In-Person Extended Session

BEGINNING AT 11:00 A.M.

KIRKHOF CENTER 2263
Stimulation of Retinal Pigment Epithelium with an α7 nAChR Agonist Leads to Neurogenesis in Cultured Pig Retina
Presenters: Cydney Eastman, Taylor Saber, Eliot Van Pelt
Mentor: David Linn

Previous work has shown that activation of a specific nicotinic acetylcholine receptor (nAChR) on retinal ganglion cells (RGCs) protects from the damage associated with glaucoma. More recent work has shown that in addition to this neuroprotective effect, activation of the alpha7 nAChR can lead to the generation of new adult retinal cells via a multi-cellular pathway. Specifically, activation of alpha7 nAChRs (with PNU-282987) on retinal pigment epithelial (RPE) cells induces the release of substances that cause retinal Muller glia (MG) to re-enter the cell cycle and produce new retinal cells, including RGCs. One such study exposed an RPE cell line to PNU-282987 and then injected the supernatant from that culture into the eye of an adult rodent. The neurogenesis of retinal cells was confirmed by several techniques. We are attempting to replicate those studies using primary culture of adult pig RPE and adult pig retina. Basically, we used 4 different experimental conditions and counted cells at the end (ImageJ). Condition A: Retinal cells cultured for 5 days without any intervention. B: Retinal cells exposed to untreated RPE. C: Retinal cells exposed to RPE treated with a low dose of PNU-282987. D: Retinal cells exposed to RPE treated with a high dose of alpha7 activator. We observed a dose-dependent increase in retinal cells exposed to supernatant from RPE stimulated with PNU-282987 confirming the validity of this approach using non-rodent mammalian tissue.

BEGINNING AT 12:30 P.M.

KIRKHOF CENTER 2263
Mathematics Presentations
Presenters: Alaina Hogan, Rowan Kennedy, Marshall Nicholson, Mallory Price, Bridget Rozema, Justin Sciullo, Nicholas Simmons, Maisie Smith, Ethan Woudwyk, Sarah Zaske
Mentors: Feryal Alayont, Lora Bailey, Lauren Keough

12:40-1:00 Calculating Differences between Dancers and Non-Dancers
Alaina Hogan
Mentor: Lora Bailey

In this project, we study the physical, visual, and stylistic characteristics of trained and untrained dancing individuals. We determine these characteristics and prospective differences by acquiring data through motion capture equipment and analyzing it using singular value decomposition. We aim to answer the question: what mathematical differences in movement and artistic ability are there between dancers and non-dancers?

1:00-1:20 Edge Covers of Unions of Path and Cycle Graphs
Bridget Rozema and Maisie Smith
Mentor: Feryal Alayont

We can represent relations among discrete objects using a visual graph with dots (vertices) and lines connecting the dots (edges). A line between two dots indicates a relation between those two objects. An edge cover of a graph G is a subset of the edges where every vertex is the endpoint of at least one edge in the subset. In this project, we studied the number of sequences formed by counting the edge covers in a graph family. Path and cycle graphs generate the famous number sequences Fibonacci and Lucas

numbers, respectively. We will report on the properties of the number sequences resulting from graphs obtained by taking the union of path and cycle graphs with one or more common vertices.

1:20–1:40 Edge Covers of Joined Cycle Graphs
Marshall Nicholson, Ethan Woudwyk
Mentor: Feryal Alayont

A graph is a mathematical representation of binary relations between discrete objects. An edge cover of a graph is a selection of these relations where each object is part of at least one relation. We represent graphs using dots (representing objects) and lines (representing relations). Our project investigated counting edge covers of a specific type of graph consisting of iterations of a six dot graph arranged in a cycle where each dot is connected to two neighbor dots and where two neighboring cycles share two common dots. We will present a matrix model to count the edge covers of these chains of cycle graphs.

1:40–2:00 Edge Covers of Modified Path and Cycle Graphs
Rowan Kennedy, Mallory Price
Mentor: Feryal Alayont

A graph is a mathematical structure visually represented with vertices (dots) and edges (lines) that connect pairs of vertices. An edge cover of a graph is a subset of the graph's edges chosen so that each vertex is an endpoint of at least one edge in this subset. In this project, we studied the sequences formed by counting the total number of edge covers in a graph family. It is known that the edge cover totals of certain graph families, such as the path and cycle graphs, give rise to known sequences, the Fibonacci and Lucas numbers, respectively. This allows us to obtain new combinatorial interpretations of known sequences or to generate new sequences from edge cover totals. In this presentation, we will report on our results on the edge cover sequences for graphs obtained by attaching 3–vertex path and cycle graphs.

2:00–2:20 Distinguishing Index of Mycielskian Graphs
Rowan Kennedy, Mallory Price, Nicholas Simmons, Sarah Zaske
Mentor: Lauren Keough

The distinguishing number and distinguishing index give a measure of the symmetry of a graph. We define a distinguishing vertex coloring to be a coloring of the vertices of a graph G such that no non-trivial automorphism preserves the vertex coloring. The distinguishing number, Dist(G), is the smallest number of colors possible for which there is a distinguishing coloring. Similarly, a distinguishing edge coloring is a coloring of the edges of G such that no non-trivial automorphism preserves the edge coloring, and the distinguishing index, Dist'(G), is the smallest number of colors needed for a distinguishing edge coloring. The Mycielskian of a graph G, denoted mu(G), is an extension of G introduced by Mycielski in 1955. In 2022 Boutin, Cockburn, Keough, Loeb, Perry, and Rombach showed that for graphs on at least 3 vertices $Dist(\mu(G)) \leq Dist(G)$ and a similar result for generalized Mycielskians. We prove $Dist'(\mu(G)) \leq Dist'(G)$, finishing a conjecture of Alikhani and Soltani, as well as prove analogous results about generalized Mycielskian graphs.

2:20–2:40 An Analysis of Grand Valley State University Using Network Theory
Justin Sciullo
Mentor: Lora Bailey

We applied concepts from network theory to analyze Grand Valley State University's Allendale campus. In particular, we investigated the shortest path between campus buildings. We created a weighted graph of the sidewalks and buildings of GVSU, and created a program for students to use to find the shortest path between any two buildings on campus. Through additional analysis using NetworkX and Python we explored other questions such as where the center of campus is located, and what is the most important sidewalk.

BEGINNING AT 3:00 P.M.

KIRKHOF CENTER 2263

Psychology Department Awards Ceremony and Research Symposium

Presenters: Lauryn Babb, Lauren Behrenwald, Brooke Campbell, Elias Ghazal, Abigail Graffenius, Mya Hanna, GraceAna Hoorn, Joshua Kopich, Erin Korte, Amber Luckett, Brianna Mucciante, Emily Murray, Destinee Partain, Zoe Schultz, Jada Thomas, Samantha Walquist, Elizabeth Wehner
Mentors: Brian Bowdle, Kristy Dean, Robert Deaner, Amanda Dillard, Gwenden Dueker, Mario Fific, Luke Galen, Mary Russa, Christine Smith

Psychology Department Student Awards Ceremony, 3–3:20pm

Presentation #1, 3:20–3:35pm: MasterChef Contestant to Social Media Influencer: Do Men and Women Differ in Pursuing Prestige?

Presenter: Jada Thomas

Mentor: Robert Deaner

Abstract: The male show–off hypothesis claims that men are more likely than women to show off their abilities and publicly compete. However, the male show–off hypothesis has yet to be tested in a domain where both men and women are consistently involved, such as cooking. To examine showing off and cooking, we assessed the social media behavior of MasterChef reality program contestants both in the U.S. and Australia. We focused on 98 contestants from MasterChef U.S. (m = 52 & f = 46) and 107 contestants from MasterChef Australia (m = 45 & f = 62). For each contestant, we examined the social media content they produced on several popular platforms upon the conclusion of their season. Although we coded several measures, our primary measure was Instagram followers. Contrary to the male show–off hypothesis, in both the U.S. and Australia, the number of followers did not differ significantly between male and female contestants. This result suggests that the male show–off hypothesis may not be valid in all domains.

Presentation #2, 3:35–3:50pm: The Impact of Social Exclusion on Conspiracy Belief Formation and Reality Construction

Presenter: Destinee Partain

Mentor: Kristy K. Dean

Abstract: Social exclusion fosters conspiratorial beliefs although the mechanisms at play are still unknown. Prior research suggests that excluded people join conspiratorial groups as a way to regain both acceptance and a level of control over their reality (van der Wal et al., 2018). The current study aims to replicate these results, while also examining the role of other basic needs (e.g., self–esteem, meaning in life, physical safety) in fueling conspiratorial beliefs. Additionally, the study aims to investigate how beliefs on reality (spiritual vs. scientific) act as a type of mediator potentially fueling conspiratorial thinking. To study this phenomenon, approximately 250 participants will experience either exclusion or inclusion in a workplace scenario. We will then measure threat to basic needs, belief in conspiracies, thinking styles (analytic vs. intuitive), and views on reality (scientific vs. spiritual). We expect that those who feel excluded will report higher threats to basic needs, stronger conspiratorial beliefs, and a preference for spiritual over scientific views on reality, compared to those who feel accepted. If our hypotheses are supported, the underlying mechanisms of how conspiracy ideas are formed and maintained will be further understood; allowing for more effective preventative measures and deradicalization techniques.

Presentation #3, 3:50–4:05pm: Testing the "natural-is-better bias for sunscreen

Presenter: Brooke Campbell

Mentor: Amanda Dillard

Abstract: This study tested the "natural-is-better bias" for sunscreen in college students. The goal of this experiment was to determine if people had different emotions and beliefs about a sunscreen when it was labeled natural vs synthetic. The participants in this study were randomly assigned to one of two conditions. In one condition, they were told that the sunscreen they would be using was synthetic or made from ingredients not found in nature. In the other condition, participants were told that the sunscreen they were using was natural or made from ingredients found in nature. All participants were asked to use it under a fake sunlamp for a period of 7 minutes. Before and after using the sunscreen, participants' emotions were measured. Following using the sunscreen, participants were asked to rate their attitude toward the sunscreen as well as rate its safety and effectiveness. Results indicated that compared to those who believed they used a synthetic sunscreen, those who believed they used a natural sunscreen had a more positive attitude toward the sunscreen. Compared to those in the synthetic condition, those in the natural condition applied more of the sunscreen prior to using it under the sunlamp.

Presentation #4, 4:05-4:20pm: Authentic Dissent is Superior to a Devil's Advocate in Inspiring Divergent Thinking

Presenters: GraceAna Hoorn (co-presenter), Samantha Walquist (co-presenter), Lauren Behrenwald (co-author), & Emily Murray (co-author).

Mentor: Christine M. Smith

Abstract: Although the presence of minority dissent within groups is associated with multiple benefits (e.g., divergent thinking, more robust examination issues), sources of dissent are perceived less positively than other group members, perhaps because they are construed as members of the outgroup. This has prompted the suggestion that dissent be introduced by way of a devil's advocate, thereby allowing the benefits of dissent to be reaped without any cost. We examined the cognitive processes of those exposed to majority influence, authentic minority influence and an assigned devil's advocate arguing a minority point of view. Our results suggest that authentic sources of dissent are more effective than devil's advocates in inspiring divergent thinking. However, despite their arguments being identical, authentic sources of minority influence compared less favorably to the majority than did those who were assigned the role of devil's advocate within their group along a variety of dimensions.

Presentation #5, 4:30-4:45pm: What Do Campus Police Officers Think About Their Role in Supporting Student Mental Health?

Presenters: Zoe Schultz, Abigail Graffenius, & Amber Luckett

Mentor: Kristy K. Dean

Abstract: Recognizing the role law enforcement officials have played in dealing with mental health issues across the nation, this study examined how campus police officers view their roles and responsibilities when responding to calls of service that include mental health concerns. Semi-structured interviews were conducted with 10 law enforcement officials from a midwestern university campus. Interviews asked about mental health training, the steps they take during a mental health call, how they distinguish criminal concerns and mental health issues, and who they believe should be responsible for responding to these calls. Interviews were transcribed and then coded and analyzed using MAXQDA. Preliminary results show that when interacting with students, officers utilize a direct line of questioning to help discern mental health concerns vs crises. Additionally, when asked who should be responsible for mental health-related calls, many officers recognized that within our society citizens call the police for most things. Therefore, police first responders bear some responsibility for addressing students' mental health crises, and report confidence in the skills their training provided. This research furthers our understanding of policing and mental health concerns in both a university context and in general.

Presentation #6, 4:45-5:00pm: Investigating predictors of neglect and termination of parental rights in local families

Presenters: Zoe Schultz, Erin Korte, & Brooke Campbell

Mentor: Mary Bower-Russa & Gwenden Dueker

Abstract: The Competency to Parent Project aims to understand how various parent, child, and family factors impact a parent's ability to effectively care for their child(ren). Archival Child Protective Services (CPS) family court case filings from a southwest Michigan county were analyzed and information relating to why CPS was investigating the family situation and the eventual court outcomes of the case were coded. Preliminary analyses aimed to discover what factors were related to the presence of physical neglect in the home, what factors predicted the court's decisions to terminate parental rights and whether including a "family churn" score (an attempt to describe the level of chaos in the family system) would improve prediction of court outcomes. Parent substance abuse and mental illness both positively predicted the presence of neglect in the home. Parent substance abuse, current incarceration, a child having been temporarily removed from parent custody and family economic instability were factors associated with an increased risk of losing parental rights, while the presence of emotional abuse in the home was associated with a decreased likelihood of termination. The family churn score did not predict court outcomes. This study explored the process surrounding local decisions about the termination of parental rights.

Presentation #7, 5:00–5:15pm: Religious Framing, Moral Foundations, and Identity: A Replication and Extension

Presenter: Brianna Mucciante

Mentor: Luke Galen

Abstract: Religiosity is positively associated with moral self-image enhancement. However, two previous pre-registered studies identified a framing effect such that initial completion of general religious measures resulted in lower moral self-image and binding morality compared to when the moral measures were administered first. This study attempts to replicate this effect with measures featuring differing religious content. Participants were assigned to receive either conservative religion first (followed by moral measures), liberal religion first, or the moral measures first. ANOVAs did not reveal an effect of type of religious measure on subsequent moral responding. However, exploratory analyses indicated a framing effect such that those first completing moral measures reported lower certainty of God's existence and greater atheist identification compared to those completing religious items first. Although not specifically hypothesized, this is similar to the previous pre-registered effect in that, despite a positive association between the two constructs, those completing moral measures subsequently report lower levels of religiosity. This may represent a "contrast effect" such that one set of material induces the motivation to respond in the opposite direction on the other. Although modest in size, this effect suggests that even reporting of self-identity (i.e., as religious or atheist) can be malleable.

Presentation #8, 5:15–5:30pm: Exploring the Causal Relationship Between Lack of Control in One's Life and Conspiratorial Beliefs

Presenters: Elias Ghazal, Lauryn Babb, Elizabeth Wehner, Mya Hanna, & Joshua Kopich

Mentors: Mario Fific & Brian Bowdle

Abstract: Exploring the individual tendency towards embracing conspiratorial beliefs presents a considerable challenge for researchers, frequently uncovering weak and inconsistent correlations with factors such as personality traits, perception of cognitive processes, decision-making capabilities, and sensory sensitivity. A major limitation of these research is its reliance on correlational, self-report measures. To address this gap, our study introduces an experimental approach, the "Broken Fridge" task, designed to place participants in a scenario where they must attempt to control the temperature of a refrigerator. This setting uniquely positions participants to experience a loss of control, thereby allowing for a direct assessment of the locus of control. Our methodology aims to provide more detailed insights into the effect of individual's locus of control and their propensity towards conspiratorial beliefs. This experimental procedure not only circumvents the limitations of traditional self-report measures but also offers a novel perspective on the intricate dynamics underlying the formation of conspiratorial thinking.

Through this approach, our study aims to illuminate the detailed interplay between psychological control and the endorsement of conspiracy theories, offering a more robust understanding of the factors that contribute to conspiratorial beliefs.