adults. We also discovered an additional factor that may affect memory self-reports in young, but not older, adults: humility. Interestingly, young adults higher in humility also had higher MSE based on positively- and neutrally-worded items. Further research will be necessary to determine whether this results in more or less accurate memory self-perceptions in this age group.

Moderator: **Stuart Glennan**

Presenter(s): Seamus Donahue

1:45 PM

Faculty mentor: Stuart Glennan

I Can't Introspect (But Everyone Else Can)

Traditionally, philosophical skeptics raise doubts about the existence of the physical world or our ability to properly perceive it. As Eric Schwitzgebel will point out however, a person's ability to know their own conscious thoughts and feelings are rarely questioned. Through a variety of different examples and scenarios in his paper, "The Unreliability of Naïve Introspection," Schwitzgebel argues that our introspective abilities are much less reliable than one would assume. In this paper, I will focus on an example Schwitzgebel gives to show that we cannot properly introspect our own emotions. In this example Schwitzgebel claims that his wife can read his emotions better than he can introspect. I argue that, if one accepts Schwitzgebel's claim that we can't properly read our own emotions through introspection, then it follows that other people can't know what we are thinking or feeling either.

Presenter(s): Joseph Price

2:00 PM

Faculty mentor: Lavender McKittrick-Sweitzer

The Problematic Nature of National Responsibility

In "National Responsibility and Global Justice", David Miller argues that the citizens of a state are responsible for their state's outcomes. This is because he considers the stances of the citizens to be the primary factor in determining a state's policies, and the policies which a state implements to be the primary factor in determining its outcomes. Miller argues that responsibility is therefore assigned by assessing where citizens fall on two dimensions: control and constraint. The control dimension measures the degree to which a populace actually influences their state's policies, while the constraint dimension measures the degree to which contextual factors limit the scope of policies that might be enacted. Placement on these two axes determines the degree to which a state's citizens are responsible for their state's outcomes, and therefore their standard of living. As claims of global justice are often made on the basis of outcomes, accurately assessing responsibility is of great importance.

I argue that Miller's conception of national responsibility fails to adequately weigh the influence of the control and constraint dimensions. Miller fails to adequately account for dissent within a citizen population, which greatly weakens his argument. This failure is compounded by the constraint dimension, where he fails to sufficiently recognize the effects of external and

physical factors (a state's geopolitical context and a state's access to natural resources respectively). Thus, his model facilitates two injustices: (i) great inequality between states and (ii) a failure to require privileged states to aid less fortunate states.

Presenter(s): Ethan Shopmeyer

2:15 PM

Faculty mentor: Lavender McKittrick-Sweitzer

The Ultimate Necessity of Radical Feminism

In "Radicalising Feminism," Joy James draws attention to the erosion of radical black feminism and its unique ability to address the oppression of poor black women. Despite its "transformative" character and "revolutionary" potential to effect change and liberate marginalized voices, James maintains that "radicalism remains problematic for many" (James 1999). Even still, her ultimate conclusion is unclear, for she avoids explicitly making the stronger claim that radical feminism should supplant its liberal counterpart entirely. Instead, her focus is on justifying radicalism and exposing the dangers it faces in modern feminist discourse, such as those at the hands of neoradicals who co-opt radical symbols and rhetoric for liberal ends. I argue, however, that when James' claims are evaluated in the broader context of intersectionality and radical feminists' own conception of power as a relation, the foundation for a stronger claim to radicalism is realized.

In this essay, I put James' "Radicalising Feminism" into conversation with Amy Allen's "Feminist Perspectives on Power" and Kimberle Crenshaw's principles of intersectional thinking. I then use the concepts from each of these theorists to make a strong claim for the ultimate necessity of radical feminism. Since certain individuals with intersecting identities are powerless along each dimension of their identity, they are utterly unable to effectively engage in traditional liberal feminism, even to accomplish traditionally liberal goals. Radical feminism, I argue, is the unique tool with which these individuals can free themselves from this "ultimate powerlessness" and achieve liberation from oppression.

Moderator: **Ashey Hutson**

Presenter(s): Grace Johnson

1:45 PM

Faculty mentor: Ashley Hutson

Psychosocial Student Adaptations to COVID-19 and Anomie

The COVID-19 pandemic impacted individuals and social institutions due to an abrupt and expansive change to norms and values, which are key characteristics of transitioning societal states. The purpose of this study was to understand how students perceived the educational and societal pressures associated with COVID-19. My research utilized a three-phase research phase via triangulation: data derived from a pilot survey (N=54; n=45 completed n=9 partial), qualitative interviews (n=14), and a quantitative questionnaire (projected n=355). Current findings suggest students reported mixed feelings about one Midwestern University's supports given to them throughout the response to COVID-19, relating the actions at times to being performative. Because higher education shapes social norms and reflects students' awareness of important social values, results of this study will be conceptually framed using anomie—utilizing both individual and societal lenses to understand how COVID-19 changed the lives of college age students.

Presenter(s): Caitlin Seagraves

2:00 PM

Faculty mentor: Ashley C. F. Hutson

#NotAllMen and #MeToo: Investigating Perceptions of Masculine Victimhood and Constructions of Masculinity among College-aged Men in the #MeToo Era

#MeToo reignited a global conversation about the prevalence of sexual violence in women's lives, renewing interest in addressing sexual violence and rape culture. In response, men's rights activists have voiced a concern for false allegations of sexual violence. Much of the existing research on #MeToo has focused on women and, to a lesser extent, trans* experiences. While theoretical frameworks for masculinity remain less developed, feminist theory offers insight into gender inequalities and differences. This research examines how young adult men at a medium-sized college have interpreted the #MeToo movement's emphasis on feminine victimization and masculine aggression. I interviewed (n=15) men, males, and masculine-identifying individuals who were enrolled full-time and recruited through snowball sampling. Inductive analysis was used to code transcripts, utilizing open and axial coding to identify emergent themes. Investigating the perceived impact of this movement on masculinity will extend the framework of masculinity to include the #MeToo era.

Presenter(s): Lauren Frederick
Faculty mentor: Ashley C. F. Hutson

2:15 PM

Fact or Fiction?: Representations of Crime and Criminality in Popular True Crime Podcasts

Storytelling has long been used to socialize future generations. As a form of storytelling, podcasting has rapidly expanded through the true crime genre. Existing literature on such podcasts is limited by its focus on listeners and conceptual definition of “true crime.” This study applied content analysis to 10 randomly selected true crime podcast episodes from 2012-2021, which were inductively coded and analyzed using conflict (critical race and feminist) and symbolic interactionist (labeling) theories. Preliminary findings indicate podcasters applied stereotypical tropes of race and gender to perpetrators and victims, which do not always reflect demographics in crime statistics. Specifically, women were depicted as passive victims and sexualized in theories about motive, thus reinforcing broader feminine stereotypes. Furthermore, race and gender were salient features for male Black and Brown perpetrators and relatively invisible for white male perpetrators. This research provides insight on how storytelling reinforces stereotypes through contemporary means: true crime podcasts.

Presenter(s): Emily Leonard
Faculty mentor: Ashley C. F. Hutson

2:30 PM

Punishment versus Hope: Perceptions of Social Media Portrayals of Restorative Justice

Research focused on the intersection of social media messages and perceptions of restorative justice have the potential to provide insight on criminal justice reform. In light of national conversations about mass incarceration, restorative justice has become a topic of conversation on social media, particularly among activists. This research utilizes qualitative interviews (n=15) to ascertain Gen Z college students’ familiarity, understanding, and interpretation of messages about restorative justice as portrayed in social media posts which they have been exposed to during the course of their everyday lives. Upon completion, each interview will be qualitatively coded to identify emergent themes and patterns. The results of this study will describe how social media advocacy for restorative justice is interpreted, and findings have the potential to contribute to the literature on restorative justice, as well as current advocacy practices as they are perceived by young adults.

Moderator: **Julia Angstmann**

Presenter(s): Krista Pulley

12:30 PM

Faculty mentor: Shelley Etnier

Drag Reduction and High Flow Adaptations of Floodplain Plants: A Morphological and Mechanical Approach

As stationary organisms, plants are limited in their ability to escape the force brought on by strong winds and fast-moving water. If a plant cannot withstand this force, known as drag, then it is at a high risk of being severely damaged or destroyed. As such, plants have evolved numerous strategies to overcome the force of drag, but these adaptations often come at the cost of photosynthetic efficiency. Terrestrial plants generally prioritize photosynthesis, and only temporarily reconfigure – twisting their stems and curling their leaves – to withstand intermittent gusts of wind. On the other hand, aquatic plants live under the constant flow of water, and have adapted to prioritize drag reduction, favoring thinner, more streamlined leaf shapes. However, floodplain plants, which grow around rivers and wetlands, are subjected to the stresses of both wind and water, and it is unknown whether the threat of occasional flooding is a strong enough selective pressure to justify trading photosynthetic ability for a stronger drag reduction response. This study aims to determine how floodplain plants respond to high flow, and whether their drag reduction strategies are more similar to fully terrestrial or fully aquatic plants. Plants from each of the three categories were collected from the Butler Woods and White River, and the leaves and stems were measured and subjected to mechanical testing. This data will be plotted using morpho-mechanical visualization techniques in order to determine whether floodplain plants tend toward a more terrestrial-like or aquatic-like drag reduction strategy.

Presenter(s): Nicole Keller

12:45 PM

Braxton Martorano

Cameron Ellison

Faculty mentor: Jamie Valentine

DEI and Sustainability in Procurement

Diversity, Equity, and Inclusion is at the foundation of Butler University and its future. A demonstration of diversity at Butler extends beyond the student enrollment figures, employee hiring statistics, and academic curricula. This includes a commitment to diversify Butler's supply chain to better economically include the underrepresented communities of qualified contractors and vendors in the local area.

This semester, CUES interns Nicole Keller, Cameron Ellison, and Braxton Martorano are working together to create recommendations for Butler's purchasing department on implementing actionable items to express Butler's commitment to diversity, equity, and inclusion as well as sustainability. The focus is on ensuring access and information to qualified underrepresented organizations to compete for contracts with Butler University with an opportunity to create lasting relationships. This process involves eliminating existing barriers for qualified, underrepresented companies that are associated with competition against larger firms with deeper pockets or more years of bidding experience. In addition, it is important to accurately reflect the available Indianapolis contractor demographics within our own supply chain as we strive to provide more representation throughout Butler University. Surveying a greater market of qualified contractors will also give Butler additional access and options to purchase affordable and quality products. Each development and recommendation within this project is based on academic research, supplier diversity/sustainability initiatives at other universities, and federal data.

Presenter(s): Kathryn Aldstadt
Faculty mentor: Stacy Wetmore

1:00 PM

Responding to The Climate Crisis: How Fear and Social Norms Interact to Drive Attitudes and Action

This study presented participants with either an intense, scary video PSA about climate change that did not offer any mitigating strategies or a calm, yet still informative PSA that had possible strategies and solutions. This was based on the idea that when confronted with high-fear information about a topic like climate change, people will feel like "a deer in the headlights" and tune-out because they become overwhelmed with anxiety and focus on reducing their own fear rather than the danger presented. If they are presented with the same information but in a calmer setting with strategies to channel their anxiety into, they are more effective at tackling the problem. Participants then read a short paragraph written by Kathryn Aldstadt, and these paragraphs either did or did not present social norms about environmental behaviors in the United States. Social norms are incredibly powerful and can motivate behavior change. Participants then completed two, ten-question surveys from the Environmental Attitudes Inventory by Milfont and Duckitt (2010), and these measured attitudes and actions. Participants were then asked about their political affiliation at the end. The results from these four groups were compared against each other to see what combination (high fear vs. low fear video and high social norm vs. low social norm paragraph) lead to the most pro-environmental attitudes.

Presenter(s): Emory Lietz
Faculty mentor: Elise Edwards

1:15 PM

Biking in Indianapolis: An Ethnographic Analysis of Obstacles and Solutions

Indiana is known as the “Crossroads of America” for its historic investment in vehicle infrastructure. This focus on automobiles has shaped Indianapolis’s urban landscape, to the dismay of many cyclists. Based on semi-structured interviews with a range of stakeholders in the Indianapolis cycling community, including urban planners, bike commuters, IndyGo employees, city government officials, and bike advocates, this project identifies and evaluates the current barriers that prevent Indianapolis residents from riding their bikes. These obstacles, which include infrastructural, safety, and social factors, make it more difficult than it ought to be to bike in Indy.

For my thesis project, I researched Bike Indianapolis’s Neighborhood Rides and Bike Guide partnerships, as well as Bike Party and other independently organized rides, which allow cyclists to build their skills and enthusiasm for biking. Additionally, I interviewed stakeholders with different areas of expertise, who had numerous suggestions about what would help further Indianapolis’s transition towards greater bike-friendliness, providing solutions to several of the challenges that riders face.

The project captures a moment in Indianapolis’s history through the viewpoint of people passionate about cycling. For this presentation, I will draw from my larger thesis project and tell the stories of local experts, successful ride programs, and my own city riding experiences. Further, the solutions and suggestions in this paper can be used as a model for improving the city’s bikeability. My passion for cycling and my position as an intern for Bike Indianapolis make me cautiously optimistic for a brighter future of biking in Indy.

Poster #1

Presenter(s): Corey Dea

A

Faculty mentor: Julia Angstmann

Categorizing urban greenspaces by vegetation complexity: implications for managing biodiversity

Urban areas have been recognized as a major driver of global biodiversity change, yet little is known about how urban wildlife utilize these highly altered landscapes. One key challenge in research-informed wildlife management is whether to define variable habitats based upon human land use or if more ecologically relevant measures of habitat variability, such as vegetation complexity, should be used to determine species occupancy of urban habitats. At 41 sites across Indianapolis the vegetation complexity was measured, and camera traps were used to measure species occupancy. Using this data, we investigated if how we classify land for human use (e.g. cemetery, park) is a relevant way to manage urban biodiversity or if measures of habitat complexity are better. Using principal component analysis, we were able to determine the vegetation variables that best drove habitat variability among sites and group sites into clusters with similar vegetation complexities. Human land uses such as cemeteries and remnant forest had greater habitat complexities, but even within the same land use type sites varied highly meaning this strategy is not best to manage biodiversity. Alpha diversity and habitat complexity scores of each site did not correlate highly but when looking at individual species patterns, it could be assumed which vegetation complexities were preferred based on occupancy data. Determining habitat complexities of sites can therefore be useful to understanding how to effectively manage urban wildlife. With this data, land management recommendations can be made to increase biodiversity and beneficial human and wildlife interactions in urban landscapes.

Poster #2

Presenter(s): Catherine Rock

B

Faculty mentor: Kyryll Savchenko

Molecular Analysis of *Ustilago bromivora*

This study aims to identify the evolutionary relationships, host ranges, and geographic distribution of the species *Ustilago bromivora*, a species of biotrophic smut fungi that infects the *Brachypodium* and *Bromus* species (Bosch & Djamei, 2017), by conducting the multigene phylogenetic analysis on isolates from various host species collected in three continents. Previous phylogenetic studies on *U. bromivora* reveal only a few isolates from the *U. bromivora* complex (Stoll et al., 2005; Kruse et al., 2019; McTaggart et al., 2016). This information would allow a better understanding of which species of *U. bromivora* are appropriate to use on the various invasive host plants from which the samples were collected. Sixty one specimens of *Ustilago bromivora* collected on various hosts in the United States, Ukraine, and Israel were

examined and analyzed. This analysis process included DNA isolation and extraction, PCR amplification at the LSU, ITS, and ATP gene regions for each sample, and these PCR products were then sent to ASU Genomics for direct sequencing and phylogenetic data. In future studies, samples need to be collected from North Carolina, South Carolina, and Indiana, and additional gene regions need to be sequenced for the multi-gene phylogenetic analyses to produce a more accurate phylogeny for *U. bromivora*.

Poster #3

Presenter(s): Tara Poindexter

A

Faculty mentor: Kyryll Savchenko

Diversity of Pucciniales on Cyperaceae from Savannah National Wildlife Refuge and the Great Smoky Mountains National Park

Rust fungi (Pucciniales) are a group of Fungi under the phylum Basidiomycota within the kingdom Fungi (Kolmer et al., 2009). Rusts are considered to be obligate parasites of the host plant species, indicating that the fungus must colonize a host plant in order to complete its life cycle, and each stage of the life cycle causes disease that is significant to the host. In the case of Pucciniales, this can involve one or more host plants that may or may not be taxonomically related (Kolmer et al., 2009). Rust fungi of wild hosts are not well explored in North America, with estimates showing that only about 20% of species diversity have been documented (Callan and Carris, 2004). Out of all the US regions, the Carolinas is one of the least studied (despite the wide array of plant hosts) and thus harbors the best opportunities for the discoveries of novel species. The aim of this study is to explore the diversity of Pucciniales found on Cyperaceae hosts (sedges) in two conservation regions, Great Smoky Mountain National Park in North Carolina and Savannah National Wildlife Refuge in South Carolina. Although Cyperaceae serves as a relatively common host for rust fungi (specifically *Puccinia* and *Uromyces*), the first large scale exploration of the molecular relationship between sedges and these rusts was performed just in 2021 (Léveillé-Bourret et al., 2021). This study will focus on exploring the molecular diversity of Pucciniales on sedges collected in the Carolinas.

Poster #4

Presenter(s): Rose Meyer

B

Faculty mentor: Lindsey Lewellyn

The role of Rack1 in the germline of the developing egg chamber

The fruit fly egg develops from a structure called an egg chamber. Each egg chamber consists of 16 germs cells (1 will develop into the oocyte and the remaining 15 will become nurse cells). The 15 nurse cells are connected to each other and the oocyte through the intercellular bridges. These intercellular bridges, or ring canals, are essential for fertility, but how they are regulated during oogenesis is not fully understood. Our lab has identified that the kinase, Misshapen, plays a role in regulating the stability and size of the ring canals; however, the targets of the kinase activity are not known. Proteomics analysis identified the scaffold, Rack1,

as a potential target of the Misshapen kinase. A previous study demonstrated that mutation of Rack1 in the germline impacted egg development, but the specific role for Rack1 and whether it is regulated by phosphorylation is not known. Therefore, we want to determine whether depletion or overexpression of Rack1 alters the size or structure of the ring canals. I have cloned the two reported isoforms of Rack1 into a UAS expression vector, which has been injected into fly embryos to produce lines that allow us to over-express Rack1 in the germline. I will use different GAL4 lines to overexpress each isoform in the germline looking for any changes in the ring canals or nurse cell membranes. Preliminary data suggest that depletion of Rack1 alters intercellular bridge size and oocyte size. Further direction from this study will be characterizing the specific role of the Rack1 in the germline and confirming that it is a target of the Misshapen kinase.

Poster #5

Presenter(s): Mason Gaerte

A

Faculty mentor: Kyryll Savchenko

A Genetic Analysis of Ustilago Striiformis

The purpose of this study is to investigate evolutionary relationships and pathogen/host of Ustilago striiformis connections through multigene molecular analysis. Ustilago striiformis is a smut fungus found across the world that is responsible for stripe smut in nearly 165 species of grass species (Savchenko et al. 2014.) The samples used were from the western United States and were found on a variety of host plants. Previous studies have found slightly conflicting conclusions regarding the phylogeny of this species, so a more comprehensive study is needed (Savchenko et al., 2014, Kruse et al., 2018). Also, specificity between fungi and host plant can help us understand which species can be used to target invasive host plants while maintaining the integrity of surrounding flora. DNA was extracted from fungal samples, PCR's were run for the ITS gene region, and then those products were put through gel electrophoresis. If a positive band was indicated, the PCR product was sent to ASU genomics for full sequencing. Sequences were run through Bayesian analysis to construct phylogeny. The future of this study will include genetic sequencing of host plants and analysis of more gene regions including LSU, ATP, SSC, and SDH.

Poster #6

Presenter(s): Audrey Young

B

Faculty mentor: Christopher Stobart

Design of a Novel Reverse Genetics System for Coronavirus Mouse Hepatitis Virus (MHV)

Reverse genetics systems are molecular tools to synthesize viruses de novo and introduce mutations to better understand the function of viral genes. Mouse hepatitis virus (MHV) is a mouse coronavirus has been studied extensively for the last 40 years as a model of coronavirus replication due to its genetics and structural similarities to human coronaviruses HKU1 and OC43. Currently, there is one reverse genetics system employed for recovery of mutant MHV.

However this system is difficult to use due to cellular toxicity of some of the components and the extensive resources needed to use it. In this study, we describe a progress made towards the development of a new reverse genetics system involving a bacterial artificial chromosome (BAC). This system improves on several of the issues plaguing the old system and is far more efficient at virus recovery.

Poster #7

Presenter(s): Zac Stanley

A

Faculty mentor: Shelly Etnier

A Case Study of Avian Collisions at Butler Skybridges

Every year, up to one billion birds die due to window-strike collisions in the United States. This study looks at three years of window strike data collected by Butler's Department of Biological Sciences. Data was collected during spring and fall migrations from 2016-2018. Results suggest that window strike fatalities occur at buildings with a higher percentage of glass relative to building size. Two problematic areas for window strike fatalities are the Jordan and Pharmacy skybridges. This study focuses on these two bridges, examining the species composition for each site. The results show that nocturnal migrators collide with the Jordan and Pharmacy bridges at a higher frequency than other species. This includes birds such as thrushes and warblers. The Swainson's Thrush is particularly problematic, with almost 56% of the strikes coming from this species alone. To prevent future collisions, Butler University will be transitioning to bird-safe glass on both bridges in hopes this has a positive impact on future migration periods.

Poster #8

Presenter(s): Abigail Screen

B

Faculty mentor: Jennifer Kowalski

Investigation of α/β subunit glycopeptides as potential ligands of the FSHR-1 receptor in regulating neuromuscular signaling in *C. elegans*

The ability of cells to communicate is vital to an organism's success. Neurons, for example, can send signals to muscle effector cells at sites called neuromuscular junctions (NMJs) via signaling molecules known as neurotransmitters. An excellent model organism to study neuronal signaling is *Caenorhabditis elegans*, a microscopic nematode that shares many homologous genes with humans. Muscle contraction in *C. elegans* is partially controlled by the release of a neurotransmitter, acetylcholine (ACh), but the mechanisms are unknown. Previous research identified the G-protein coupled receptor FSHR-1 as a regulator of neuromuscular signaling, as *fshr-1* mutants are resistant to paralysis induced by the drug aldicarb, which enhances excitatory signaling for muscle contraction. The FSHR-1 receptor activates downstream factors that initiate ACh release from motor neurons, but the ligand for this receptor is still unknown. We hypothesized that the α glycopeptide subunit encoded by the *flr-2* gene, as well as the β glycopeptide subunit encoded the T23B12.8 gene, are activating ligands of FSHR-1. If this is

true, then flr-2 and T23B12.8 loss of function single mutants should exhibit the same defects in muscle contraction as fshr-1 mutants, and the double mutant flr-2;fshr-1 animals should have a phenotype no worse than either single mutant. Using aldicarb paralysis assays, I found flr-2 and fshr-1 single mutants exhibit similar rates of paralysis to each other, and preliminary data indicate the fshr-1;flr-2 double mutant also shows a similar paralysis rate to these single mutants. These data support their function in a common pathway at the NMJ.

Poster #9

Presenter(s): Anna Pressel

A

Faculty mentor: Jennifer Kowalski

Potential regulation of SYD-2 protein abundance by ubiquitination from the Anaphase Promoting Complex (APC) in *C. elegans*

Neurons and their corresponding signaling comprise the basis of every thought, action, and movement. Understanding neurological signaling is critical in acknowledging the foundation of neurological diseases. Specifically, a balance of excitatory to inhibitory neuronal signaling is controlled by many proteins; yet details of this regulation remain incompletely understood. *C. elegans* roundworms are an excellent model for studying neuronal signaling. One key neuronal protein, SYD-2 (also known as Liprin α), acts in inhibitory GABA neurotransmitter-releasing neurons to regulate inhibitory signaling at the *C. elegans* neuromuscular junction (NMJ). Previous research showed the abundance of SYD-2 is regulated by the Anaphase Promoting Complex (APC), a ubiquitinating enzyme present in GABA neurons that also regulates inhibitory signaling at the NMJ. *C. elegans* APC mutants have decreased GABA release and more muscle contraction, whereas *syd-2* mutants have less muscle contraction that suppresses increased contraction of APC mutants. Additionally, more SYD-2 is present in GABA neurons in APC's absence. These data support a model where APC negatively regulates SYD-2 to promote GABA release, likely by ubiquitin-tagging and promoting SYD-2 degradation. However, whether the APC directly controls SYD-2 ubiquitination is unknown. I am using double immunoprecipitation (IP) and Western blot protocols to determine if SYD-2 is ubiquitinated in *C. elegans* and test the hypothesis that APC directly regulates SYD-2 ubiquitination in GABA neurons. It is expected that the double IP shows SYD-2 ubiquitination, which should be increased in APC mutants if the APC is required for ubiquitination. Results of pilot experiments for these studies will be presented.

Poster #10

Presenter(s): Jack Paras

B

Faculty mentor: Lindsey Lewellyn

Determining whether the Tao kinase functions as an upstream regulator of the Misshapen kinase in the *Drosophila* egg chamber

The *Drosophila* fruit fly has proven to be a strong model organism for studying certain biological and physiological processes, such as oogenesis. Female gamete development takes place in cellular structures known as egg chambers, where the developing egg goes through various

stages of development and is supported by multiple nurse cells. This process strictly relies on the interconnected workings of many proteins and cellular structures. For example, intercellular bridges help facilitate the transfer of cytoplasmic material from one cell to another. Regulation of these intercellular bridges relies on the activities of various regulatory enzymes. The Ste20 kinase Misshapen (Msn) is one such enzyme used to regulate size and stability of intercellular bridges, or ring canals, in the *Drosophila* germline. Although previous research has found a role for Msn in the germline, little is known about the upstream regulators of Msn in this signal transduction pathway. Studies on the role of Msn in *Drosophila* intestinal cell turnover have identified the Tao kinase as an upstream regulator of Msn. Therefore, this study aims to test whether the Tao kinase functions as an upstream regulator of Msn in the *Drosophila* germline, as it does in the *Drosophila* intestine. This study will begin by determining whether depletion of Tao expression in *Drosophila* egg chambers affects ring canal size and stability using fluorescence microscopy and analysis of ring canal diameter. The results from this study will be used in future work looking into specific mechanisms of Tao activity on Msn.

Poster #11

Presenter(s): George Papadeas

A

Faculty mentor: Christopher Stobart

Evaluating the Susceptibility of Coronavirus Mouse Hepatitis Virus (MHV) to Thermal Inactivation

Mouse hepatitis virus (MHV) is a highly contagious coronavirus pathogen in mice and commonly studied model of coronavirus replication due to its genetic similarities and close relatedness to human coronaviruses HKU1 and OC43. Recent epidemic and pandemic coronavirus outbreaks globally have led to the increased need on information regarding their virulence. It is known that coronaviruses thrive in host environments at 37°C, but limited information represents the effect of temperature variability on the persistence of these viruses. In this study, we evaluate the thermal stability and growth of MHV strain A59 under different environmental pressures with the objective of using this data to develop computational landscape models of the persistence of coronaviruses. Thermal stability was evaluated over 7 days at incubation temperatures of 4°C, 20°C, 32°C, and 37°C. In addition, MHV-A59 replication was investigated at a range of temperatures permitted by our host delayed brain tumor-9 (DBT-9) cells. Our data show that the stability of MHV-A59 decreases with elevated temperatures and through the use of both stability and replication data, this study expands on our understanding of the scope of coronavirus environmental stability and its role in virus replication.

Poster #12

Presenter(s): Sarah Maarouf

B

Faculty mentor: Jennifer Kowalski

Investigation of potential proteasomal regulation of the synaptic protein, SYD-2 Liprin- α in *C. elegans*

The nervous system requires both excitatory and inhibitory synaptic signals to function properly. Imbalances in excitatory to inhibitory (E:I) signaling occur in numerous neurological diseases; however, the molecular mechanisms controlling this balance are not fully understood. The ubiquitin signaling system functions in neurons to control protein stability, activity, and localization, which impact synaptic signaling. The Anaphase-Promoting Complex (APC) is an E3 ubiquitin ligase, a component of the ubiquitin system that mediates protein degradation via the addition of chains of the small polypeptide, ubiquitin, to its substrates. This signals for the subsequent destruction of the ubiquitin-tagged proteins by the proteasome, a multi-subunit protein degradation complex. We previously demonstrated that the APC promotes inhibitory synaptic signaling to prevent excessive muscle excitation at the neuromuscular junction (NMJ) in *C. elegans* roundworms, a model for E:I balance. However, substrates of the APC in this context are unknown. Our genetic, behavioral, and imaging data indicate the presynaptic protein SYD-2 Liprin- α is regulated by the APC at the NMJ. We thus hypothesized SYD-2 is a substrate of the APC that becomes ubiquitin-tagged and targeted for destruction by the proteasome. If this is true, SYD-2 levels should increase in proteasome-deficient worms. Preliminary results of experiments using RNA interference to knock down expression of essential proteasome subunits followed by Western blot analysis of SYD-2::GFP indicated that knockdown of the proteasomal subunit RPT-5 causes increased SYD-2::GFP, supporting our hypothesis. Results of experiments confirming this finding and testing knockdown of the RPN-6, RPN-10, and PAS-6 subunits will be presented.

Poster # 13

Presenter(s): Emily Landwehr

A

Faculty mentor: Christopher Stobart

Mathematical Modeling of Respiratory Syncytial Virus (RSV) and Coronavirus Stability

Respiratory syncytial virus (RSV) and coronaviruses are enveloped RNA viruses, which cause respiratory diseases in humans and have the potential to cause both hospitalizations and death. As of right now, no widely accessible vaccine for RSV exists, though many institutions are actively pursuing one. The current COVID-19 pandemic highlights the need for further investigation into both the persistence and stability of coronaviruses in our environment. The purpose of this study was to better understand the combined roles of environmental conditions, such as temperature and pH, on the resulting degradation of RSV and mouse hepatitis virus (MHV), a murine coronavirus, to create predictive mathematical models. Thermal and pH inactivation data were acquired using RSV strains A2 and A2-line19F and thermal inactivation data was acquired using MHV-A59. Using these inactivation data for

temperature and pH, we assembled mathematical models to predict the clearance rates of the two viruses. These data shed new light on the external forces impacting RSV and coronavirus biology and will make it possible to predict the most and least optimal incubation conditions for storage or inactivation of certain strains of RSV for potential future live-attenuated vaccine design and aid in reducing spread and transmissibility of these two viruses in the

Poster #14

Presenter(s): Elise Huffman

B

Faculty mentor: Christopher Stobart

Inhibition of respiratory syncytial virus (RSV) with the human antimicrobial peptides cathelicidin (LL-37) and human beta-defensins (hBDs)

Respiratory syncytial virus (RSV) is a negative-sense, single stranded RNA virus that is responsible for both upper and lower respiratory tract infections predominantly in infants, the elderly, and individuals who are immunocompromised. Currently, there is no available vaccine and there are limited treatment options for RSV. Antimicrobial peptides (AMPs) are small peptide molecules that are generated and secreted into the mucosa of a wide range of animals to direct antimicrobial activity against fungal, bacterial, and viral pathogens. In this study, we evaluated the potential of antimicrobial peptides cathelicidin (LL-37) and human beta-defensins (hBDs) to inactivate RSV. Previous studies have suggested that LL-37 is capable of inactivating RSV through direct damage to the viral envelope as well as arbitrating other antiviral activities. However, these studies were limited to a single strain of RSV. Very little is known of whether hBDs have the capacity to inhibit the replication of RSV. To evaluate whether these AMPs exhibit strain-specific differences in its efficacy against RSV, we evaluated the susceptibility to inactivation upon direct exposure and during replication in cell culture of a panel of recombinant RSV strains that differ in their expression of surface glycoproteins F and G. We show in this study that RSV is sensitive to both LL-37 and some hBDs expressed by humans. These studies provide important insight into host factors which may limit RSV replication in the airway epithelium and may highlight a therapeutic role for AMPs in treating active RSV infections.

Poster #15

Presenter(s): Abigayle Elsbury

A

Faculty mentor: Lindsay Lewellyn

Using FIB-SEM to create a 3D model of early oogenesis in *Drosophila melanogaster*

The fruit fly serves as an excellent model for studying oogenesis, or female gamete formation. Each egg develops from an egg chamber, which progresses through the stages of oogenesis as part of a developmental array known as an ovariole. At the anterior of each ovariole lies the germarium, which contains the germline and somatic stem cells which will divide to give rise to each newly formed egg chamber. Much has already been learned about oogenesis using a combination of fluorescence and electron microscopy to study specific structures and proteins;

however, a complete picture of the organization of germline and somatic cells and their intracellular structures and organelles is lacking. To learn more about the early stages of oogenesis, we are rendering a large data set collected using Focused Ion Beam Scanning Electron Microscopy (FIB-SEM) to generate a complete 3D model of the germarium and an early-stage egg chamber. Our lab is primarily interested in the structure of the germline ring canals, or intercellular bridges, which allow nurse cells to transfer their cytoplasmic contents into the growing oocyte. Electron microscopy has previously revealed the presence of extensive membrane protrusions, or microvilli, surrounding the germline ring canals. This microvilli meshwork is thought to maintain the anchoring and stability of the ring canals during egg chamber growth, yet the stage of oogenesis when these protrusions first appear and their spatial distribution within the germline is not known. Therefore, we hope to characterize changes in the size and structure of the germline ring canals and the organization of germ cell membranes during early oogenesis. Once completed, we envision that this dataset can become a valuable resource that can be further mined by other researchers in the field.

Poster #16

Presenter(s): Madeline Coffey

B

Faculty mentor: Nathanael Hauck

The Effects of Salt and ABA Exposure on Survival and Gene Expression in *Physcomitrella patens*

Every organism deals with stressors from their environment in unique ways that deviate due to evolution. The way that plants deal with these stressors often involves genes being “turned on and off” or expressed in the organism, which activates pathways to react to the stressor. I specifically look into the stressor of salinity and how it affects the moss *Physcomitrella patens*, as high salinity levels cause phenotypic (or observable) damage to plants and triggers the expression of genes along with the activation of subsequent pathways. I used a spectrophotometer to measure chlorophyll levels, which correlates to cell death of the plant, to determine phenotypic damage at different salinity levels. The moss, a nonvascular plant which lacks hormones, was also exposed to ABA, a vascular plant hormone that plays an important role in stress response, in order to determine its effect on gene expression and phenotypic damage. This will allow us to determine the level of conservation that exists between vascular and nonvascular plants’ genes that manage salt stress.

Poster #17

Presenter(s): Anna Childers

A

Maura Donnelly

Faculty mentor: Benjamin Spears

Exploring AtTCP8 localization and behavior by targeted and broad mutagenic analysis

Protein interactions can be affected by changes in structure, changing behavior and causing separation from other things in the cell by phase. This is often seen in proteins with intrinsically disordered regions (IDRs), or parts of a protein with no specific structure. The plant-specific Arabidopsis transcription factor AtTCP8 is important to cellular signaling and transcriptional activities, potentially determining their response to environmental stressors. TCP8 contains three IDRs which are likely sites of post-translational modifications that determine whether the transcription factor is enhancing growth or defense, as TCP8 cannot do both at once. Recently the movement of TCP8 into phase-separated locations was seen in response to hormones within the nuclei of *Nicotiana benthamiana*, as well as interactions with other growth and defense-related transcription factors. To explore TCP8 IDRs further, individual point mutations of potential amino acids, as well as larger truncation mutations will be used to remove different combinations of post-translational modification sites and IDRs and a protein interaction assay will be used to observe whether or not there is a change in TCP8's interactions with BZR2, a brassinosteroid regulatory protein, in these mutants. Using the new confocal microscope on campus, dynamic movement of TCP8 into localized condensates will be observed, tracked, and quantified using microscopy in this project. Little is known about how TCP8 regulates growth and defense; this project will allow for further research to be more focused on one or a few IDRs, as compared to higher-order single mutants, to save time and resources in our initial study.

Poster #18

Presenter(s): Letitia Bortey

B

Faculty mentor: Jennifer Kowalski

FSHR-1 and its candidate ligands FLR-2 and T23B12.8 regulate neuromuscular signaling balance.

Normal neuronal signaling regulates the balance of chemical messages to the postsynaptic cell. FSHR-1 is the sole *C. elegans* homolog to a family of glycopeptide hormone receptors involved in gonad function and required for normal neuromuscular activity. However, FSHR-1's potential activating protein (ligand) is unknown. Possible ligands for FSHR-1 may be the α glycopeptide FLR-2, the closest homolog to the human FSHR ligand, and T23B12.8, which encodes the β glycopeptide. I hypothesized FLR-2 and the β glycopeptide work in a ligand-receptor relationship with FSHR-1 in *C. elegans* to control neuromuscular function. In swimming assays measuring neuromuscular function, *flr-2* loss of function mutants showed the same deficits in motility as *fshr-1* loss of function mutants, demonstrating *flr-2* is required for neuromuscular signaling. The T23B12.8 beta mutants showed a slight decrease in motility, but the decline was

weaker. This indicates the beta subunit may play a minor role in motility or another co-ligand could influence motility. fshr-1;flr-2 loss of function mutants showed similar decreases in motility as the fshr-1 and flr-2 mutants alone, suggesting fshr-1 and flr-2 work within the same pathway and support a model in which flr-2 is an fshr-1 ligand. Future studies with β mutants will test if the two ligands and/or FSHR-1 and the β subunit work within the same pathway and if the glycopeptides and FSHR-1 receptor physically interact. These results contribute to understanding the role of glycopeptides and their receptors in neuronal signaling balance, which may be important in approaching neurological diseases.

Poster #19

Presenter(s): Yara Batista

A

Faculty mentor: Christopher Stobart

The Role of Asn203 in the Function of Coronavirus Protease nsp5 (3CLpro)

Coronaviruses are enveloped, positive-strand RNA viruses which are associated with upper and lower respiratory infections in humans. The current COVID-19 pandemic highlights both the potential for emerging severe coronaviruses and the need for continued investigation of therapeutic options. Upon entry, the coronavirus translates its genome into polyproteins which must be proteolytically cleaved and processed to yield mature non-structural proteins that facilitate genomic synthesis. Non-structural protein 5 (nsp5, 3CLpro) is a highly conserved 3-domain protein throughout all coronaviruses which mediates proteolytic cleaves at 11 different sites and is essential for virus replication. While the domains one and two of nsp5 have been well studied and house the proteolytic machinery of the enzyme, little is known about the third domain and its association with the enzymatic core of the protease. We describe in this study the critical role of a conserved Asn203 residue in domain 3 of mouse hepatitis virus (MHV) nsp5. Using site-directed mutagenesis and analyses of virus replication, we show an important role for this residue in both the replication of the virus and likely association with the protease enzymatic core. These ongoing studies highlight a new critical region of the protease that may be targeted by future coronavirus therapeutics.

Poster #20

Presenter(s): Ryan Adkins

B

Faculty mentor: Jennifer Kowalski

Investigation of the Roles of fshr-1 and sphk-1 on Life History Traits in *C. elegans*

The later years of life are often characterized by declining cognitive function and mobility. One contributor is the cellular accumulation of reactive oxygen species (ROS). However, our understanding of how cells respond to ROS to promote health and survival is incomplete. We focused here on two genes, follicle stimulating hormone receptor-1 (fshr-1) and sphingosine kinase-1 (sphk-1), encoding proteins that mediate responses to oxidative stress and regulate life history traits, including lifespan and brood size, as well as neuromuscular function, in the roundworm *C. elegans*. Both genes are conserved in humans where they are similarly

implicated in stress responses, cellular survival, and neuronal functions. Interestingly, *fshr-1* and *sphk-1* work together to mediate responses to intestinal oxidative stress. Whether these genes work in a common pathway to control lifespan or brood size is unknown. Our recent findings indicate potential phenotypic differences in life history traits based on the bacterial food source for the worms. The typical food source, OP50 *E. coli*, is pathogenic compared to the alternative HB101 strain. We hypothesized differences in pathogenicity between the two bacteria strains causes decreased lifespan and brood size through oxidative stress effects that may differentially affect *sphk-1* and *fshr-1* mutants. We found *fshr-1* is required for normal lifespan and brood size in *C. elegans* and confirmed the pathogenicity levels of the bacterial lawns did not significantly impact on these traits. Tests for effects on *sphk-1* mutants are ongoing as are experiments testing the activity of these genes in a common pathway for life history regulation.

Poster #21

Presenter(s): Megan Leaman

A

Faculty mentor: R. Jeremy Johnson

Role of a conserved family of serine hydrolases in ethanol toxicity

A recent CRISPR screen for genes involved in controlling acetaldehyde dependent ethanol toxicity, identified OVCA2, a conserved serine hydrolase, as the highest protectant against acetaldehyde toxicity. OVCA2 is a member of a larger, diverse group of proteins responsible for metabolic activities known as the family of serine hydrolases (FSH). In *S. cerevisiae*, three FSH homologues (FSH1, FSH2, and FSH3) are present, but their overlapping functions and their connection to acetaldehyde toxicity are unknown. In this study, we worked to understand the role of FSH proteins in controlling acetaldehyde toxicity in two divergent ways. First, we compared the substrate specificity of the three FSH homologues from *S. cerevisiae* against a library of ester substrates at varying pH environments. Second, we constructed combinatorial deletions of FSH genes in *S. cerevisiae* and screened deletion strains for changes in growth under high ethanol, acetaldehyde, and varying other toxic aldehydes. For enzyme activity, both FSH2 and FSH3 had a preference for alkaline conditions and thus the comparative substrate specificity screen was completed at pH 7.5. In this screen, FSH2 and FSH3 showed substrate preferences in line with FSH1, as they both preferred short chain esters versus longer chain esters (>8C). To further evaluate the metabolic activity of FSH enzymes in acetaldehyde toxicity, single, double, and triple deletion strains of the three FSH genes were made in *S. cerevisiae*. Proper gene deletions for each strain were confirmed by colony PCR. Each of the deletion strains were then grown on agar plates with varying concentrations of alcohol and aldehyde toxins. Each of the single deletion mutants showed similar growth rates to each other and to the wild-type strain by spot dilution but exhibited slightly different colony morphology from the wild-type strain. Further testing on the ability to withstand toxins produced by the alcohol metabolism pathway will be conducted to determine whether these enzymes and OVCA2 can metabolize the toxic byproducts of ethanol production.

Poster #22

Presenter(s): William Harris

B

Faculty mentor: R. Jeremy Johnson

Effect of loop variants on enzymatic activity in acyl-protein thioesterases

Acyl-protein thioesterases (APT) depalmitoylate, or remove fatty acid modifications, from proteins attached to membranes. In humans, APT1 and APT2 are known to control the palmitoylation of Ras, a signaling oncogene whose mutations are linked to cancer. My goal was to analyze the relative importance of specific loop residues hypothesized to regulate the membrane binding and catalytic activity of APT1. To accomplish this goal, wild-type and loop variants of APT1 were expressed in *Escherichia coli* and purified to homogeneity. Purified APT proteins were then assayed for changes in thermal stability to confirm that mutations did not significantly shift the folding of the APT. Changes in enzyme function were measured using fluorescent kinetic measurements on substrates with various alkyl chain lengths. From each kinetic assay, a Michaelis-Menten plot was created and the catalytic constant (k_{cat}) and catalytic efficiency (k_{cat}/K_M) were recorded. Multiple APT loop variants have been successfully engineered and purified. Enzyme activity results indicate that substrates with smaller methyl chains are hydrolyzed more quickly by wild-type APTs while APT1 variant W71A showed hinderance of enzymatic function in these substrates. In the future, we plan to analyze a wider library of APT1 and APT2 variants for shifts in biological activity of APT upon loop substitution.

Poster #23

Presenter(s): Allison Goss

A

Faculty mentor: Jeremy Johnson

Shifted Activity of Serine Hydrolases in *Mycobacterium smegmatis* During the Dormant to Active Transition

The success of *Mycobacterium tuberculosis* (Mtb), the causative agent of Tuberculosis (TB), can be largely attributed to its ability to enter a dormant, or inactive, state within a host. When infected with dormant Mtb, the host is entirely asymptomatic; however, dormant Mtb can reactivate upon which the host would experience symptoms of TB and could be contagious. Most current treatments for TB are ineffective against the dormant growth state, necessitating new therapeutic targets for combating dormant infections. One class of enzymes essential to dormant growth and survival are serine hydrolases, which catalyze the cleavage of lipids—a process essential for the reactivation of Mtb. Herein, we show that *Mycobacterium smegmatis* (M. smeg) can be used as a model organism for Mtb by developing a growth system that mimics the relative changes in serine hydrolase activity and lipid concentrations previously observed in Mtb upon reactivation. Using TLC for analysis, our growth system showed an increase in TAG concentrations with increasing amounts of supplied carbon (0%, 1%, 2% and 5%). It also revealed a decrease in TAG concentrations with increasing activation time (0 hr., 3 hr. or 6 hr.) after being grown in an environment with limited nitrogen. These results mimicked both the derivation of TAGs by Mtb upon infection and their cleavage upon reactivation. Furthermore ,

using variable ester substrates, we identify specific serine hydrolases with changes in activity across these different cultures as future targets for therapeutic treatments of TB.

Poster #24

Presenter(s): Corinna Peña

B

Faculty mentor: Brian Murphy

Searching for Extremely Low-Mass White Dwarf Stars using NASA's TESS Mission

A white dwarf star is essentially a core of a dead star made up of mostly carbon and oxygen. Extremely low-mass white dwarf stars (ELM) are white dwarf stars with a mass lower than 0.45 solar masses that could not have evolved through normal processes within the lifetime of our universe. Therefore, all of these objects are in a binary system and are typically funneling mass onto the second star in either a stable Roche lobe overflow or a common envelope phase. These objects have periods between a few minutes to a few hours, so they are very short lived which makes them very rare. Our goal for this project was to find these ELM stars by using NASA's Transiting Exoplanet Survey Satellite (TESS) data. We analyzed this data and did follow-up research using the Zwicky Transient Facility (ZTF), Sloan Digital Sky Survey (SDSS), and our own observations. Through our research, we were able to find 2 ELMs, 5 white dwarf + m-dwarf (WD+dM) binaries, and 4 cataclysmic variables. These ELMs are sources of persistent gravitational waves that will be detectable by future space-based missions.

Poster #25

Presenter(s): Emily Shoemaker

A

Faculty Member: Rasitha Jayasekare

Identifying how Home Advantage Manifests in Butler Basketball Using SFA

Butler University's basketball team has been in the Big East Conference since 2013 and is known for having a distinct home court advantage named 'Hinkle Magic' by fans. It is of interest to identify how home court advantage affects a Big East team's ability to play to its full potential to generate wins and what factors are most accurate in measuring this potential. This project will utilize the Stochastic Frontier Approach (SFA) to answer these questions using panel data collected from each Big East Team from the 2013-2014 to 2019-2020 seasons. With this approach, we define 'frontier' as a team's maximum attainable wins given the strength of their program and compare this threshold to the team's actual success during the season. In other words, we will be using the SFA approach to model a team's efficiency when playing at home vs. away and identify which factors, they most readily meet, or fail to meet, this potential based on game location.

Poster #1

Presenter(s): Nicole Dickson

B

Faculty mentor: M. Shaha Patwary

Study of Asymptotic Normality for the Gamma Distribution

In this project, we examine the normality assumption of $n \geq 30$ for any distribution, where n is the sample size. We study this assumption using a Gamma Distribution by comparing it to the Gaussian Distribution. Additionally, we test different sample sizes via normality tests to discover the smallest point of asymptotic normality. Both graphical and numerical analyzes are needed for a proper conceptualization of the data. Therefore, we analyze the graphs of the two distributions and the results of the normality tests performed on the simulated Gamma Distribution using $\alpha = 0.05$ to draw our conclusions. Using simulated data in R, the Shapiro-Wilks Normality Test indicates a sample size of 48 as the point at which the data produced for the Gamma Distribution achieves asymptotic normality. However, the consistency of normality is not shown until a sample size larger than 175. Therefore, the standard normality assumption should be questioned and considered more significantly, especially for right-skewed distributions

Poster #2

Presenter(s): Victoria Turner

A

Faculty mentor: Wendy Meaden

Denim: Flashing Through the Years

Denim started to become a popular fashion amongst the working class around 1870s. However, since then denim has become so much more than just work pants. Throughout the years since then it has grown popularity. Denim is one of the first kinds of fashion that began popular for the working class and moved up the hierarchy chain to become popular amongst the upper classes as well. And since then it has become a fashion staple, used to express personality, while also remaining practical.

Poster #3

Presenter(s): Lishan Rosen

B

Faculty mentor: Karina Hamamouche

Undergraduate Students' Emotions Changed During Covid-19

The COVID-19 pandemic that started in March 2020 impacted daily life for everyone. People's social interactions declined, which caused increased feelings of loneliness (Kovacs et al., 2021). Coping with uncertainty was an additional challenge people faced. College students were uniquely affected as they moved home, and transitioned to online learning and test taking,

which resulted in a lack of peer support (Guppy et al., 2021). We hypothesized all of these changes would result in a variety of emotions for students. In the present study, we collected survey data from Butler undergraduates to determine how their emotions changed over the course of the pandemic. 949 students (668 females, 281 males) participated in the study at Time 1 (August 2020) and 321 of those students (235 females, 86 males) participated in the study at Time 2 (January 2021). At both time points, participants were asked the extent to which they felt 19 different emotions due to the COVID-19 pandemic. Exploratory analyses in the form of independent samples t-tests were conducted to determine how student's emotions changed over time. We found that students reported feeling more distressed, ashamed, and attentive in January 2021 compared to August 2020, yet feelings of excitement, strength, enthusiasm, pride, inspiration, and activity decreased over the same period of time (p 's < .05). Despite vaccines becoming available at the end of 2020 and life starting to "return to normal," our data suggest that undergraduates' emotions were still being impacted by the pandemic.

Poster #4

Presenter(s): Gabi Natalizio

A

Ilanah Mangan

Avery Buck

Anna Overman

Faculty mentor: Stacy Wetmore

The More the Merrier: When Multiple Jailhouse Informants Testify

In 1984, Darryl Hunt was wrongfully incarcerated for the murder of Deborah Sykes, a murder he did not commit. While cases such as Hunt's are appalling, jailhouse informants (JI) are a staple in U.S. criminal trials, contributing to about one in five of the 367 DNA-based exoneration cases (Innocence Project, 2020). A JI is a cooperating witness that testifies about statements a defendant made while imprisoned together, called a secondary confession (Neuschatz et al., 2008). Ultimately, Darryl Hunt was exonerated through incontrovertible DNA evidence in 2005 (Innocence Project, 2020). While DNA evidence later conclusively proved the prosecution's JIs fabricated their testimonies, the jurors were unable to recognize and properly evaluate the unreliable testimonies from the prosecution JIs when considering their verdict. The purpose of this study is to examine how potential jurors evaluate jailhouse informant testimony specifically when provided by multiple jailhouse informants. In an archival analysis of cases that involved jailhouse informants, Neuschatz et al. (2020) found that a number of exoneration cases included testimony from multiple jailhouse informants. Interestingly, these informants would not always provide consistent statements, but given these cases initially were convictions, the jurors did not appear to evaluate these inconsistencies. Therefore, the purpose of the current study is to assess how jailhouse informant testimony is evaluated from multiple jailhouse informants, especially in conditions where the informants provide inconsistent details in their testimony.

Poster #5

Presenter(s): Natalie Heller

B

Faculty mentor: Stacy Wetmore

The Tale of Two Informants: Who do you Believe?

A jailhouse informant (JI) is a cooperating witness that testifies about statements a defendant made while imprisoned together, often called a secondary confession (Neuschatz et al., 2008). This evidence is a staple in U.S. criminal trials, contributing to one in five of the 367 DNA-based exoneration cases (Innocence Project, 2022). While DNA evidence later conclusively proves the prosecution's JIs fabricated their testimonies, jurors seem unable to recognize and properly evaluate the testimonies when considering their verdict. Furthermore, a recent archival analysis of exoneration cases that included jailhouse informants (Neuschatz et al., 2020) found a number of cases (21%) that not only included a JI for the prosecution, but also a JI who testified for the defense. Interestingly, a defense JI specifically pointed out the faults of the prosecution JI, however, jurors still voted to convict in these cases. To further understand how potential jurors evaluate informant testimony, the current study asked participants to read a trial summary in which a prosecution JI, a defense JI, both informants, or neither informants testified before rendering a verdict. Results indicated that participants voted guilty more often when presented with prosecution JI testimony, regardless of the presence of competing defense JI testimony. Planned comparisons revealed that participants in the single prosecution (42.42%) and multiple JI (45.45%) conditions voted guilty significantly more often than those in the control condition. There were no significant differences between the perceived truthfulness of the testimonies of the prosecution and defense JIs when they testified against one another.

Poster #6

Presenter(s): Presley Fletcher

A

Faculty mentor: Jennifer Berry

Effects of alcohol and nicotine co-consumption model in an intermittent access paradigm in C57BL/6J mice

Two of the world's leading causes of preventable deaths include both the use of alcohol and tobacco. While independently these substances have negative consequences, they are often used in combination. For instance, those who are dependent on nicotine are more likely to engage in hazardous drinking and/or have a dependence on alcohol and vice versa. As different methods of consuming nicotine become more normalized, there is a concern of associated harmful alcohol consumption being that both substances are widely available and rewarding. The objective of this study is to understand the relationship between nicotine and alcohol and the behavioral effects of co-dependence in an animal drinking model. In the current study, C57BL/6J mice underwent an intermittent access two bottle drinking paradigm inducing a dependency on alcohol, nicotine, or both. Every week, the concentrations of alcohol were increased while the concentration of nicotine remained constant. After the consumption period, mice were then subjected to an open field test 24 hours after removal of the test

bottles to examine the anxiety-like behavior exhibited during withdrawal from these substances. In all concentrations examined, there is a high preference for alcohol as well as increases in consumption. The behavioral task testing for withdrawal fails to illustrate significant group differences.

Poster #7

Presenter(s): Zoe Stapleton-Deno

B

Faculty mentor: Lavender McKittrick-Sweitzer

Distorting Childhood: How Dominant Western Conceptions of Childhood "Innocence" are Bound to Epistemic and Social Injustice

In this presentation I will argue that dominant Western conceptions in the United States that consider childhood to be synonymous with innocence are ethically and epistemically wrong. In *The Epistemology of Resistance* (2013) José Medina responds to Miranda Fricker's work *Epistemic Injustice* (2007) to highlight the ways in which social inequality and injustice constrain and distort our abilities to know. Building upon Medina's and Fricker's works on epistemic injustice, Charles Mills' "White Ignorance and Hermeneutical Injustice" (2013), and drawing upon feminist thought on intersectionality and power, I argue that the dominant Western conception of childhood innocence damages collective knowledge. I contend that dominant assumptions consider children to be innocent insofar as they are "unmarked" by broader social and political forces. I consider that these assumptions are not only epistemically dishonest but that these views constitute epistemic injustices against children, particularly children with intersecting marginalized identities. Regarding children as innately innocent, I argue, is morally impermissible insofar as it delegitimizes the perspectives and testimonies of children. Furthermore, such views are unjust in that they reinforce cycles of oppression and marginalization as they reinforce the maldistribution of epistemic responsibilities based on race, gender, and other identities.

Poster #8

Presenter(s): Luke Manship

A

Faculty mentor: Lisa Farley

Sexual and Reproductive Health Education... Is It "Man Enough?"

Although pregnancy and STIs affect both men and women, it is oftentimes the sole focus of sexual health education and related studies. These programs and studies tend to focus on women, and as a result, they are being used to frame interventions for men and ignoring their sexual and reproductive health needs (Jack, 2005). Women's sexual and reproductive health is extremely important, but men's sexual and reproductive health still needs to be treated with the same importance. Men need the equivalent type of support that specifically meets their sexual and reproductive needs. When men were surveyed in multiple different cited studies, they reported that their biggest sexual health needs revolved around psychosexual behavior

and disorders. The purpose of this exploratory study was to understand and explore the inequities in sexual and reproductive health education for men.

Poster #9

Presenter(s): Mason Runkel

B

Faculty mentor: Roger Cornwall

Effect of sympathetic innervation on modulation of contractures in Neonatal Brachial Plexus Injury (NBPI)

Neonatal brachial plexus injury (NBPI) during childbirth, the most common cause of pediatric upper limb paralysis, leads to the secondary formation of debilitating muscle contractures, or limb stiffness. These contractures severely impede limb function and mobility, ultimately resulting in dysfunction and disability. Previous work in animal and clinical studies has revealed that contractures are caused by impaired longitudinal growth of denervated muscle following postganglionic nerve root injuries, the most common form of NBPI. This type of the injury occurs distal to the dorsal root ganglion and disrupts afferent, efferent, and sympathetic innervation, leading to a completely denervated muscle. In contrast, contractures are absent in preganglionic injuries, a much rarer form of NBPI, which occurs proximal to the dorsal root ganglion and disrupts efferent innervation but preserves both afferent and sympathetic innervation. This potential protective effect of afferent and sympathetic innervation against contractures must be investigated to decipher underlying molecular mechanism(s) by which neural input governs longitudinal muscle growth and contracture formation following neonatal denervation. Our previous work has found that NRG/ErbB signaling, a major afferent neuromuscular pathway, is neither required nor sufficient for the modulation of contractures. In the present study, we therefore investigated whether the protective effect of preganglionic injury against contractures is conferred by sympathetic innervation, by specifically testing the hypothesis that elimination of sympathetic innervation would induce contractures after preganglionic NBPI.

Poster #10

Presenter(s): Evan Blom

A

Faculty mentor: John Herr

Integer Tilings and Hadamard Submatrices

This poster, created by myself and faculty advisor Dr. John Herr, explores some properties of the Universal Tiling Conjecture in an attempt to ultimately prove or disprove the conjecture. A set of integers is said to tile if you can take the set and shift it forwards and backwards, covering every integer once and only once in the process. Next, through constructing a polynomial using the values of a given set of rows/columns (i.e. creating a Hadamard sub-matrix) of a Fourier matrix, we explored and applied some properties of Hadamard sub-matrices to construct what's called a primitive set. A primitive set is not unique to a specific sub-matrix, but each unique primitive set has a distinct corresponding set, referred to as the S_A set for a set A .

Through those sets, we can see that some are compatible with others. We noticed some trends between the primitive set from set A and the S_B set from set B, and vice versa, which are outlined on the poster. Additionally, the poster walks through an example, taking a 24×24 Fourier matrix and using two 4×4 Hadamard sub-matrices to show their compatibility and what that means in terms of the Universal Tiling Conjecture. In presenting the poster to members of the Mathematics department and other math majors, it's much easier to visualize the problem when tangible numbers are applied and used, and so I would imagine that would hold for non-math majors/professors as well.

Poster #11

Presenter(s): Annabella Cobos

B

Faculty mentor: Lova Randrianasolo

Investigating Instagram Marketing Strategies for Nonprofit Donor Engagement during the Covid-19 Pandemic

The research of this thesis will aim to answer what strategic components of Instagram marketing worked best to influence NPO donations during the Covid-19 pandemic, as well as provide a long-term outlook as to what strategic components will remain important for donor retention as the world enters post-pandemic mode.

Poster #12

Presenter(s): Riley Reddan

A

Colleen Kirby

Faculty mentor: Tonya Bergeson

Effects of Pediatric Hearing Loss on Language- and Music-Based Bedtime Routines

The purpose of this study is to compare linguistic and acoustic characteristics during bedtime routines in families who have infants with and without hearing loss. Collaborators at The Ohio State University recorded caregiver-child interactions in the homes of young children with and without hearing loss. In this study, we transcribed the portion of the day between dinner and bedtime, assuming young families use that time to prepare their young children for bed. As of now, we have completed transcriptions of bedtime routines from 4 families with typically hearing children and 11 families with deaf or hard of hearing children at 3-, 6-, 9-, and 12-months of age (chronological age for typically hearing children and hearing experience age for deaf or hard of hearing children with hearing aids and/or cochlear implants). We coded the use of music and language during this period, and found that all families of typically hearing children used both during their bedtime routines. However, only 54% of the families with children who use cochlear implants used both music and language during this window, preferring to use only language. Utterance length, turn-taking behaviors, and frequency levels were similar across the families. The findings will add important new knowledge to our understanding of the effects of hearing loss on caregivers' use of spoken language and music

during daily bedtime routines. Future analyses will examine the relationship between these variables and children's language development.

Poster #13

Presenter(s): Matthew Moraw

B

Faculty mentor: Lisa Farley

Comparison of Injuries to the Anterior Cruciate Ligament in Male Soccer and Football Athletes and the Effect of Varying Rehabilitation on Recovery Time.

In this study, done over the summer of 2021, the researcher sought to determine if there was a relationship between sport played, recovery plan, and the length of recovery time in regards to an ACL injury. This goal was operationalized by taking a look at the male football and soccer athletes on Butler University's campus who have had a grade 3 ACL tear in the past 5 years. The rehabilitation data of these athletes was analyzed to determine if there was a trend between how the athletes rehabbed and the speed of their recovery. It was discovered that there was a correlation between sport and recovery time, as well as within some of the subgroups that data was collected for. The data was significant, however over the course of the study, many other possible variables were found that may have played a role in speeding up or slowing down the recovery of the athletes. The goal of this study was to provide information to Butler University's athletic training team in order to help improve recovery in the future, and that goal was accomplished as there are conclusions that can be drawn to benefit future athletes.

Poster #14

Presenter(s): Anna Nelsen

A

Faculty mentor: Lisa Farley

A Comparison of ACL Tear Risk Factors in Males vs. Females

The Anterior Cruciate Ligament is a ligament located in the front of the knee that attaches to the tibia and femur, preventing the knee from sliding too far forward. ACL tears are a relatively common injury, especially in sports involving a lot of quick cutting motions. Due to the structural, physiological, and muscular differences between males and females, females are more likely than males to tear their ACL. This study's purpose was to investigate those differences to explain why females are more susceptible to ACL tears. A variety of academic journals and articles were reviewed to draw conclusions about the aforementioned topics. The findings highlighted key differences in males and females that contribute to higher rates of ACL tears in females, such as biomechanics and bony anatomy, muscular anatomy and imbalances, hormones, and hip and core strength. Due to the way female bodies are built, forces act on their bodies differently than males, putting their ACLs at a higher risk for a tear. Additionally, imbalances between the strength of the muscles on the front and back sides of the body impact the knee's stability. These imbalances most often occur between the quads and hamstrings, but a weak core and hips also contribute to knee instability. Some research finds that hormone fluctuation during the menstrual cycle causes females to be more prone to ACL tears, but not all

studies agree. Despite all of these predispositions, there are many preventative measures that can help minimize the risk of ACL tears.

Poster #15

Presenter(s): Jenna Hensen

B

Faculty mentor: Lisa Farley

The Impact of Dance on Physical, Intellectual, and Social Aspects of College Life

This study aimed to examine the physical, intellectual, and social impacts of dance on collegiate life. Members of the Butler University Dance Team were surveyed, and 3 members were interviewed in order to gain insight into how they perceived dance has impacted various aspects of their college life. Results showed that increased physical activity levels, academic motivation from teammates and coaching staff, as well as a positive relationship with teammates were positive aspects that dance team participants added to their college experience. Negatively, results showed lack of time for proper warm up, intense time commitments, and pressure to maintain a specific body image to be negative aspects of dance team participation in college. This study thus gave insight into a multitude of factors, both positive and negative, that come with dance participation at the collegiate level.

Poster #16

Presenter(s): Nicholas Robie

A

Faculty mentor: Julia Angstmann

Pollinator Distribution in Urban Farms

Issues of food insecurity and food deserts come to the forefront when considering how to better design healthy and fulfilling urban spaces for people. Indianapolis ranks as one of the worst cities in the country for many of these demographics, and urban farms have been proposed as a way to bridge these gaps. These locally operated developments provide fresh, healthy food to communities directly from the source. They also serve as much needed green space in concrete laden cities. Our research project compares pollinator populations within both urban farms and natural prairies to determine what role these spaces may serve in the urban ecosystem. The project also analyzes land use surrounding the farms to reveal what types of development are favorable for pollinators. This information is critically important for future designers of urban spaces who wish to maximize the social and ecological functions of their creations. How do urban pollinator populations compare to those in natural prairies? How does city design and development impact these populations? These are the questions that we seek to answer.

Poster #17

Presenter(s): Bridget Corrigan

B

Faculty mentor: Tonya Bergeson

#InstagramMoms: The effects of Instagram use on mother-infant interactions

Social media has become present in our everyday lives. New mothers use Instagram to record not only new recipes they've developed and the latest baby sleep research, but also the adorable antics of their babies. The purpose of this study is to examine the effects of Instagram use on interactions between mothers and infants. Researchers observed 12 mothers' public Instagram footage of their infants between 5-12 months of age. The mothers' language characteristics, babies' behavior, environmental factors, and phone proximity were examined in the videos. Preliminary results reveal that half of the mothers spend more time interacting with their babies via selfie mode whereas the other half spend more time filming their babies from behind the camera. Proportions of videos in which mothers made eye contact only with their phones ranged from 5%-46% across the mothers. Similarly, when behind the camera mothers made eye contact with their babies in 15-60% of their videos. Finally, when in selfie mode mothers and infants made eye contact between 16-46% of their videos. Some mothers were more likely to use infant-directed speech, and others used predominantly adult-directed speech in these videos. These findings suggest that the active use of Instagram may disrupt typical mother-infant interactions, which could influence infants' later language development.

Poster #18

Presenter(s): Victoria Templin

A

Faculty mentor: Stacy O'Reilly

A Limited Look at the Educational Experiences of Black STEM Professionals from the Butler Community and Beyond

This presentation looks at the STEM educational experiences of Black professionals from both the Butler community and outside of it. It focuses on the perspectives of five individuals (three Butler graduates and two non-Butler graduates) interviewed via Zoom and analyzes how their experiences compare to those of other Black STEM professionals in the nation. After completing the interviews and conducting thorough background research, all data was examined. It was found that what was discussed during the interviews paralleled what was discovered in the research, such as the importance of mentors and broadening the image of what a scientist looks like. In conclusion, there is some work being done by various organizations to combat the systemic racism we see in the STEM field, but we must continue this work in order to dismantle it.

Poster #19

Presenter(s): Anthony Durand

B

Faculty mentor: John Esteb

Synthesis of Thiophene Acetate Ester Derivatives

A popular belief held regarding enzymes is that for every enzyme there is only one substrate. This is analogous to a lock and key, where only one key can unlock the lock. As it turns out, this is not always the case with many enzymes being able to utilize a variety of different substrates. One class of enzymes that is known to demonstrate this promiscuous behavior are esterase enzymes which catalyze the hydrolysis of esters into carboxylic acids and alcohols. Although known to catalyze a variety of different substrates, not all substrates are created equally. In our research, we synthesized a variety of different ester substrates derived from thiophene acetate. Our goal is to eventually screen these substrates with an esterase enzyme to determine which structures are preferred for catalysis.

Poster #20

Presenter(s): Caitlin Dunlap

A

Faculty mentor: Olujide Akinbo

Investigation of the analytical capability of a single quadrupole inductively coupled plasma mass spectrometer (ICP-MS) for the quantitation of proteins via lanthanide labeling

This presentation will discuss some of the preliminary and foundational experimental design and data for the establishment of a single quadrupole inductively coupled plasma mass spectrometer (an instrument that measures element concentration in a solution) for the detection and quantitation of low abundance proteins. Low abundance proteins may sometimes be found in important biomarkers that are used to indicate changes in the body such as the development of a disease, or cancers, as well as how the body is responding to a certain drug. Current methods have limited clinical utility in detecting and quantitating these low abundance proteins hindering the early discovery of diseases and infections. This is mainly because the proteome (the total protein content in a cell) has concentrations and abundances that can span over twelve orders of magnitude (around twelve powers of ten) while current methods can only see a small portion of this range. The method being developed will hopefully provide useful diagnostic and clinical applications that will allow for doctors to determine more easily and quickly, for example, the stage of cancer a patient is in, how their cancer will progress, and a more personalized treatment/ drug dosage plan.

Poster #21

Presenter: Alex Poore

B

Faculty mentor: Melissa Etzler

Meth-amorphosis: "Breaking Bad," The Butterfly Effect, and Duality

My submission is a work of art which I created as my final project for my Honors First Year Seminar course. I'm currently majoring in Art + Design and Chemistry, with my works finding ways to meld both the arts and sciences. I constructed this piece out of wood, door hinges, a shattered mirror, blue-stained glass, and acrylic paint. This piece features Breaking Bad's protagonist, Walter White, with many details in the background having been featured in scenes throughout the show. I also used this piece to highlight primary themes inherent to this series, such as the duality of Gilligan's characters and the presence of mirrors in relation to duality, as well as The Butterfly Effect and how even the smallest actions can have monumental impacts on characters down the road. This image tells a story, going from right to left, with Walter's beginnings being represented through the flipped New Mexico landscape and pants flying throughout the sky. The green caterpillar on his shoulder plants the seed for his role as Heisenberg, with the green representing Walter's drive for wealth. On the left, we see Walter's role as Heisenberg fully realized, with the caterpillar now having undergone metamorphosis and evolved into a yellow butterfly, a symbol for the toxicity Walter is now surrounded by as New Mexico's most-wanted kingpin. As for the background, the mix of mirrors and blue-stained glass show how Walter's self-image is shattered, his identity now being directly tied to his infamous blue methamphetamine.

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