



Macalester College
Senior Honors Projects

2024

April 26, 2024

Macalester College is fortunate to have an abundance of creative, thoughtful and engaged students. The graduating seniors who have completed honors projects have further distinguished themselves through this accomplishment. They deserve our congratulations and gratitude.

This booklet describes the honors projects completed by the Class of 2024. These compelling and original works, completed under the guidance of dedicated faculty sponsors, were judged worthy of honors by an examining committee in accordance with the standards of their fields. A copy of each project will become part of the DeWitt Wallace Library's permanent collection, joining those completed by previous honors graduates.

It is with great pride I make these achievements public and wish the Class of 2024 the very best in the years to come.

Ann Minnick
Director of Academic Programs and Advising

HONORS PROJECTS

Ghaïcha Aboubacar Ahé

Crisis Unearthed: Unraveling Resilience in the Face of Natural Disasters - Impact on Global and Domestic Firms in India

This paper investigates the nuanced impact of natural disasters on firms in India, considering their engagement in global markets. Utilizing the Annual Survey of Industries, covering larger and smaller enterprises, the study employs a Differences-in-Differences methodology to assess outcomes such as gross sale value, receipts and operational activities in the aftermath of the four most severe disasters between 2009 and 2020. Findings reveal that firms engaged in international activities, particularly importers, demonstrate heightened resilience compared to their domestic counterparts. The study contributes to disaster literature by shedding light on the intricate relationship between global market engagement and firm-level responses.

Honors Project in Economics

Advisor: Felix Friedt

Economics Department

Hufsa Fatima Ahmed

The Voters Say Nay, Then Yay: Evolving Support for Public Transit in Austin, TX

In 2014, Austin voters rejected a \$1 billion ballot measure investing in an urban rail line through downtown. Just 6 years later, Austinites approved a \$7.1 billion dollar ballot measure to create a more expansive public transit system. To understand what changed between these two votes for investments into “Project Connect,” I conduct a content analysis of Austin City Council Meeting public comments, identifying sentiments about transportation in Austin and the proposed public transit investments. I then investigate the role two special interest groups, AURA in 2014 and Vision Zero in 2020, played in the outcome of the votes. I find that the way each proposed investment was *framed*, particularly by special interests, provides the greatest insight into the change in outcome between 2014 and 2020. These findings provide insight into how we can build support for public transit investments across US cities.

Honors Project in Political Science

Advisor: Lesley Lavery

Political Science Department

Zayde Rami Alafranji

Ultraconserved Elements Based Phylogeny of the New Zealand Mite Harvester Genus Rakaia

New Zealand is home to a remarkable number of endemic taxa, some of which existed on the archipelago before the breakup of Gondwana. The mite harvesters (suborder Cyphophthalmi), tiny arachnids which dwell in forest leaf litter and caves, are one such group. The mite harvester family Pettalidae exhibits a classic Gondwanan distribution, informative for describing ancient patterns of diversification. Within New Zealand, there are three genera of pettalids; our research focuses on the phylogeny of the most widespread and diverse of these: Rakaia. Through phylogenetic analysis, we provide a window into patterns of ancient diversification and infer historical biogeographic trends. The culminating phylogeny resulted in a total of 68 taxa of which 54 were Rakaia, six were the sister genus Aoraki, and eight were part of Opiliones outgroups. The final 50% and 75% taxon-occupancy matrix retrieved 729 and 355 loci, a large improvement from historic attempts. The phylogeny retrieved was fully resolved, and time-calibration using Bayesian Analysis yielded divergence dates across the genus. The study validated that the origin of Rakaia predates that of Gondwana, and that divergence within the genus may have been spurred by geologic events such as the Oligocene Drowning and the Last Glacial Maximum. The results need further validation through repeated attempts at time-calibration using different models, as well as estimation of evolutionary rates using Bayesian Analysis of Macroevolutionary Mixtures (BAMM). But, this study provides a novel high resolution depiction of the genus Rakaia with accompanying deep-time divergences.

Honors Project in Biology
Advisor: Sarah Boyer
Biology Department

Elena Pilar Alcalá

Perspectives on Neurodiversity-Affirming Education for Autistic Children

Rates of autism diagnosis have increased dramatically in recent decades, along with efforts to include disabled students in general education classes. Autistic students with all levels of support needs face barriers to full inclusion in general education. Chapter 1 of this honors project proposes an innovative, neurodiversity-affirming model of service delivery for autistic elementary school students in general education classrooms. Chapter 2 considers the challenges of choosing an educational placement for autistic students with high support needs, with particular attention paid to the role of parents and their ideological conceptions of autism.

Honors Project in Psychology
Advisor: Jaine Strauss
Psychology Department

Daisy Alcantar

Embracing Existence: Exploring Mexican-American Identity, Agency, and Resistance

This research investigates Mexican-American identity, agency, and resistance, contextualizing them within the socio-political landscape of the United States. Drawing from existing scholarship, the study employs qualitative interviews to explore how Mexican-American college students assert their ethnic identities as a form of resistance against societal pressures to assimilate and institutions that marginalize them. The findings reveal the pervasive influence of racialization and marginalization experienced by Mexican-Americans, shaping their sense of belonging and connection to their Mexican heritage. Drawing upon Telles and Sue's (2019) concept of the "ethnic core," participants deepen their ties to their Mexican identities through familial and social networks, cultural practices, religion, and geographical context. This robust framework enables them to resist attempts aimed at erasing or diminishing their cultural identities. Moreover, extended periods abroad, particularly in Latin America, contribute to their cultural rediscovery and appreciation, further solidifying their Mexican identity. Unlike previous generations, participants exhibit a disconnection from their American identity, this in part is due to historical events such as the Trump presidency and the racial reckoning following George Floyd's murder as contributing factors. Nevertheless, they acknowledge the privileges of U.S. citizenship but prioritize their Mexican heritage as a means of resistance. The research underscores the complexity of Mexican-American identity formation and resistance, highlighting the importance of individual agency in navigating societal structures and asserting cultural identity.

Honors Project in Sociology
Advisor: Erika Busse-Cárdenas
Sociology Department

Corgan Ronald Archuleta

Designed for Life: Unearthing Just and Sustainable Urban Design through the Daylighting of Phalen Creek

This thesis conceptualizes a relational approach to urban design. Often separated from justice, I argue urban design can shape spaces to enable respectful and reciprocal human and more-than-human relationships. Focusing on Phalen Creek in Saint Paul, Minnesota, I illuminate just and sustainable possibilities between ecologically sustainable and socially inclusive design. Phalen Creek was a natural waterway buried in a pipe during 20th century urbanization to be partially reconstructed through daylighting. The Indigenous and Immigrant stories driving restoration expand urban design's liberatory potential. Combining just sustainabilities with infrastructure theory and Indigenous Knowledges, I contend urban design offers a relational approach to implementing Just Sustainabilities.

Honors Project in Geography
Advisor: Dan Trudeau
Geography Department

Samuel Louis Ash

Improvement of Attitudes Towards People with Disabilities Through Education and Contact

Two studies were conducted to investigate the impact of educational interventions and contact with individuals with disabilities on explicit and implicit attitudes towards people with disabilities. In study 1, 63 participants watched one of two videos, one on the social model of disability (experimental condition) and the other about wheelchair soccer (control condition). Participants also completed measures of contact, explicit, and implicit attitudes. Results from regression analyses indicated no significant effects of the videos or reported contact on either explicit or implicit attitudes, challenging previous findings that suggested positive effects of contact and education on explicit attitudes. To address potential issues, study 2 included 42 participants, and employed a more substantial educational intervention. Rather than a video, participants consisted of students in four intermediate and advanced psychology courses, with a course specifically on disability acting as the experimental condition. Results from repeated measure ANOVA's indicated no significant changes in explicit or implicit attitudes by condition over time. Both studies raise questions about the efficacy of educational interventions in altering

deeply rooted societal attitudes, emphasizing the need for even more substantial and intentional approaches. In conclusion, the research underscores the challenges in shifting societal attitudes, and future research may explore longer and more tailored interventions to foster meaningful changes in attitudes towards disability.

Honors Project in Psychology
Advisor: Cari Gillen-O'Neel
Psychology Department

Sami Nael-Joseph Banat

A Veneer of Democracy: How *el-Zu'ama* Dominate Lebanon's Political System

As Lebanon has endured a never-ending cycle of crises for decades, scholars have sought explanations via the country's intense sectarian system, and have investigated its origins extensively. However, this search has neglected the question of sectarianism's permanence and maintenance. This paper will focus on the latter, and argues that the sectarian system is sustained by a sectarian elite class, known as *el-zu'ama*, via their own cults of personality enabling them to maintain control of their sects. This paper will examine pre-statehood history, the civil war, post-war reconstruction, and finally, 21st century failed challenges to the system to illustrate this thesis.

Honors Project in Political Science
Advisor: Patrick Schmidt
Political Science Department

Marchelle Nichole Beougher

Gonality, Scramble Number, and Screewidth of Several Graph Families

Graphs are mathematical structures that represent relationships (edges) between objects (vertices). We define chip-firing games on graphs by stacking chips on vertices and "firing" chips along edges, in an effort to eliminate a debt introduced on the graph. In this paper, we define and prove a variety of graph parameters related to winning this game efficiently for various graph families.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Kristin Heysse
Mathematics, Statistics, and Computer Science Department

Francesca Casal Bernardino

Eating the Other: Invisibilities and Inequalities within Culinary Cosmopolitanism

This study interrogates culinary cosmopolitanism- food consumption aligned with cultural tolerance and exploration- alongside the assumption that our society is genuinely moving towards multicultural acceptance. Using surveys and interviews from students at Macalester College, I conceptualize cosmopolitan capital and authenticity negotiation as strategies students take to align their consumption with worldliness, exploration, and authenticity- core tenets of cosmopolitanism. However, I found cosmopolitan capital employed in ways that render class privilege invisible, while authenticity negotiation recenters whiteness and legitimizes the commodification of Otherness. Ultimately, despite assumptions of multiculturalism and egalitarianism in today's food consumption, culinary cosmopolitan practices reveal how inequalities endure.

Honors Project in Sociology
Advisor: Erika Busse-Cárdenas
Sociology Department

Chloe Marie Bischoff

We Wander Like Lost Children Without It

We Wander Like Lost Children Without It features two 30" wet clay figures inside an 11' structure of black plastic sheeting. As the viewer approaches the installation, its facade looms above, with triangular spires reaching upward. Upon entering, the viewer steps into a small, humid room. The darkness of the interior is interrupted only by the two clay figures, which sit facing each other on a podium, lit from below with a soft, warm light. A low hum permeates the space. Manipulating light, proportion, sound, and air, I mimic the sensory experiences utilized by medieval gothic cathedrals to instill wonder upon their pilgrims and transport them to another dimension of reality. Investigating the kinship between humans and material, this project beholds clay as an emissary of matter through which to explore themes of animism and queer ecology. The clay figures offer a glimpse at hybrid forms of embodiment that challenge the boundary between 'self' and 'other.' *We Wander Like Lost Children Without It* playfully subverts the idea that gods created humans from clay—exhibiting instead a human forming gods from clay—highlighting how, in both cases, clay serves as the material conduit between humans and our spiritual imaginings.

Honors Project in Art and Art History
Advisor: Summer Hills-Bonczyk
Art and Art History Department

Seth Aaron Buesing

Mapping Beyond-Landau Phase Transitions in 1+1 Dimensional U(1) Quantum Field Theories

Phase transitions are widely studied in the context of statistical physics and condensed matter systems, but the principles of this study can be extended to more generalized field theories. We examine a 1+1 U(1) quantum field theory in one spatial and one Euclidean temporal dimension that displays a dualism with the classical rotor model in 2D. The classical rotor model is known for the BKT (Berezinskii–Kosterlitz–Thouless) transition which is not consistent with the Landau paradigm of phase transitions and is instead driven by the proliferation of vortex field solutions. We use this dualism to examine a Villain formulation of our U(1) QFT and observe the analogous phase transition. To probe the phase transition we use Monte Carlo methods to calculate expectation values in the path integral formulation of QFT via a novel Python-based software package. We begin by using this package to reproduce supercomputer mappings of the BKT transition performed in 1993, which yielded a transition point at a critical thermodynamic $\beta \approx 0.74$. In the latter part of this paper we develop the so-called Worldline formulation, dual to the Villain formulation via Poisson resummation, which allows the use of "worm" algorithms for Monte Carlo updates. These worm algorithms can circumvent the "critical slowing" of the Monte Carlo Markov Chain autocorrelation, which is otherwise characteristic of such studies. Further applications, including the implementation of vortex winding constraints, are discussed.

Honors Project in Physics

Advisor: Tonnis ter Veldhuis

Physics and Astronomy Department

Charles Gateley Burton

Ammonia Emission in the Milky Way Galactic Bar Dust Lanes

The Central Molecular Zone (CMZ) of the Milky Way is a region of molecular gas within the inner few hundred parsecs of the Galaxy. This inner region of the Milky Way is hotter and more turbulent when compared with the disk of the Milky Way. Gas is thought to be funneled into the CMZ through dense gaseous dust lanes that are associated with the Galactic Bar. I studied two regions of one of these dust lanes using the NH₃ inversion transitions of (J,K) = (1,1), (2,2), (3,3), and (4,4). Data has been obtained from the Green Bank Telescope targeting these transitions at $\sim 32''$ angular resolution. I present results probing the kinematic and thermal structure of these target gas clouds. I find the velocity of the pilot region gas cloud to be around 205 km/s as it accretes into the CMZ of the Milky Way. I also find the velocity of a gas cloud more toward the edge of this dust lane to be around 130 km/s. When comparing the (1,1) to the (2,2) transition lines to probe temperature, I found a temperature of $\sim 20\text{K} (\pm 6.6\text{K})$ for the pilot region and a temperature of $\sim 17\text{K} (\pm 6.6\text{K})$ for the edge region. When comparing the (2,2) to the (4,4) transition lines I found a temperature of $\sim 65\text{K} (\pm 3.15\text{K})$ for the pilot region. These values are in mutual agreement as the temperatures found in the edge region are slightly cooler than

those found in the pilot region which is located at the midpoint of the dust lane. I also compare both regions with infrared Herschel data and CO data. Both of these comparisons find strong spatial correlation of the NH₃ dense gas regions with the more diffuse CO data as well as the dust emission from Herschel.

Honors Project in Physics and Astronomy
Advisor: John Cannon
Physics and Astronomy Department

Xavier Alexander Calicdan

Diels-Alder Approach Towards Synthesis of Diimide-Capped Acenes

Acene structures have proved useful in their application in semiconductors in organic optoelectronic applications spanning field effect transistors (OFETs), light-emitting diodes, and photovoltaics. As the length of these structures increase, the stability is challenged by the rise of the HOMO and lowering of the LUMO. The addition of cyclic imides has proven to provide stabilization while preserving the optical and electronic properties of the acenes. However, current research on the synthesis of diimide-capped acenes is scarce because of synthetic difficulties. Here, we report a Diels-Alder reaction between 3-aryl maleimide and maleimide that yields the acene diimides after an oxidation process.

Honors Project in Chemistry
Advisor: Dennis Cao
Chemistry Department

Ezekiel Ambrose Cambey

Invisible Giants

I have worked on *Invisible Giants* for four years and throughout this time, my artistic process has utterly transformed. The text and illustrations featured in this book explore death, religion, and humanity's relationship to nature and the myths that formed our history. The book consists of two parts, the first entitled “Winter” features black and white drawings and poetry, and the second is entitled “Spring,” and features watercolor drawings alongside short prose pieces outfitted with borders drawn with colored pencils and oil pastels.

Honors Project in Art and Art History
Advisor: Megan Vossler
Art and Art History Department

Isabel Viola Capecci

American Evangelicals’ New Testament: How Trump Gained Support from the Nation’s Most “Moral” Voters

For nearly four decades, white Evangelical Christians in the United States rallied around politicians who all fit a similar mold. This consistency was flipped on its head in 2016 when Evangelicals poured out in unprecedented levels to support Donald Trump. Despite being inconsistent with the type of candidate they have traditionally voted for, Evangelicals flocked to the polls with 81% of this group supporting Trump for the presidency. Evangelical support for Trump remained over 75% for the duration of his presidency and his reelection campaign in 2020. This shift begs the following research question: How was Donald Trump able to garner such unprecedented levels of support from Evangelical Christians despite at face value being inconsistent with the type of candidates they have favored for the better part of four decades? In this paper I use a combination of polling data and rhetorical analysis to argue that Trump garnered such high levels of support by leveraging three key themes: (1) “us versus them” framing of immigration issues, (2) fear of Christianity slipping from national prominence, and (3) belief that American society was rapidly degrading, each of which capitalized on Evangelicals’ main fear that their way of life was becoming obsolete in the US.

Honors Project in Political Science
Advisor: Julie Dolan
Political Science Department

Nicholas Cebula

Variability of High-Degree Modes over Multiple Solar Cycles Using Local Helioseismic Data from GONG

In this investigation we use the local helioseismic technique of ring diagrams to study the power, energy, and damping rates of high degree solar acoustic modes. Our data covers the period from the maximum phase of solar cycle 23 to the ascending phase of cycle 25. The goal is to examine the variations in the mode parameters with solar activity as well as the differences between different cycles. For this, we use different proxies of solar activity. We use 10.7 cm radio flux measurements and a measure of magnetic flux known as magnetic activity index from magnetograms.

Honors Project in Physics and Astronomy
Advisor: John Cannon
Physics and Astronomy Department

Uditi Chandrashekar

The Hodgkin-Huxley Model for Neuron Action Potentials: A Computational Study

Neurons are fundamental units of the nervous system that receive stimuli and pass on this information to other cells. Electrical impulses along the neurons are known as action potentials. In 1952, Alan L. Hodgkin and Andrew Huxley proposed a mathematical model of neuronal membrane action potentials based on a series of experiments they conducted using the giant squid neuron. This thesis is a study of the nature of the action potential used to transfer signals along the neuron based on the Hodgkin-Huxley (HH) model. The model consists of four coupled differential equations that contain non-linear terms and have no analytic solutions, and so numerical methods must be employed. MATLAB programs using the Runge-Kutta and Finite Difference Method were developed to solve the space-clamped and full spatial-temporal HH equations. Solutions from these programs were consistent with current understanding of action potential behavior. The full spatial-temporal results represented a type of non-linear diffusion of voltage, but with important differences from classical linear diffusion. Finally, some preliminary work on extensions of the HH model is provided.

Honors Project in Physics and Astronomy
Advisor: James Doyle
Physics and Astronomy Department

Uditi Chandrashekhara

International Student Perceptions on Success, Supportive Factors and Challenges

To date, studies on student success have centered researchers' definitions and emphasized academic markers (e.g., Kuh et al., 2008). The aim of this study was to center international students' voices in defining what constitutes "success" in higher education. Participants also identified factors that support and factors that are barriers to these self-definitions of success. Twenty-three international students at Macalester College on F or J visas completed an open-ended survey. Thematic analysis was conducted by following guidelines by Braune and Clarke (2006). In addition to *academic markers*, participants identified *social connections, future and career, personal well-being, independence, and balance* between different aspects as key elements of success. For factors that hinder success, participants identified *cultural differences, visa status, personal factors, financial barriers, and academic stress*. For factors that support success, participants pointed to *social connections, campus resources/non-academic departments, personal factors, and previous high school experiences*. Results showed that holding the international student identity has unique personal, social, and legal implications. Elements of effective support centered students' own definitions of success while having awareness of systemic factors. These findings were used to develop a resource on international student support at Macalester.

Honors Project in Psychology
Advisor: Cari Gillen-O'Neel
Psychology Department

Jo-Hsuan Chen

Methylisothiazolinone Induces Cell Death in Primary and Immortalized Mast Cells

Environmental exposures to harmful substances are a significant cause of morbidity and mortality. In particular, exposure to preservatives has been an area of concern, especially in occupational and household settings. Methylisothiazolinone (MI) is a common preservative in household and personal care products with demonstrated cytotoxic effects, an association with chronic vulvar pain, and increased allergic sensitization in tested populations. Given the role of mast cells in allergies and their involvement in chronic pain conditions, we investigated the effects of MI on mast cells to understand their contributions to the development of chronic pain and assess the effects of MI on mast cells more broadly. We treated primary and immortalized mast cell lines with increasing concentrations of MI for 24 hours and measured cell viability via MTT and LDH assays. We also quantified cell viability using annexin V and propidium iodide staining. We found that MI treatment decreased both primary and immortalized mast cell viability in a dose-dependent manner. We also found that MI treatment decreased mast cell mitochondrial function, which was evaluated by concurrent MitoTracker Green and MitoTracker Red staining by flow cytometry. However, MI did not have significant effects on mast cell release of inflammatory cytokines. Collectively, this data shows that MI is highly cytotoxic to

both primary and immortalized mast cells, and in conjunction with other studies on its negative health associations, suggests a need for increased regulation of its use in personal care and other products.

Honors Project in Biology
Advisor: Elena Tonc
Biology Department

Yunzhu Chen

Theater as an Experiential Destination: Exploration of Themed Entertainment Design Techniques for Theatrical Productions

The paper investigates the integration of methods used in theme parks into theater productions to create experiences that foster returning patrons. Through examining their existing presence and other possible applications in theatrical performances, the research demonstrates how themed pre- and post-show environments, dynamic audience mobility, and techniques such as detailing and focusing can enhance narrative immersion in ways that traditional theater may not, potentially increasing reoccurring attendance. Additionally, the creative component of the project illustrates the implementation of these methods in staging the classic short story "The Yellow Wallpaper" by Charlotte Perkins Gilman as an immersive theatrical production.

Honors Project in Theater and Dance
Advisors: Cláudia Tatinge Nascimento and Thomas Barrett
Theater and Dance Department

Bennet Christensen

Brown v. Plata (2011): Mental Health Outcomes and Prison Reform

In 2011 the Supreme Court ruled that California prisons were so overcrowded that they couldn't provide adequate health care. Subsequent research on the reductions in the prison population, known as Public Safety Realignment, focused on crime rates and how much money it would save the state instead of inmate wellbeing. This project tries to answer what should have been everyone's first question, which is: what effect did the court case have on the mental health of inmates? To do this, individual level survey data from the Bureau of Justice Statistics (BJS), namely the 2004 Survey of Inmates in State and Federal Correctional Facilities, and the 2016 Survey of Prison Inmates was used. The National Prisoner Statistics Program, also from the BJS was used to provide prison level population data. Additionally, to analyze changes in jails the time series data from California Board of State and Community Corrections was used in the form

of the Jail Profile Survey. Informed by causal inference methodology, we used an ordinal logistic regression in a difference-in-differences framework to determine the effect of California’s realignment policy on inmate mental health. We additionally used linear models under similar frameworks to add robustness to our findings and compared results under different interpretations of mental health screener results. We then used a linear mixed effects model to look at the association between the realignment policy and mental health case rates in California Jails. We found that at best realignment moderately improved the mental health of inmates in prisons and at worst did not significantly improve mental health in prisons. However, for jails, realignment was associated with increased mental health case rates, indicating that some of the mental health burden was just potentially passed off from one institution to another.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Leslie Myint
Mathematics, Statistics, and Computer Science Department

Rachel Doris Paul Colson

Between Exclusion and Empathy: Knowledge and Sentiments of Jewish Youth in Buenos Aires about the “Jewish Community” in Argentina’s Collective Memory of the Dictatorship (1976-1983)

Argentina has been considered a vanguard in engaging collective memory to confront violations of human rights during the 1976-1983 dictatorship. However, this memory often omits the experience of the Jewish community during these years, although its members faced increased persecution in military detention centers. Conflicting perspectives from within the Jewish community as well as the recent politics of President Javier Milei further complicate contemporary memory. Given these dynamics, how do current Jewish youth in Buenos Aires understand and relate to collective memory? What do they perceive as the most important aspects and outcomes of different forms of remembering? Semi-structured qualitative interviews with Jewish youth in Buenos Aires illuminate both the shortcomings and prospects of Argentine national memory.

Honors Project in International Studies
Advisor: Nadya Nedelsky
International Studies Department

Heather Erin Cook

“Somebody’s gotta try and go forward”: Musical Identity and the (Re)Construction of Authenticity in Hawai‘i and Mongolia

Based on thirty-seven interviews with musicians and performers in Mongolia and Hawai‘i, this ethnography explores the complex relationships between nationalism, cultural imperialism, hybridity, and conceptions of authenticity in the colonial context through the lens of folk music. Engaging with theories of practice and postcolonialism, I argue that by attempting to reclaim elements of a pre-colonial musical culture as a vital form of cultural identity, Mongolian and Hawaiian musicians reckon with the feelings of loss inherent to the experience of political subordination and cultural imperialism while asserting a new form of cultural and political sovereignty within a globalizing national framework.

Honors Project in Anthropology
Advisor: Arjun Guneratne
Anthropology Department

Calvin Elliott DeWitte

Logical Heresy and Revisability

When we see something which arouses shock, we sometimes say it “defies logic.” But we don’t mean that we should change the way that mathematics is done. However, a recent view in the contemporary literature, called anti-exceptionalism, claims that some evidence would lead us to such a drastic conclusion. Defined broadly, the anti-exceptionalist says that logic is continuous with the sciences. My thesis considers a specific version of anti-exceptionalism: The view that logic is revisable due to abductive criteria, such as simplicity, explanatory power, and fitness with data. Some go so far as to argue that logic is even revisable due to empirical evidence, as opposed to *a priori* evidence. This thesis begins by assessing an anti-exceptionalist argument that geometry is analogous to logic. Since applied geometry has been revised due to empirical evidence in the past, so too is this possible with logic. I suggest gaps in the analogy. The second chapter develops these gaps into two further arguments: The first is that logical revision cannot be made *a priori*. The other suggests it is impossible to decide deductively that a particular logic is better than our current one. Finally, I examine what kinds of evidence we could have against a logical theory and the extent to which different kinds of evidence demand revision.

Honors Project in Philosophy
Advisor: Geoffrey Gorham
Philosophy Department

Anna Leah Durall

Partisan Perspectives on Inflation: Exploring Bias in Economic Expectations

Recent attention has been devoted to individual-level heterogeneity in inflation expectations. I consider political partisanship as a source of heterogeneity and find that expectations are biased by partisanship, i.e., that individuals from the president’s political party expect lower inflation relative to opposition party supporters (though results during Bush’s presidency lack statistical significance), and that this cannot be explained by other sources of heterogeneity including time-varying regional inflation. I find that individuals from the president’s political party generally base their expectations more closely on inflation relative to the opposing party and have more accurate expectations.

Honors Project in Economics
Advisor: Mario Solis-Garcia
Economics Department

Haoxuan Gao

Triple Consciousness: How Chinese International Students Navigate Identity Amidst U.S.-China Tension and COVID-19 Xenophobia

International students from China account for the largest number of international students in the United States. Behind their vast and growing population lies the legacy of U.S. soft power diplomacy to spread democracy during the Cold War era, while a similar strategy is utilized by the Chinese government for students to “represent China.” However, Chinese international students now stand on the intersection between the COVID-19 xenophobia and the contentious U.S.-China relationship. How do these individuals navigate and (re)orientate their identities when they are pulled to opposite directions? This study utilizes one-on-one interviews with 22 Chinese international students from a small liberal arts college in the Midwest to seek the answer. Using W.E.B. Du Bois’ concept of double consciousness, I argue that Chinese international students develop a “triple consciousness” with two external and competing gazes from the U.S. and China, and one internally conscious self. The findings suggest that the students develop resiliency apart from the state controlled gazes through forming more nuanced self-consciousness. The study provides a lens into how historical xenophobia and Cold War legacy shape the modern U.S.-China debate while illustrating opportunities for individual autonomy to exist outside of state ideologies.

Honors Project in Sociology
Advisor: Christina Hughes
Sociology Department

Rose Marie Giblin-Vance

**Les femmes marocains: les agentivités divers
Moroccan Women and Diverse Agencies**

In this project, I examine the diverse aspects of agency among Moroccan women. This agency can be formal or informal depending on areas of ethnicity, class, and familial status, and how this is actualized for themselves and others. In the past decade, many Moroccan women have disagreed on how to impact social change. For example, the recent changes in the family code has garnered controversy. These changes were championed by organizations like USAID, but for some conservative women like in the Justice and Development Party (PJD), traditional Islam should be at the heart of their government's policies. In addition to these tensions, there are structural limitations in the country such as widespread unemployment that also limit opportunities across gender lines. My goal is to see how Moroccan women navigate between the complex working around various factors and how this directly impacts how these women act in the world.

Honors Project in French and Francophone Studies
Advisor: Joëlle Vitiello
French and Francophone Studies Department

Gabriel Gonzalez

Fables as Smoking Mirrors: Classical Nahuatl Translation of Aesop's Fables at the Franciscan College of Santa Cruz at Tlatelolco

The College of Santa Cruz presents 47 of Aesop's Fables in Classical Nahuatl. Without context, only the initial phrase suggests a purpose: to "teach us to live an orderly life." Scholarship agrees: Renaissance Humanists, taught and read Aesop's Fables to impart morals. Specifically, they were "mirrors for princes," a European genre pitched to educated elites for political wisdom. For Franciscans teaching the indigenous elites at Tlatelolco, these "mirrors" presented colonial hierarchies as natural, and the eventual responsibility of the indigenous students. However, when the divine of Nahua religion was seeped into the new translations, how was Aesop's secular wisdom subverted?

Honors Project in Classical Mediterranean and Middle East
Advisor: Beth Severy-Hoven
Classical Mediterranean and Middle East Department

Emilio Alexander Ellis Gray

Enhancing Early Detection: Improving Autism Spectrum Disorder Diagnostic Processes

Efforts to enhance early detection and intervention for Autism Spectrum Disorder (ASD) are crucial for optimal developmental outcomes, yet the average diagnostic age remains suboptimal. This two-part literature review explores potential modifications to diagnostic practices to improve early detection. Firstly, current gold-standard diagnostic tools struggle to accommodate for ASD's heterogeneity, thus modifying practices in response could give families earlier resources. Secondly, despite established links between ASD and motor delays, mainstream practices often overlook motor considerations. Incorporating motor assessment into screening and modifying diagnostic criteria could significantly improve early recognition and intervention, potentially enhancing support for affected individuals and families.

Honors Project in Psychology
Advisor: Jaine Strauss
Psychology Department

Sylvia Greene

Simulation of Polymerization on Surfaces: Implications for Abiogenesis

How did life arise from the prebiotic conditions of the early earth? This problem has vexed scientists for decades with no consensus on its solution. Significant spontaneous formation of biopolymers such as proteins and nucleic acids in the aqueous phase appears to be improbable due to thermodynamic considerations. It has been proposed that mineral surfaces could have served as a catalyst for the initial formation of biopolymers. However, the feasibility of this mechanism has not been thoroughly studied. In this study a particle simulation of polypeptide formation on surfaces is developed to assess the feasibility of this mechanism. Elementary processes such as monomer adsorption, monomer and dimer diffusion, desorption, and peptide bond formation are included in the model. The production of long polymers that could serve as building blocks of proteins are considered as a function of bonding activation energy, polymer desorption energy, and the number of wet-dry cycles experienced by the surface.

Honors Project in Physics and Astronomy
Advisor: James Doyle
Physics and Astronomy Department

Ani Sori Gribbin

Sequence Learning in a 6-OHDA Model of Parkinson's Disease

Parkinson's disease (PD), a neurodegenerative disorder originating in the dopaminergic cells of the basal ganglia, is characterized by severe motor impairments such as tremors, bradykinesia, and postural instability. However, non-motor symptoms impacting sensory systems and cognition are consistently pointed to as more greatly affecting quality of life for PD patients. Cognitive impairments in PD can include changes in reward processing, depression, apathy, and increases in risk-taking behavior. Additionally, learning and memory deficits are seen in PD, specifically in motor sequence learning. Often, the neural correlates of sequence learning impairments are traced to the substantia nigra. However, there is some evidence in the literature that the ventral tegmental area (VTA) could also play a role in sequence learning deficits. In the present study we investigate the potential role of the VTA in sequence learning using a unilateral 6-OHDA lesion model of PD in mice. In comparison to control animals (n=3), some lesion animals (2 out of n=3) experienced an impairment in performance and rate of learning on a sequence task post-lesion surgery. This impairment also occurred without significant changes in motor skill measured by gait analysis and a cylinder test of forelimb laterality. This indicates that a lesion to the VTA may impact sequence learning without causing motor impairment- pointing to a more direct role of the VTA in sequence learning. This result contributes to our understanding of the neural correlates of cognitive impairments in PD, and could provide a basis for more targeted treatment of PD.

Honors Project in Neuroscience
Advisor: Marc Pisansky
Biology Department

Jingyi Guan

Topological Data Analysis of Knowledge Networks

The Science of Science is an emerging field of study where researchers use knowledge networks to represent organizations of ideas, agents, or institutions in order to study the progress of science. We consider knowledge networks as graphs where nodes are scientific concepts, and edges represent papers that first join pairs of concepts. Cycles in the knowledge network can be viewed as areas of incomplete understanding, i.e., knowledge gaps, as they represent groups of related concepts where connections have not yet been established by researchers. In this project, we use topological data analysis, specifically persistent homology, to analyze knowledge networks by tracking the evolution and studying the survival of knowledge gaps in various dimensions through a filtration on the metric of time.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Lori Ziegelmeier
Mathematics, Statistics, and Computer Science Department

Noah John Hanson

The Big City

The Big City is a series of six paintings, each measuring 2’x4’, depicting scenes inspired by *Dante's Inferno* and the underworld mythologies that inspired it. The project explores the underworld as a historical site of creative freedom, artistic collaboration, and morbid humor, drawing on imagery and esthetics from across time. Visual characteristics of hell, such as chaos and excess, are reframed as positive. Each painting is densely packed with information, featuring tens of figures in a variety of small scenes. This approach draws on both the language of Renaissance hellscapes and the representational techniques of ancient narrative art.

Honors Project in Art and Art History
Advisor: Chris Wilcox
Art and Art History Department

Joseph Arthur Harrington

Redefining the Region: Cross-Boundary and Regional Governance of Taipei’s Circular Line

This research aims to understand the cross-boundary and regional governance of the Taipei metropolitan area through the Mass Rapid Transit Circular Line. The research findings reveal that the Circular Line is not only a modernization effort for inter-urban competition under Taiwan’s developmental state legacy, but also a strategic tool employed by the local governments to (re)territorialize the metropolitan area for acquiring political autonomy and resources from the central government. The findings suggest a relational understanding of regional governance as a dynamic and fluid process, extending beyond the administrative boundary of the metropolitan areas.

Honors Project in Geography
Advisor: I-Chun Catherine Chang
Geography Department

Sarah E. Hobby

Settler Colonialism and Ecosystem Change: How Ideology Has Shaped Minnesota’s Environments

The formation of a uniquely American land ethic—defined by European political history and Christian biblical doctrine, and forged through systems of dispossession—is central to the creation of environments within the United States today. Using Minnesota as a microcosm to understand how settler colonial interactions played out all across the United States, this paper analyzes connections between violent dispossession of Indigenous people and the degradation of environments. By understanding how Ojibwe and Dakota people think about and have shaped Minnesotan lands throughout their history, and comparing Indigenous land-ethics to the Euro-American-settler land ethic, this paper evaluates the role that ideology and identity have played in environmental realities within the United States. Through the process of settler colonialism, European settlers reshaped environments within Minnesota—and North America broadly—and tied themselves to landscapes through their transformation. Under a Euro-American land ethic, though, and without Indigenous land-management, much of Minnesota has lost key relationships that its ecosystems depend on, fundamentally changing landscapes as a direct result of how settlers thought about and interacted with the world around them.

Honors Project in History
Advisor: Chris Wells
Environmental Studies Department

Yuheng Jiang

Beyond the Veil: A Contemporary Reimagining of Chinese Shadow Puppetry

Chinese shadow puppetry is a traditional art-form of storytelling that requires highly-skilled craftsmanship. Though it enjoyed great prestige in the past, at present Chinese shadow puppetry struggles to survive as it is difficult to recruit apprentices and to appeal to contemporary audiences. This honors project explores how to adapt the art-form with alternative materials and performance techniques, so that it may welcome younger generations as practitioners and spectators. For example, a simpler crafting process makes the art-form more accessible for novice puppeteers while preserving key traditional elements; or a Chinese horror-themed story that tailors more towards the youth’s interest.

Honors Project in Theater and Dance
Advisor: Wu Chen Khoo
Theater and Dance Department

Ebony Monique Johnson

How Am I Doing? (H.A.I.D.): How a Community-Based Peer Support Program Can Improve the Well-Being of Black Women

The Strong Black Woman Schema (SBWS), the idea that Black women must remain strong despite what they may be experiencing in life, has been linked to higher psychological distress and heightened health risks (Thomas et al., 2022; Castelin & White, 2022; Platt & Fanning, 2023; Ilyumzhinova et al., 2021; Woods-Giscombe & Black, 2015). In Chapter 1 of this project, I explore past research on the SBWS and propose a community-based support program to enhance Black women’s well-being based on findings about significant mediators. In Chapter 2, I provide a detailed week-by-week curriculum for this program, which I call How Am I Doing?

Honors Project in Psychology
Advisor: Jaine Strauss
Psychology Department

Anna Catherine Jonaus

Developing a Novel Assay for Quantifying Allelopathy Tolerance in Soybeans to Pennycress Glucosinolates in a Controlled Environment

In a pennycress (*Thlaspi arvense* L.) and soybean (*Glycine max* L.) relay-cropping system, one concern for farmers is the effects of pennycress allelochemicals on soybean growth and yield. Pennycress root exudates are known to contain sinigrin, a glucosinolate which hydrolyzes to form the harmful compound allyl isothiocyanate (AITC). In addition to serving as defense against herbivory, glucosinolates are also known to have allelopathic effects on surrounding plants by possibly affecting traits like germination, biomass accumulation, nutrient uptake, mycorrhizal symbioses, and nitrogen fixation. This is not ideal in a relay cropping system, where the presence of pennycress can decrease soybean yields by nearly half after only a few weeks together. It may be possible to breed soybeans that are more tolerant to this system if researchers can identify the genetic architecture of this allelopathy tolerance. Here I demonstrate the efficacy of using an aqueous solution of sinigrin or AITC to assess juvenile allelopathy tolerance of different soybean genotypes, while also determining phenotypes potentially impacted by glucosinolate presence. I found that biomass accumulation and chlorophyll were significantly negatively affected by treatments, whereas height, internode distances, and developmental stages were not consistently affected. By determining which phenotypes are most affected by treatment, researchers can use this protocol to breed soybeans that are tolerant to these allelochemicals.

Honors Project in Biology
Advisor: Mary Heskell
Biology Department

Cecelia Isabelle Elise Kaufmann

Towards Accessible Futures: Re-imagining Space and Inclusion in Higher Education

Since the Americans with Disabilities Act (ADA), an increased number of people with disabilities participate in higher education, yet their experiences continue to differ from their able-bodied peers. This thesis considers these differences utilizing Dolmage’s academic ableism, Foucault’s theory of Biopower, and Lefebvre’s theory on the Production of Space. This research shows how physical infrastructure and levels of power reproduce instances of academic ableism. Utilizing a case study of a private college in Minnesota, this research draws on interviews with stakeholders, offering guidance to correct the broader social and physical exclusions created that people with disabilities encounter in higher education.

Honors Project in Geography
Advisor: Dan Trudeau
Geography Department

Kendall Jennifer Kieras

The Abhorrent Condition: Representation in Pro-Lesbian Pulps, 1952-1962

From 1952 to 1962, over 2,000 lesbian themed pulp novels were printed, resulting in a period known as the “lesbian pulp boom.” Among these 2,000 are a handful of “pro-lesbian” pulps, distinguished by lesbian literary scholars as positively representing lesbians. These texts were produced in the face of government and editorial pressures that targeted “obscene” material and encouraged depictions of lesbianism as tragic. This paper analyzes four of the most popular lesbian pulps written by lesbians: *Spring Fire*, *The Price of Salt*, *The Girls in 3-B*, and *Beebo Brinker*, analyzing the thematic commonalities between these books. Ultimately, it argues that a small group of lesbian authors were able to reclaim the themes of a genre not written for them. These pro-lesbian novels introduced honest conversations about lesbian life into public discourse, creating a lasting impact on queer literature and activism.

Honors Project in English
Advisor: James Dawes
English Department

Grace A. Killackey

Life and Letters of Ada E. Leslie: A Victorian Woman's Story of Travel, Career, and Class Mobility

For around a century, the letters of Ada Leslie, a Victorian woman, traveler, worker, and class migrant, have sat in a desk drawer. Lovingly bound in leather by her cousin Pollie (the recipient of the letters), the archive tells the story of Ada's independent and self-driven journey of travel and class mobility as a young domestic servant. My project contains a scholarly introduction, a biography of Ada, and annotated copies of the letters themselves, and seeks to contextualize Ada as a historical figure in the eyes of modern readers. My introduction explores the ways that she does and does not fit into current scholarship regarding four main categories. First, I discuss Ada as an example of late nineteenth century New Woman, a proto feminist caricature embodying Britain's fears, insecurities, and hopes regarding the direction of female liberation. Next, I situate her letters within the genres of life writing and travel writing, examining the ways that her letters do and do not conform to aspects of each genre and making note of the ways that, through her writing, she constructs and asserts her perception of herself. I also examine Ada's position as both oppressor and oppressed as a British woman abroad, and her agency within the larger narrative of British imperialism. Finally, I examine Ada as a class migrant, highlighting the elusive path she takes from a domestic nurse to a royal lady's maid, as well as emphasizing the high costs and rewards of class migration. Throughout the biography, I seek to stay as true as possible to the content of the letters themselves, which are included in an appendix. I do not invent, but rather seek to highlight, connect, and collect any detail that may add insight to Ada's narrative. This project is significant because written narratives of Victorian women class migrants are difficult to find, and no two women's journeys through social class look quite the same. This project is an attempt to highlight one of these journeys in all its complexity, and present it alongside the original texts.

Honors Project in English
Advisor: Andrea Kaston-Tange
English Department

Miriam L. Kleit

Ecosystem Response to Post-hurricane Shifts in Community Composition: Comparing Nutrient Cycling Dynamics Associated with Early- and Late-Successional Tree Species in a Wet Tropical Forest

Climate change is altering hurricane disturbance regimes, and the impact on ecosystem functioning is poorly understood. I examined differences in carbon and nitrogen cycling between early, secondary, and late successional tree species in El Yunque National Forest, Puerto Rico. I found statistically significant species-related differences in leaf composition, soil nutrients, and soil gas fluxes. My results suggest that, as the successional state of the forest shifts to be dominated by early successional species for longer stretches of time due to increasing incidence of large-scale hurricane disturbance, the nutrient cycling of this forest may also be altered drastically.

Honors Project in Biology
Advisor: Christine O'Connell
Environmental Studies Department

Caedmon Petrella Kollmer-Dorsey

A Secessionist and French Red: The Life of Pierre Soulé in Transatlantic Context

This honors project seeks to analyze the life of Pierre Soulé (1801-1870), a US Senator representing Louisiana and Minister to Spain who began his political life as a liberal political exile from Restoration-era France. It argues that Pierre Soulé's fights for slavery and US expansion were in fact not as contradictory with his radically democratic liberalism as they appear to contemporary observers. The particular social, economic, cultural, and political conditions of the 19th century Atlantic World created an environment where liberals such as Soulé engaged in a transnational struggle for increasingly democratic governance which did not necessarily draw them into conflict with the institution of slavery, especially in cases such as Soulé's when they directly benefited from it. This thesis will also argue that his positions and political identities were reinforced by his participation in concrete political networks which allowed him to gain political power.

Honors Project in History
Advisor: Ernesto Capello
History Department

Oliver Gregory Lagasse

Repeat Methylisothiazolinone Exposure Alters the Inflammatory Potential of Murine Skin Fibroblasts

Vulvodynia is a chronic vulvar pain condition estimated to affect roughly 10% of woman-identifying individuals in the United States. Vulvodynia has been associated with a history of allergies and exposure to common household cleaning and personal care products. Methylisothiazolinone (MI), a preservative often found in these products, elicits inflammatory responses in allergic individuals. In our murine model of vulvodynia, dermal application of MI results in enduring anogenital hypersensitivity and mirrors other clinical findings. This suggests MI has the potential to lead to chronic pain in humans. Vulvar fibroblasts from patients diagnosed with vulvodynia express higher levels of inflammatory cytokines upon activation in *in vitro* cultures. With this in mind, we investigated how the *in vitro* inflammatory potential of fibroblasts is altered in response to repeated *in vivo* exposure to MI. We find trends of heightened IL-6, TNF- α , and CXCL2 responses to *in vitro* LPS activation of fibroblasts across several time points. This suggests that *in vivo* MI treatment increases the inflammatory activity of fibroblasts and could initiate a cascade of events that lead to chronic pain development, including low-grade long-term inflammation in the tissue. We are currently further profiling the changes in the biology of fibroblasts from our animal model to help elucidate the hitherto obscure etiology of vulvodynia.

Honors Project in Biology
Advisor: Elena Tonc
Biology Department

Olivia Xiang Xiang Laske

Linking the Population of Binary Black Holes with the Stochastic Gravitational-Wave Background

The astrophysical stochastic gravitational-wave background (SGWB) is the product of overlapping waveforms that create a single unresolvable background. While current LIGO sensitivity is insufficient to uncover the SGWB, future space-based detectors and Third Generation (3G) experiments are expected to probe deep enough for detection. Predictions of the SGWB can constrain future searches as well as provide insight into star formation, merger history, and mass distribution. Here, three primary methods are used to calculate a theoretical SGWB. The first method integrates over a precomputed mass distribution probability grid, while the second and third employ Monte Carlo integration with simulated data. After standardizing a prior distribution across both methods, the output energy density spectra is analyzed with regard to parameters such as binary black hole mass, merger rate, and spin distribution. Increasing the maximum merger mass shifts the gravitational-wave (GW) energy density peak to lower frequencies, while increasing merger rate parameters increases the GW energy density. In

addition, higher spin magnitude and more closely aligned spins produce a maximum GW energy density higher in amplitude and frequency.

Honors Project in Physics and Astronomy
Advisor: John Cannon
Physics and Astronomy Department

Christian Lentz

Persistent Relative Homology for Topological Data Analysis

A central problem in data-driven scientific inquiry is how to interpret structure in noisy, high-dimensional data. Topological data analysis (TDA) provides a solution via the language of persistent homology, which encodes features of interest as holes within a filtration of the data. The recently presented U-Match Decomposition places the standard persistence computation in a flexible form, allowing for straight-forward extensions of the algorithm to variations of persistent homology. We describe the U-Match in the context of persistent homology, and extend it to an algorithm for persistent relative homology, providing proofs for the correctness and stability of the presented algorithm.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Lori Ziegelmeier
Mathematics, Statistics, and Computer Science Department

Cora Mae Margaret Lewis

Theorizing Folk Cinema

This honors project theorizes the concept of folk cinema. The project grapples with the complex history of the study of folklore and cinema's historic inaccessibility as a medium in order to position folk cinema as a revolutionary project capable of reimagining both cinema and folklore. Avoiding concrete definitions or the urge to label any specific films as folk cinema, the project explores folk cinema theoretically through the experimental Spanish short film *Aguaespejo Granadino*, the films of the Bolivian Third Cinema filmmaking collective the Ukamau Group, and finally my own creative intervention via the creation of a short diary film.

Honors Project in Media and Cultural Studies
Advisor: Bradley Stiffler
Media and Cultural Studies Department

Eunice Yu Jean Lim

Methylisothiazolinone Induces Apoptotic Cell Death in Primary Skin Fibroblasts

Chemical preservatives prevent microbial growth and increase shelf life, making them an essential ingredient in products across many industries. Despite their effectiveness in maintaining product quality, some chemical preservatives have adverse effects on human health, putting exposed individuals at risk. Methylisothiazolinone (MI) is a chemical preservative commonly found in household and personal care products, and studies have linked prolonged or repeated MI exposure with the development of contact allergies and chronic inflammation, prompting investigation into the cytotoxicity of MI. We investigated the direct effects of MI on fibroblasts, which are key cellular players in wound-healing and the initiation of immune responses. We cultured primary skin fibroblasts from naive mice and treated them with increasing concentrations of MI. Cell viability was assessed by MTT and LDH assays, and Annexin V and propidium iodide (PI) staining. Mitochondrial mass and membrane potential were assessed by MitoTracker Green and MitoTracker Deep Red staining. Our results show that MI-treatment leads to a dose-dependent decrease in fibroblast viability 24 hours post-treatment, suggesting that MI is cytotoxic to fibroblasts. However, we did not observe inflammatory cytokine production by MI-treated fibroblasts compared to those treated with the vehicle control. Taken together, our results suggest that MI induces apoptotic cell death in primary fibroblasts without an overt inflammatory response. Further research is needed to comprehensively evaluate the inflammatory responses of fibroblasts to MI and the cellular cascades that may contribute to development of associated health conditions.

Honors Project in Biology
Advisor: Elena Tonc
Biology Department

Hongyi Liu

A Discussion on Estimation of The Best Constant for Spherical Restriction Inequalities

The restriction conjecture asks for a meaningful restriction of the Fourier transform of a function to a sufficiently curved lower dimensional manifold. It then conjectures certain size estimates for this restriction in terms of the size of the original function. It has been proven in 2 dimensions, but it is open in dimensions 3 and larger, and is an area of much recent active effort. In our study, instead of aiming to prove the restriction conjecture, we target understanding its worst-case scenarios within known estimates. Specifically, we investigate the extension operator applied to antipodally concentrating profiles, examining the ratio of the norms of these extensions. This involves understanding how the mass near the north pole compares to the mass near the south pole in terms of magnitude. Initial computational studies confirmed the established dichotomy between $p \geq 2$ and $1 \leq p < 2$. Based on these findings, we propose two conjectures: the first one is that there are 3 cases of the behavior of this constant, and the second one is that there exists a cutoff. We will also present some facts and conjectures related to special values such as the endpoint of $t=1$.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Taryn Flock
Mathematics, Statistics, and Computer Science Department

Linda True Lor

Digital Boundaries: Exploring Personal Workspace Awareness in Co-Located Augmented Reality

Augmented Reality (AR) incorporates digital content with the physical space of its users. Because of its semi-immersive nature, users safely engage with their AR application whilst being aware of their physical surroundings, but in spaces with other AR users, it does not provide awareness of their virtual content. In this thesis, we conduct a user-study to understand user awareness and personal workspaces in AR. Our user-study explores the use-case of co-located AR users who perform independent tasks in three different conditions. Each condition has its own unique interface representing the neighboring AR user's content: showing all virtual content, showing bounding box outlines of content, and a self-defined boundary. Our findings suggest that a self-defined boundary led to significantly more personal workspace encroachments.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Bret Jackson
Mathematics, Statistics, and Computer Science Department

Jiawei Ma

No Self: Consciousness, Life and Value

The problem of personal identity has been an ongoing debate in the history of philosophy for thousands of years. This thesis examines personal identity from a variety of philosophical approaches. I begin with the historical assumption made by Descartes and Locke that people have a 'self' because they have successive consciousness over time. I argue that no 'self' exists as a coherent entity because consciousness, which makes up the self, exists as separate pieces. By exploring the weakness of defining the self as consciousness, I argue that society is the efficient cause and final cause of personal identity. By studying different definitions of personal identity through Marx, Nietzsche, and Foucault, I examine how society influences and determines who we are. Further, I examine different people's identities living in different societies. Examining Confucianism, Communitarianism, Liberal Individualism, and Gender Construction, I discuss their similarities in setting up guidelines and expectations for people. I believe social values and expectations play a substantial role in constructing personal identity.

Honors Project in Philosophy
Advisor: Geoffrey Gorham
Philosophy Department

Mahmoud Majdi

**What Is the Impact of an Anti-Poverty Program on Resilience to Negative Shocks?
Evidence from Bangladesh**

In this paper, I test whether the Ultra-Poor Graduation Program (UPGP), an anti-poverty intervention, improved household resilience to various negative shocks in Bangladesh. I also estimate the impact of the program on household welfare in the presence of Covid-19. Exploiting the RCT design of the intervention, I employ two methods: a difference-in-differences method to examine the effect of the UPGP on household welfare outcomes in light of Covid-19, and a triple differences method to uncover the effect of the program on resilience to sudden price changes, natural disasters, and illness or death of a household member. While the program significantly improved household outcomes despite Covid-19, I find little evidence that the UPGP had an effect on resilience to the shocks that I examine. I discuss potential explanations for the null effect of the program on resilience in the paper.

Honors Project in Economics
Advisor: Amy Damon
Economics Department

Lucas Stewart Martin

Designed Dissonance: The Crossroads of the Theatrical Production Process

The production model fostered by ensemble-based theater companies often employs an extended rehearsal period that supports experimentation and collaboration among designers, director, and performers. Alternatively, the production model used by LORT (League of Resident Theaters) and Broadway theaters emphasizes commercial appeal and cost-driven efficiency. I take a few theater companies as case studies to grasp how the production model of such companies adapted to socio-economic shifts over time. I identify collaborative practices employed by these ensembles that can benefit commercial productions, as such practices balance artistic experimentation and costs, and thus the aesthetic growth of American theater.

Honors Project in Theater and Dance
Advisor: Randy Reyes
Theater and Dance Department

Audrey Genevieve McGuinness

Integrative and Holistic Approaches to Treating PTSD: Two Theoretical Models to Guide Best Practice

Posttraumatic Stress Disorder (PTSD) is rooted in both neurological and psychological abnormalities, but gold-standard psychotherapies target only one or the other and leave symptom profiles inadequately addressed. Integrative therapies may offer more complete symptom resolution than cognitive or somatic therapies alone. The therapeutic alliance, despite its known curative effect, is often overlooked in research on trauma treatment. A holistic approach that centers the alliance is needed to effectively treat PTSD. I first propose a theoretical model for integrative psychotherapy as best practice in PTSD treatment, followed by a second theoretical model that embeds integrative PTSD psychotherapy within a holistic framework.

Honors Project in Psychology
Advisor: Jaine Strauss
Psychology Department

Emily A. Neuman

Power, Control, and Policy: A Comparison of State Policy Responses to Domestic Violence

What policies are most effective at addressing and lowering cases of domestic violence? In the United States, there have been, and continue to be, a variety of responses and solutions brought forward by governments, communities, and individuals on how to prevent violence within families and what the consequences are when it occurs. Following federal policy guidelines, state and local governments have adopted different approaches to address domestic violence that focus on specific programs and systems that contribute to the reduction of domestic violence. This project is an in-depth analysis of different policy approaches to identify the strategies that have empirically proven successful in lowering levels of domestic violence, as reported by the CDC. I analyze two groups of states to determine if policies related to criminal justice or services for survivors have proven to be more successful at addressing domestic violence among women in the United States.

Honors Project in Political Science
Advisor: Julie Dolan
Political Science Department

Skyler Daimhín Newhall

Gaeilge in Éirinn: Irish Language Ideologies and Attitudes in a Divided Island Nation

Sociolinguistic research on Irish has predominantly examined language dynamics within either the Republic of Ireland or Northern Ireland, neglecting the connected experiences of language communities across both territories. Drawing on media and interview data, this paper investigates the significance of a shared 'language=identity' ideology. The results reveal that despite most Irish identifying individuals operating within this framework, diverse controversies regarding attitudes towards language legitimacy, speaker agency, and perceived 'usefulness' affect native and new speaker language use and motivation. These findings underscore the need for language reclamation and revitalization projects to address language ideologies and attitudes.

Honors Project in Linguistics
Advisor: Morgan Sleeper
Linguistics Department

Hương Nguyễn Hoàng Quỳnh

Bác Hồ in the Business Lounge: The Curious Case of Vietnam’s Neoliberal Socialists

This project examines how neoliberal economic policies and socialist signifiers have co-existed in Vietnam since the 1980s market reforms. Focusing on Vietnam’s national airline, Vietnam Airlines, I draw on the ideas of Michel Foucault to show how neoliberal governmentality subsumes socialism to shape better citizens, workers, consumers, and human capital. Through an autoethnographic thick description of a flight from Ho Chi Minh City to San Francisco, I capture neoliberal governmentality’s intimate interactions with the subject. With Aihwa Ong’s theory of “neoliberalism as exception” as a guide, I analyze how the selective deployment of socialist signifiers in the spaces, practices, and texts I encounter throughout this flight produces a distinctly neoliberal Vietnamese citizen-subject.

Honors Project in Media and Cultural Studies
Advisor: Bradley Stiffler
Media and Cultural Studies Department

Hương Nguyễn Hoàng Quỳnh

Now I See You, Now I Know You: How Constructions of Space and the Self Navigate the Tension Between Reenchantment of the World and Intimate Communion in Autobiographical Performance

The transformative power of live performances lies in their reenchantment of the world: how they allow us to see special qualities of everyday objects and phenomena. Autobiographical theatre, rather than trying to find new ways of seeing, aims to transform the audience to “[make] the stranger less strange”. How do these qualities co-exist in autobiographical performance, and how does such a style of performance navigate them? By centralizing a comparative analysis of stagecraft in Aya Ogawa’s *The Nosebleed* and my honors project, *Anti-Cartesian Variety Show*, I demonstrate how constructions of space and the self help collapse the boundary between worldly reenchantment and intimate communion of the self.

Honors Project in Theater and Dance
Advisor: Randy Reyes
Theater and Dance Department

Holiday Rosa O'Bryan

Diagenesis of a Pyritized Contact of the Middle to Late Devonian Transition from Carbonate to Black Shale in the Michigan Basin

Petrographic analysis can reveal information about original depositional environments and subsequent diagenetic conditions. Here, I examine a well-developed pyritized interval at the contact between the Traverse Limestone (a fossiliferous dolomitic packstone) and the “Squaw Bay Formation” in the Michigan Basin. Overlying the pyritized discontinuity, the “Squaw Bay Formation” is a calcareous, highly bioturbated shale, indicating Devonian sea level rise and/or basin subsidence. Little prior petrographic analysis has been done on these formations and given the stratigraphic consistency of the pyritized interval across geographically diverse cores, detailed petrographic study aids me in understanding the diagenetic history of each formation and the contact itself.

Ten thin sections were cut from three cores with samples taken at the contact and in both the underlying Traverse Limestone and overlying “Squaw Bay Formation”. Thin section petrography, SEM, and μ XRF technologies are used to delineate diagenetic overprints and stratigraphic relationships. Data suggests extensive dolomitization of the Traverse Limestone and reveals diverse modes of fossilization preserved in the “Squaw Bay Formation”. The presence of chalcedony, glauconite, various forms of calcite, and several crystal morphologies of pyrite imply a complicated diagenetic history. Two generations of pyrite were identified, the first being nodular and massive, and the second being framboidal and replacement-types. This second generation likely occurred as a result of hydrothermal fluid reacting with the subsurface, becoming available as a result of tectonic activity.

Honors Project in Geology
Advisor: Kelly MacGregor
Geology Department

Hannah Jane O'Connor

Religious Right Countermovement Tactics: Taking Down LGBTQ+ Rights One Letter at a Time

The group we know today as the “Religious Right” (“R.R.”) has been in contention with the LGBTQ+ movement since the early 1970s. Using a single case study method, I analyze how, if at all, Religious Right framing and LGBTQ+ counter-framing evolved at a point in time where the R.R. recognized it was losing its fight against same-sex marriage. Using Arizona’s 2013 Senate Bill 1045 (one of the nation’s first bathroom bills) as a case study, I find that the Religious Right translates protectionist framing from its anti-gay marriage crusade into its anti-trans rights offensive, and the LGBTQ+ movement also responds with similar framing around civil rights. However, given this new focus on trans rights, the R.R. emphasizes its belief that trans people are predators, and LGBTQ+ allies arguments are strengthened by repeated, sobering statistics that identify trans people as the most vulnerable minority class of people in our society.

Honors Project in Political Science
Advisors: Lesley Lavery
Political Science Department

Sofia Joy Onuscheck

Geriatric Psychology: Using Program and Curriculum Development as a Method of Synthesizing and Assessing Best Practices in Improving Psychological Outcomes for Senior Populations

This project on geriatric psychology and improving psychological outcomes in elderly populations uses curriculum/program development to synthesize best practices. Chapter One reviews literature concerning and informing intergenerational friendships, concluding that intergenerational friendships present a novel opportunity to ease some social/cognitive concerns around aging. A program facilitating intergenerational relationships within communities is proposed. Chapter Two conducts a broader study of geriatric psychology in order to develop a 14 week course curriculum that provides an introduction to the field and asks students to apply literature-informed methods to more fully understand and connect with this growing population and their unique needs.

Honors Project in Psychology
Advisor: Jaine Strauss
Psychology Department

Michelle Achieng Osiro

Establishing the Muscle Immune Landscape of Facioscapulohumeral Muscular Dystrophy (FSHD)

Facioscapulohumeral muscular dystrophy (FSHD) is a genetic muscular disease characterized by progressive skeletal muscle weakness and wasting due to inappropriate expression of the DUX4 gene. It is estimated to be the second most common form of muscular dystrophy, and affects approximately 870,000 people worldwide without accounting for possible undiagnosed cases. Immune cells play key roles in enabling normal muscle function and regeneration via crosstalk with various populations in the muscle microenvironment, however, previous findings from the Bosnakovski lab indicate a dysfunctional immune response in FSHD-affected muscle derived from the doxycycline inducible iDUX4-HSA FSHD mouse model. As a result, my thesis aims to identify immune-specific genetic differences in FSHD-affected muscle after long or short term DUX4 expression; as well as quantify and visualize the in-situ localisation of immune cells in murine muscle in response to varying periods of DUX4 expression. Through use of RNA sequencing data analysis, immunofluorescence staining, imaging and flow cytometry, our findings suggest that DUX4 expression in the iDUX4pA-HSA mouse model causes significant differential expression of the immune-related genes, Myo1g and Alcam (CD166). We also observe a general increase in CD11B+ F480+ macrophage infiltration into muscle subjected to DUX4 expression, which likely consists of both proinflammatory and anti-inflammatory cells. Additionally, in spite of minimal T-cell infiltration, there is a substantial response from a unique CD3+ CD11b+ myeloid population. By developing a basic understanding of the body's immune response to FSHD, researchers can then harness its capabilities to alleviate the condition's debilitating symptoms and potentially develop therapeutics that will improve FSHD patients' quality of life.

Honors Project in Biology
Advisor: Robin Shields-Cutler
Biology Department

Aldo Andrés Palacio Quaranta

English Title: “The River Does Not Go Back to Its Spring:” Interracial Relationships, Métissage, and Assimilation in the French Colonial Empire

French Title: « La rivière ne remonte pas à sa source : » relations interraciales, métissage, et assimilation dans l’empire colonial français

This project focuses on the contact between colonized and colonizer in the French Colonial Empire. It analyzes the ways in which interracial unions, mixed-race individuals, and assimilated native peoples posed a threat to the colonial order established by France’s “mission civilisatrice.” This work takes historical, literary, and cinematic sources into account to produce an argument surrounding the challenge of French colonial authorities to control and monitor these populations. It takes several geographic regions into account, ranging from West Africa to Southeast Asia to the Pacific Ocean, and it focused on a time period from the end of the 19th century to the mid-20th century.

Honors Project in French and Francophone Studies

Advisor: Joëlle Vitiello

French and Francophone Studies Department

Clarence Pan

Quantum Chemical Studies of Gas-Phase α -Pinene Ozonolysis Mechanism with Stereochemical Emphasis

α -Pinene is the most abundant biogenic monoterpene released into the Earth’s troposphere. Alkene ozonolysis is a non-photochemical source of hydroxyl radical. Ozone, alkene, and hydroxyl radical engage in positive feedback cycles. α -Pinene is bi-cyclo, chiral, and an endo olefin; its ozonolysis pathways are stereochemically diverse. This research uses Density Functional Theory (DFT) to develop mechanisms, study the intermediates, and evaluate hydroxyl radical production in α -pinene ozonolysis. This research explores the following physical organic perspectives: computing stereoselectivity in organic reactions, understanding sp^2 — sp^3 (carbonyl—alkyl) bond conformations, comparing closed- and open-shell pathways in pericyclic reactions, and mapping potential energy surfaces.

Honors Project in Chemistry

Advisor: Keith Kuwata

Chemistry Department

Emily Pedersen

Improving the Mental Well-being of Children Hospitalized with Chronic Illness

The psychological well-being of children hospitalized with chronic illness is of vital importance (Eccleston et al., 2015). In the first part of this project, I documented factors that influence their well-being and identified potential pathways for enhancing psychological health. In the second part, I did qualitative research in the form of interviews with four healthcare professionals who work closely with hospitalized children. I offer recommendations based on their observations, including a new type of staff position and closer collaboration among hospital staff.

Honors Project in Psychology
Advisor: Jaine Strauss
Psychology Department

Maia Nicole Pedrosa

Predatory Inclusion in Higher Education: Labor and Financial Exploitation at a Predominantly White Institution in the Era of Neoliberal Multiculturalism

In the summer of 2020, racial justice movements that emerged in response to the murder of George Floyd at the hands of Minneapolis police officer Derek Chauvin passionately decried the systems and institutions at fault and complicit in still perpetuating racial discrimination towards Black people, as well as Indigenous and other People of Color (BIPOC). As a response to these racial justice demands, college institutions pushed for diversity in their student body and across college affairs in order to appear like they were effectively responding to student demands. However, this fight against racial inequality and inequity began long before during the post-Civil War era when, as W.E.B. DuBois has written, America’s enduring problem of the color line continued to structure race relations in the nation. Formally, the work to desegregate higher education began in the 1960s after the Civil Rights Act was passed. Over time, higher education consequently became an increasingly popular commodity as it was framed as a necessity to access better and higher-paying jobs, where going to college became framed as an inclusive opportunity for increasing racial social mobility. As BIPOC students gain opportunities to enroll in higher education, it is important that we examine the relationship between institutions’ DEI efforts and the experiences that people with “diverse” racialized bodies have within them. To further explore this relationship, I conducted in-person interviews with 14 students who self-identified as BIPOC and were currently enrolled at Macalester College, a self-proclaimed racially progressive liberal arts college located in the Twin Cities less than ten miles away from where Floyd had been murdered. Ultimately engaging with Keeanga-Yamahtta Taylor’s concept of predatory inclusion but applying it to the context of higher education instead of the housing market, my results reveal that there are two general forms of exploitation that BIPOC students reported experiencing: labor and financial. As a result, I conclude that the DEI efforts promoted and promised by the college do not reflect the true experiences of BIPOC

students who are being tokenized and exploited by the institution instead of being offered material distribution or a fair path to upward mobility.

Honors Project in Sociology
Advisor: Christina Hughes
Sociology Department

Robert W. F. Pennington

Prescription for Prosperity: The Dual Miracle of Antiretroviral Therapy and African Growth

This paper investigates the effect of antiretroviral therapy (ART) coverage on economic growth in Sub-Saharan Africa. Following the expanded Solow Growth Model, I propose a dual mechanism theory. Using a panel of all 48 countries in Sub-Saharan Africa between 2001 - 2019, I employ a two stage least squares Bartik instrumental variable approach, including two-way fixed effects to estimate the effect. I show that ART coverage does not have a significant effect on economic growth. While naive estimates suggest a significant relationship, these results are not robust to various specifications. I posit possible reasons for the difference to previous estimates.

Honors Project in Economics
Advisor: Mario Solis-Garcia
Economics Department

Marie Yoo-Jin Peterson

My Body Adorned

My studio art honors project is an autobiographical body of work expressed through a ceramic-based installation. Further exploring the hybridized identity of being an Asian-American adoptee, *My Body Adorned* aims to juxtapose the contentious history of body modifications using the familiar and prestigious visual language of South Korean-inspired celadon-ware. *My Body Adorned* showcases a collection of vessels inspired by Korean ceramics with “tattooed” exteriors. Reinforced and informed by my tattooing practice, my work exposes the visual, linguistic, and technical skills that intertwine clay and skin and establishes a conversation between my physical human body and body of work.

Honors Project in Art and Art History
Advisor: Summer Hills-Bonczyk
Art and Art History Department

Juan Carlos Pineda

Novel Changes to Perineuronal Nets in Amyotrophic Lateral Sclerosis Mouse Model

Amyotrophic lateral sclerosis (ALS) is a devastating neurodegenerative disease characterized by the progressive loss of motor function through the degeneration of motor neurons and neuromuscular junctions. Previous research has indicated the pivotal role of specific classes of glycinergic interneurons, particularly V1 inhibitory interneurons, in modulating motor neuron activity and locomotion. These interneurons establish synaptic connections with motor neurons, which are lost in the early stages of ALS due to interneuron degeneration. Perineuronal nets (PNNs), primarily composed of chondroitin sulfate proteoglycans, are known for their involvement in synapse stabilization and have been proposed to offer neuroprotective effects by mitigating oxidative stress within neurons. Nonetheless, the extent of their influence in ALS and other neurodegenerative diseases remains largely unexplored. In this study, we investigated PNN expression through immunohistochemistry and confocal imaging in adult wild-type and SOD-1 mice, a recognized model of ALS, throughout pre-symptomatic (P45, P60, P84) and symptomatic (P112) stages of the disease. Immunohistochemical analysis of cervical spinal cord slices unveiled a decrease in PNN expression surrounding a certain class of glycinergic inhibitory interneurons in SOD-1 mice as compared to wild-type counterparts over time. These findings suggest the existence of a subset of glycinergic interneurons that not only express PNNs but may also be susceptible to ALS. Interestingly, PNNs in the dorsal horn of the spinal cord, which house sensory neurons, were also found to decrease over the time course of ALS disease. This research highlights the significance of investigating the functional role of PNNs in ALS as well as in other neurodegenerative diseases.

Honors Project in Neuroscience
Advisor: Michelle Tong
Biology Department

Trinity Michael Pirrone

Local and Distal Projections of VTA GABA Neurons

Substance use disorder (SUD) is a psychiatric disorder characterized by the abuse of drugs, compulsive drug seeking, and addiction. Addiction is facilitated by social, environmental, genetic, and neurobiological mechanisms. The underlying neural circuitry of addiction encompasses several brain regions, circuits, and cell types contributing to the reward system both collectively and independently. Evidence has shown that the ventral tegmental area of the brain is a control center of reward, an important mechanism for drug-seeking in addiction. Previous research has described the ventral tegmental area as a highly heterogeneous region containing various cell types serving different roles. GABAergic neurons of the ventral tegmental area primarily inhibit dopaminergic neurons, but there is also evidence that they synapse onto local GABA neurons and provide input to a wide variety of distal brain regions. To better understand the neurobiology of addiction, this project uses a unique viral vector approach to assess the local

and distal synaptic contacts made by GABAergic neurons of the ventral tegmental area. The methodology involves a dual viral transfection, allowing for the tagging of both GABA neurons and synaptophysin, a presynaptic protein indicating synaptic connections. The findings of this study propose a model of synaptic connectivity of ventral tegmental area GABA neurons, compare quantified expression across distal projection targets, and discuss potential implications of distal synaptic connectivity on reward circuit function. These findings have important implications for current understandings of reward neurobiology, future research focused on addiction mechanisms, and knowledge of how the brain generates addiction.

Honors Project in Neuroscience
Advisor: Michelle Tong
Biology Department

Rebecca Boone Porter

Empire Upon Jerusalem: Unraveling the Imperial Construction of Jerusalem's Exclusive Religious, Political, and Archeological Dynamics

This thesis delves into Jerusalem's multifaceted identity from the 1st to the 7th century CE, a period marked by the struggle for control by over five powers, highlighting its evolution as a pivotal center for the Abrahamic faiths. It explores Jerusalem through three interconnected dimensions—archaeological, religious, and political—demonstrating how each facet has been transformed by shifts in imperial power, leading to a complex interplay of exclusion and divinity. By integrating historical texts and contemporary scholarly insights, this thesis argues that the weaponization of architecture and access has been instrumental in crafting Jerusalem's sacred yet exclusionary identity, making it a globally revered but unshareable city.

Honors Project in Classical Mediterranean and Middle East
Advisor: Nanette Goldman
Classical Mediterranean and Middle East Department

Sean Michael Restivo

Racing the Tides: Three Virginia Islands Threatened by Climate Change and the Challenge of Preserving Their Stories

Among the tidal marshes of Virginia’s York River, there are three relatively obscure groups of uninhabited islands, all with fascinating stories, and all rapidly disappearing: the Goodwin Islands, the Catlett Islands, and Poropotank Island. These islands have been almost entirely overlooked by existing historical and archaeological research, and they are all imminently threatened by climate change-induced sea level rise and erosion. In the summer of 2023, I embarked on an interdisciplinary research project to study cultural heritage sites scattered across the islands. Drawing on my experience of studying these islands, as well as other related case studies, I demonstrate that due to their geographic isolation and intimate connection with surrounding waters, islands hold stories that are unique to their locations. Yet, this same isolation makes island cultural heritage sites particularly vulnerable to deterioration. By exploring the challenges posed by limited physical accessibility, insufficient funding, and systemic biases in determining historical significance, this study illuminates the urgent need for innovative preservation strategies. Photogrammetry has been proposed as a potential method of preserving threatened sites, but I argue that while it can be a helpful tool for documentation and analysis, 3D scanning on its own cannot and should not be considered a wholly effective form of preservation.

Honors Project in History
Advisor: Katrina Phillips
History Department

Neisy Rodriguez

Unveiling the Shadows: The Impact of Illegality on Parenting Strategies and Youth Knowledge in Mixed-Status Families

While existing immigration and family scholarship highlights the challenges faced by mixed-status families, it seldom examines how illegality influences parenting practices or the development of children's skills and knowledge. This study aims to fill this gap by asking, "To what extent does illegality shape child-rearing practices in mixed-status families?" and "How do citizen youth in mixed-status families acquire and transform legal knowledge?" I find that illegality significantly influences the child-rearing practices of mixed-status families. Through nine interviews with Mexican parents and eleven with citizen youth from mixed-status families, this qualitative study reveals that illegality prompts parents to adopt what I term “concerted effort.” Parents intentionally cultivate an environment that prioritizes learning and fosters critical thinking skills. While parents strive to shield their children from the repercussions of illegality, children actively safeguard their families. This strategy helps children develop what I term “unauthorized capital”—knowledge gained from their experiences in mixed-status families,

which they use for political engagement and community building. This research underscores the profound effects of illegality on family dynamics and youth empowerment in mixed-status families.

Honors Project in Sociology
Advisor: Erika Busse-Cárdenas
Sociology Department

Dipakshi Sarma

Embody the Cause: Subaltern Body Protests as Resistance Tactics

Gendered, classed and racialized bodies differentially experience state-sanctioned violence and societal norms. Body protests — when the body manifests the political messages by drawing attention to itself — manifest in these intersections. Women engaging in body protests garner more attention; a body that is sexualized, controlled, and subjugated draws attention to itself as a political act. Conditional on using their bodies in protests, what explains the specific tactics that women employ in acts of political resistance? By employing subaltern agency and feminist social movement theories, I use process tracing and comparative analysis of three body protest cases: the incarcerated Armagh women in Northern Ireland in the 1980s, the female suicide bombers of the Liberation Tamil Tigers of Eelam in Sri Lanka in the 1990s, and the female self-immolators in Tibet in the 2010s. Through this theory development, I find that gender as a salient grievance alone cannot explain why women adopt body protests. I argue that three factors — gender/feminist grievances, tactical innovation, and self-sacrifice framing — shape women’s choice to use body protests in social movements. This holistic approach challenges dichotomous perceptions of women and tactics as docile v/s corrupted and peaceful v/s violent.

Honors Project in Political Science
Advisor: Paul Dosh
Political Science Department

Zoe Roos Scheuerman

Homemade Language, Conservative Fro-yo, and Sci-fi Sloths: Speculative Migration Fiction and the Nation-State at the Ends of Worlds

This English literature thesis project explores an emerging, genre-defying body of fiction which I call “speculative migration fiction.” Speculative migration fiction imagines how ongoing global developments like climate change, technological development, and war may shape future migrations. Drawing on Benedict Anderson’s conception of national culture, Wendy Brown’s theory of the border, and Caroline Levine’s understanding of literary form, as well as close readings from *Scattered All Over the Earth* by Yōko Tawada, *Exit West* by Mohsin Hamid, and *2 A.M. in Little America* by Ken Kalfus, I argue that transnational migrations move toward becoming postnational migrations as migrants evade border control measures and undermine whether cultures and languages can be mapped along national lines. As future migrations corrode nation-states’ alleged historical antiquity and cultural cohesion, I employ Anna Kornbluh’s comparison of mathematical limits to literary limits, P.B. Guerrero’s discussion of critical nostalgia, and Wai Chee Dimock’s theory of deep time to understand how migration at the end of the nation-state becomes both unending and a tool to reimagine human societies’ structures. In this project’s last section, I invoke Samuel Delany’s “The Star Pit” to highlight how unending migration can perpetuate the capitalistic and imperialistic progress narratives which migrations in *Scattered*, *Exit*, and *2 A.M.* subvert, ultimately acting as a cautionary tale for imagined, postnational futures.

Honors Project in English
Advisors: Michael Prior
English Department
David Moore
International Studies Department

Ruben Schneiderman

Queering Storytelling: Challenging Normative Storytelling Methodology and Building a Queer Approach to Documentary Filmmaking

As representations of queer people on screen grow, so too has the violence for queer folks at the margins. This project looks at four documentaries that cover key moments in LGBTQ history to see how filmmaking methodologies and choices can further the harms of institutional violence. Key themes include homonormative and assimilationist representations in film, the formation of a reductive cultural memory of queer politics, and the obscuring of the global crises of AIDS. Through an analysis of these films, I argue for the formation of queer documentary methodologies that are grounded in the ideas put forward by queer theorists and activists. My documentary, *When You Ask Me About the Memories*, seeks to put these theories into practice and discusses the role of grief in queer memories.

Honors Project in Women's, Gender, and Sexuality Studies
Advisor: Myrl Beam
Women's, Gender, and Sexuality Studies Department

Elias J Schue

Make Like a Bird and Have Complex Reactions to Climate Change- Analysis of Six Minnesota Bird Species in Relation to Climate Change

Using the Nestwatch data frame from Cornell's lab of ornithology, this exploratory study measured critical aspects of species and nesting changes that signify climate change— three of these indicators were measured in MN, among six bird species

- 1) range shift- evaluated using species percentages at certain geographic sites.
- 2) temporal shifts in nesting- evaluated using first lay dates.
- 3) individual nest success- evaluated using clutch sizes and fledge/hatch ratios.

Overall, six species of MN cavity-nesters were observed for signs of changing species percentages, and temporal adaptations to the environment which mostly aligned with climate trends over the last 30 years in similar areas, pointing to increasing impacts of climate change on several species of bird in MN.

Honors Project in Biology
Advisor: Michael Anderson
Biology Department

Anna Diagne Sène

Which War Stories Get Told? How the Identifiability of Villains and Victims Impacts Media Coverage of Conflicts

In the last decade, armed conflicts have been proliferating around the world. While most conflicts still get covered in the mass media, some have received more international attention than others. This disparity in attention can affect the resolution of conflicts and the support victims can get to rebuild their lives. This study seeks to answer the question of why some armed conflicts receive more media coverage than others. I hypothesize that journalists cover conflicts with clearer victims and villains more than conflicts with more vague victims and villains, because clear victims and villains provide stronger narrative frames and fewer actors to cover, easing the cognitive and logistical burdens on journalists. I derive this hypothesis from an interdisciplinary theory-building exercise that draws on communication studies, psychology, and literary criticism, in addition to the conflict studies canon. Combining expert interviews with war journalists and an original survey experiment randomizing narrative frames on journalism students, I find no significant treatment effect on conflict coverage. However, the results still point to the importance of human stories in bringing readers to empathize with conflict victims even when they seem distant. This study enriches the conflict studies literature by analyzing war coverage from a perspective not explored yet: the narrative forms that emerge from different conflict environments.

Honors Project in Political Science
Advisor: Lisa Mueller
Political Science Department

Jane Slentz-Kesler

Community Conservation in Madagascar: Aligning Local Livelihoods and Biodiversity Protection

The management of natural resources in developing countries is of utmost importance as both high levels of biodiversity and local livelihoods often hang in the balance. The debate in conservation spheres often centers on 'fortress' versus 'community-based' conservation approaches, one emphasizing nature preservation and the other emphasizing the needs and empowerment of local communities in resource management. This study evaluates the management approach of a rainforest in northeast Madagascar, asking: how effectively does the COMATSA Sud protected area management system both preserve critical forest cover and provide for the local community? This research employs a mixed-methods approach, using interviews and focus groups with local residents in the study area combined with a random forest remote sensing analysis of Planet imagery to classify the landscape and analyze forest cover. Results suggest that the system is not successful in supporting community livelihoods or preserving forest cover due to a misalignment between the theoretical management model and the reality on the ground. Furthermore, while the management system does not provide economic

benefits to the local community, the forest serves as an important safety net when economic difficulties arise. Results also show that the community is open to a more comprehensive management scheme conditional on the incorporation of complementary livelihood support into the system. These findings suggest ways forward for community-based conservation, emphasizing the importance of reforming older institutions to align with contemporary landscapes and local communities' needs.

Honors Project in Geography
Advisors: William Moseley
Geography Department
Christine O'Connell
Environmental Studies Department

Lauren Elizabeth Smith

Russian Sacred Capital in the Western Balkans - Religion's Role in the East vs. West Power Rivalry

This paper advocates for increased attentiveness to religion's power to advance political strategies and objectives by examining Russia's sacred capital in the Western Balkans via a case study of Serbia's foreign policy 'balancing act.' A neoclassical realist framework illuminates how Russian religious soft power initiatives shape and sustain the Serbian balancing act by exerting influence at the domestic level. Systematically collected knowledge and theories suggest that, going forward, the United States focus efforts in the Western Balkans at the unit level: engaging religious leaders, strengthening civil society and opening the information space.

Honors Project in Political Science
Advisor: Andrew Latham
Political Science Department

Emma Squires

Relationships in Lacustrine Ecosystems: Carbon, Color, and Precipitation in North Temperate Lakes

Lakes are an important part of the carbon cycle. During rain events, precipitation flushes dissolved organic carbon (DOC)-enriched water from upper soil layers into lakes. In this study, I found that the lag between a rain event and when DOC-enriched water entered study lakes in Michigan was less than 2 weeks and that DOC was higher in wet years than dry years. Furthermore, I found that the relationship between DOC and water color was weaker in the hypolimnion. As climate change causes increased annual precipitation in the Midwest, this could cause increased DOC in lakes with potential increased GHG release.

Honors Project in Environmental Studies
Advisor: Christine O’Connell
Environmental Studies Department

Zhaohan (Mikey) Tang

The Trial of Abraham and the Trembling of the Audience — Rereading the *Aqedah*

This thesis reexamines the *Aqedah* narrative from Genesis 22:1–19, focusing on the conveyance of emotions and the portrayal of characters in a story that lacks explicit descriptions of thoughts and feelings. Approaching the text through a literary and narratological lens, I propose that through phraseological techniques like diction and parataxis and compositional strategies such as allusion and juxtaposition, the text captures the psychological depth of biblical characters, thereby enhancing its emotional impact on the audience. I dissect the narrative into eight scenes and within each scene, I conduct close readings to identify and analyze subtle lexical choices and rhetorical devices. Bridging various methodological approaches of biblical criticism, this study highlights the narrator’s inventiveness in producing emotional intensity and character complexity within the constraints of biblical narrative traditions.

Honors Project in Classical Mediterranean and Middle East
Advisor: Nanette Goldman
Classical Mediterranean and Middle East Department

Sarah D Tannert-Lerner

An Investigation of Subgroups within Hospital Concussion Data

Gender has been prominently discussed in the concussion and sports medicine literature for a long time. However, less research has been done on how gender impacts all types of concussions beyond just the arena of sports. This project aims to look at these complex relationships between gender, age, causes, and the pandemic within concussion diagnosis from hospital emergency department data. Using both factor analysis and latent class analysis, we found underlying patterns within the data. The results found different associations between assault and gender across different age groups. For the whole dataset, there was a greater proportion of females getting concussed from causes related to less risk taking behavior.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Laura Lyman
Mathematics, Statistics, and Computer Science Department

Paige Elizabeth Tomer

An Investigation into the Causes of Home-Field Advantage in Professional Soccer

Home-field advantage is the sporting phenomenon whereby the home team outperforms the away team. Despite its widespread occurrence across sports, the underlying reasons for home-field advantage remain uncertain. In this paper, we employ a range of statistical methods to explore the causal relationships of potential determinants on home-field advantage. We measure home-field advantage using match outcomes and differential metrics (e.g., differences in yellow cards received). In an attempt to narrow the research disparity between men's and women's sports, we utilize data from the National Women's Soccer League and the English Premier League to investigate potential causes of home-field advantage.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Vittorio Addona
Mathematics, Statistics, and Computer Science Department

Lily Rebecca Turner

From Field to Fashion: A Journey in Sustainable Design and Regional Understanding

As the fashion industry became globalized over the past century, it has become a major environment polluter and exposed laborers to hazardous conditions. This honors project considers sustainability in the textile industry at large and at the regional scale of the Upper Midwest. Its scholarly component offers an overview of the current textile production, details how the industry may become sustainable, and suggests practices of environmentally-conscious and ethical design. The creative component is a soil-to-soil seasonless capsule collection titled *From Field View* that incorporates biomimicry and interrogates the concept of *place* by referencing the Midwest's flora, wool, and linen fibers.

Honors Project in Theater and Dance
Advisor: Cláudia Tatinge Nascimento
Theater and Dance Department

Margaret Elizabeth Ulrich

Breaking the Mold: Voters' Perceptions of Femininity in Campaigns

I designed a two pronged study to explore the relationship between femininity in candidate self presentation and voter perception. First, I presented a sample of U.S. voters a series of images featuring either feminine or non-feminine female professionals. I then selected two images from this study to design two faux print political advertisements, one featuring a feminine candidate and one featuring a non-feminine candidate to establish a treatment and control condition featuring similarly "attractive" candidates. Then, I showed a quasi-representative sample of 540 potential U.S. voters one of these faux political advertisements and asked a series of questions regarding the female political candidate's perceived personality, competence, and viability. My results suggest that participants perceive the feminine candidate as more viable and as more competent in dealing with education issues. Moreover, Republican participants indicated a higher likelihood of voting for the feminine candidate. This nuance is important for female candidates as they tailor their self-presentation to potential voters.

Honors Project in Political Science
Advisor: Lesley Lavery
Political Science Department

Mateo Useche Rosania

What is the Effect of Mental Health on Labor Outcomes? Evidence From Colombia

I investigate how mental health predictors, such as life dissatisfaction and worry levels, influence labor outcomes, specifically the number of hours worked and monthly wage, in Colombia. I employ a 2SLS and FE model to find that individuals already in the labor force and experiencing high life dissatisfaction work 40.7355 fewer hours compared to their low-level counterparts, holding between-region and between-year characteristics constant. Similarly, individuals with high levels of life dissatisfaction are 82.4 percentage points more likely to be satisfied with their income. My results emphasize how mental health significantly impacts people's livelihoods and stands as a significant public health concern.

Honors Project in Economics
Advisors: Amy Damon and Elizabeth Engle
Economics Department

Chloe E Vasquez

Global Health Inequalities and Snakebite Envenoming

Venomous snakebites are a severely neglected tropical condition, killing up to 138,000 annually and leaving many more with permanent disability. Snakebites primarily affect marginalized populations in low and middle income countries, where medicine is scarce and poorly distributed. Through a political economic analysis of salience, global health actors and approaches to health interventions, I describe the drivers of snakebite neglect, current initiatives in the field, and potential solutions to the present antivenom crisis.

Honors Project in Political Science
Advisor: Paul Dosh
Political Science Department

Lola Ray Vescovo

The Forget Time for Random Walks on Trees of a Fixed Diameter

A mixing measure is the expected length of a random walk on a graph given a set of starting and stopping conditions. We study a mixing measure called the forget time. Given a graph G , the pessimal access time for a target distribution is the expected length of an optimal stopping rule to that target distribution, starting from the worst initial vertex. The forget time of G is the smallest pessimal access time among all possible target distributions. We prove that the balanced double broom maximizes the forget time on the set of trees on n vertices with diameter d . We also give a precise formula for the forget time of a balanced double broom.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Andrew Beveridge
Mathematics, Statistics, and Computer Science Department

Henry Mason Walker

L'Urbanisme, L'Eau et L'Opportunit : How Colonialism, Development, and Water Made and Unmade West Africa

This project explores the relationship between West African states and their developmental partners. Composed of a robust library of secondary literature as well as archival documents from Senegal and France this project explores the complicated webs of aid, corruption and exploitation which defined Francophone countries from colonization to Structural Adjustment Programs in the 1980s and 1990s. Starting with a general history of development programs and West Africa, before moving to more specific examples in Senegal and finishing with an exploration of Senegalese water utilities this paper explores this relationship from the macro level, to micro to the granular. This paper seeks to shed some light on an overlooked part of history and to explain how and why development programs largely failed to address the issues Francophone West Africa faced during this time period, and how even the supposed successes of development are more complicated than they seem on paper.

Honors Project in History
Advisor: Ernesto Capello
History Department

Shengyuan Wang

The Future of Brain Tumor Diagnosis: CNN and Transfer Learning Innovations

To improve patient survival rates and facilitate efficient treatment planning, brain tumors need to be identified early and accurately classified. This research investigates the application of transfer learning and Convolutional Neural Networks (CNN) to create an automated, high-precision brain tumor segmentation and classification framework. Utilizing large-scale datasets, which comprise MRI images from open-accessible archives, the model exhibits the effectiveness of the method in various kinds of tumors and imaging scenarios. Our approach utilizes transfer learning techniques along with CNN architectures strengths to tackle the intrinsic difficulties of brain tumor diagnosis, namely significant tumor appearance variability and difficult segmentation tasks. The segmentation model, based on the U-Net architecture, excels in delineating tumor boundaries with remarkable precision, while the classification model, employing EfficientNetB3, achieves high accuracy in identifying tumor types. Our findings indicate a significant improvement in the speed and accuracy of brain tumor diagnosis, offering potential benefits for clinical practice and patient care.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Susan Fox
Mathematics, Statistics, and Computer Science Department

Caleb Williams

Strain Methods for Changing Local Electric Field Gradient in BaFe2As2

In this study, we introduce a novel approach aimed at advancing the investigation of local nematicity in BaFe₂As₂ via dynamically pulsed strain fields. Our research is motivated by the pursuit of a more sensitive alternative to existing static strain methods. Employing nuclear magnetic resonance techniques, we measure the nuclear quadrupolar energy splittings, utilizing them as a sensitive indicator of the electric field gradient (EFG) that couples strongly to the orbital occupations of the 75As p-orbitals. In the new method, we discern an EFG response through changes in the phase acquired by the nuclear magnetization while time-evolving in the strain field, as opposed to a change in resonance frequency under constant strain. The previous technique measured a linear response in the EFG to applied strain and extracted the nematic susceptibility from these slopes as a function of temperature. The susceptibility diverged near the known structural transition and agreed with elastoresistance measurements. Our technique replicates the static results but proves three orders of magnitude more sensitive and hence requires less strain, establishing one of the first methods for probing nematic degrees of freedom within the superconducting regime.

Honors Project in Physics
Advisor: James Heyman
Physics and Astronomy Department

Xintan Xia

First Order Approximation on the Basilica Julia Set

This project combines fractal geometry and analysis. We consider the Basilica Julia set of the quadratic polynomial $P(z) = z^2 - I$, with its successive graph approximations defined in terms of the external ray parametrization of the set. Following the model of Kigami and later Strichartz, we exploit these graph approximations to define derivatives of functions defined on the fractal, an endeavor complicated by asymmetric neighborhood behaviors at approximated vertex points across levels and by the topology of these vertices. We hence differentiate even and odd levels of approximations of the Julia set and construct, accordingly, normal derivatives corresponding to each level category at the vertices, given their assigned ray names. We also discuss how a localized harmonic function serves as the tangent line, from which local linear approximation near vertices are obtained.

Honors Project in Mathematics, Statistics, and Computer Science
Advisor: Taryn Flock
Mathematics, Statistics, and Computer Science Department

Tianyi Yu

China's Grand Strategy and its Hegemonic Aspirations

The rise of China has sparked a debate on two core questions: what are China's intentions, and, more specifically, does China aspire to become a global hegemon? At the heart of these questions lies the enduring topic of China's grand strategy, its implementation, and its narratives. This paper addresses these questions by examining China's statements regarding its national rejuvenation strategy and its use of military power. The analysis concludes that China harbors aspirations of first becoming a regional hegemon and then challenging the US-led world order. Moreover, the paper suggests that China is at a turning point in that strategic project, becoming increasingly assertive in pursuing its goals.

Honors Project in Political Science
Advisor: Andrew Latham
Political Science Department

Xiaoping Yu

International Students' Ethnic and Racial Identities Processes in the United States

Two studies examine international students' ethnic and racial identities while studying in the United States. Study 1 investigates whether time spent in the U.S. and gender are associated with international students' ethnic and racial identity centrality. Data from 42 college participants showed no main effect of time or gender on identity centrality, nor any interaction between them. This study suggests time may not reliably predict international students' identity centrality, with inconclusive results on gendered differences. Study 2 focuses on Chinese international students in the U.S. The Social Identity Model of Identity Change (SIMIC) was used to frame international students' ethnic and racial identity processes. Through semi-structured interviews with 5 participants, themes of identity maintenance and gain were identified. Ethnic identity was maintained through cultural engagement and social relationships, except for acculturation effects that show ethnic identity shifts. Racial identity was gained through racial identification and socialization. Additional themes included advocacy which helped maintain both ethnic and racial identities, and intersectional identities, which offered insights into Chinese international students' perspectives on their multiple identities. These findings contribute to understanding the complexities of ethnic and racial identity among international students in the U.S.

Honors Project in Psychology
Advisor: Cari Gillen-O'Neel
Psychology Department

Zakary K. Yudhishtu

Supply and Demand in My Backyard: How New Affordable Housing Affects Nearby Rental Prices

I investigate how low-income housing tax credit buildings affect nearby rental costs, using a difference-in-differences strategy and a dataset of rental listings in the Twin Cities over 2015-2023. Though results vary depending on the comparison group, in my strongest specification I estimate that a new building reduces rents about 6% within 300 meters, and that this effect is minimal in lower tiers of the rental market but stronger in higher tiers. Identifying effects of new development at this scale matters for empirical questions around hyperlocal supply and demand for housing, and political questions about those who influence housing approval processes.

Honors Project in Economics
Advisor: Sarah West
Economics Department

Wenxuan Zhu

“Bypass” Biomedical Literature Review: A Network Science Approach

CIC-DUX4 sarcoma (CDS) is a rare and aggressive subtype of undifferentiated round-cell sarcomas, primarily impacting adolescents and young adults, with a median survival of less than 2 years. Its molecular and cellular aspects remain poorly understood, particularly concerning the CDS surfaceome, cell surface membrane proteins. Understanding the cancer's surfaceome is important for understanding how tumors interact with their surroundings and laying the basis of developing targeted treatments.

In this study, we conducted a comprehensive analysis of the CDS surfaceome using RNA-sequencing data obtained from CDS cell lines. Through the integration of various analytical approaches, we identified a distinctive subset of 20 surface proteins that encapsulate critical biological attributes, serving as potential therapeutic targets for CIC-DUX4 sarcoma.

Beyond gene expression profiling, we utilized advanced Network Science tools such as ego networks and personalized PageRank centrality. Leveraging existing biomedical literature databases, we identified therapeutic interventions targeting the candidate genes identified in our analysis. Our findings highlighted the potential of computational tools in discovering novel biomarkers and therapeutic avenues for CDS, thereby advancing precision medicine for rare cancers.

Honors Project in Mathematics, Statistics, and Computer Science

Advisor: Leslie Myint

Mathematics, Statistics, and Computer Science Department
