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The logo for the Office of Undergraduate Research, on the front cover of this publication, consists of an “impossible triangle” within a starburst. To some, the triangle evokes the challenge of puzzles to be solved or the eternal research question, “How does that work?” To others, the triangle represents the Greek letter Δ, the mathematical symbol for change.
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Foreword

Since 2009 the Office of Undergraduate Research has published Washington University Senior Honors Thesis Abstracts (WUSHTA), an annual compendium presenting the work of our most talented and dedicated graduates. Each year our student contributors are recognized for rigorous and in-depth research projects which serve as capstones for their undergraduate years. These students have advanced beyond the scope of their coursework—exploring their topics to a degree usually expected of the graduate level—and earned the distinction of honors in their departments and schools. While these students receive their accolades individually, we would be remiss not to acknowledge the support of their mentors, whose careful guidance has inspired these students to contribute their own original conclusions to growing bodies of academic research.

As always, we owe a great deal of thanks to each academic department and school for encouraging their top students both to undertake their thesis projects and to submit their abstracts for publication. Without the help of departmental directors of undergraduate studies and honors programs, as well as departmental administrators, this publication would not be possible. We are also greatly indebted to the late Kathryn Hoopes, whose generous bequest in support of undergraduate research continues to provide students with the means to perform outstanding research and us with the means to introduce it to a wider audience.

We are honored to present the work of the Class of 2011. Congratulations!

E. HOLLY TASKER
Editor

HENRY BIGGS
Director, Office of Undergraduate Research
Associate Dean, College of Arts & Sciences
In literature on black youths’ sexual and romantic decision-making, there is much discussion of how black youth see talk and writing as a source of sexual empowerment. How socially constructed identities influence the ways black youth see themselves as agents in their sexual and romantic relationships is an undercurrent of this discussion. This paper adds to this commentary by analyzing how a small group of black youth uses constructions of race, gender, and age to make sense of their sexual and romantic decision-making. I draw my data from interviews and writing samples I collected from black youth in the St. Louis metropolitan area. Social constructionism and discourse theory frame my analysis. Specifically, my framework is informed by the work of Peter Berger and Thomas Luckmann, Michel Foucault, James Gee, and Norman Fairclough. Drawing on this framework, I argue that the youth featured in this thesis create discourses based on socially constructed identities but also resist the influence of these identities in order to achieve sexual and romantic agency. In light of their struggle to achieve and exercise agency, I conclude this paper with a meditation on different theories that could be applied to further research on black youths’ sexual and romantic decision-making.

This thesis analyzes the racial biases that are present in news reporting through an examination of The New York Times, USA Today, and the Associated Press. My research focuses on articles that were published by these three news outlets from 2005 to the present and is grounded in a contextualized understanding of racism and how it exists in the 21st century. I use excerpts of significant news events from each of these years and compare how each publication covered the same story. Some of the major news events included are Hurricane Katrina, the controversy surrounding President Barack Obama and the Reverend Jeremiah Wright, and the question of the “authenticity” of Obama’s race during the 2008 presidential election. Ultimately, I conclude that today’s national newspapers represent the unspoken and undefined attitudes in contemporary society that often manifest themselves both through the perpetuation of racial stereotypes and the refusal to recognize that race shades almost everything in American society. From 2005 to the present, newspapers failed in their responsibility to be an objective representation of society for all those who inhabit society. During this time, newspapers continued to represent a particular perspective as the objective view while the other, competing perspectives presented the biased, or extreme view. This distortion of views was seen in both front-page articles and in more mundane news briefs. Although my thesis is not a comprehensive analysis of the media during this period, the racial biases it examines, from the subtle to the more explicit, are representative of some of the most common occurring trends in newspaper reporting.
**African and African-American Studies**

**Settling for Solo: The Growing Trend of Single-Mother Families in the Black Community**

*Angelique Williamson*

*Mentor: Garrett Albert Duncan*

Over the past half century, the marriage rate for African Americans has steadily declined. Between 1970 and 2001, the marriage rate in the United States declined by an average of 17 percent; however, for African Americans, it fell by 34 percent. Today, African Americans are the least likely to marry of any racial group in the United States. African Americans also constitute the racial group with the highest percentage of women who give birth outside of marriage. In my thesis, I examine the possible factors that contribute to the high percentage of unmarried African-American women. I specifically look at the role that the legacy of slavery, mass incarceration, public policies, and education has played in black women’s expectations and perceptions of marriage, as well as their access to potential suitors. My analysis shows that higher levels of education and income increase black women’s likelihood of marriage. Better economic prospects contribute to marital satisfaction and personal wellbeing for black women, as well as increase their expectation of a more egalitarian relationship. Educational attainment and marital status also significantly improve the cognitive, emotional, and educational outcome for their children. Black women in low-income communities, however, are more likely to negatively experience the effects of male incarceration rates, unemployment, and public welfare policies on their prospects for marriage.

**American Culture Studies**

**Progress and Decay—The Double-Edged Sword of Urban Renewal: An Analysis of Select Slum Clearance, Public Housing and Urban Renewal Projects and Policies of St. Louis Downtown Urban Redevelopment, 1945-1965**

*Patricia Hill Bailey*

*Mentors: Heidi Kolk and Paula Lupkin*

A rapidly growing post-World War II St. Louis faced the Herculean task of essential infrastructural modernization and rapid housing expansion, much like other large metropolitan areas in the United States. However, St. Louis has become an extreme example of failed attempts to revive a struggling downtown, and today the city is still attempting to recover from its legacy. This project explores the local particularities that directed the implementation of national urban renewal policies in St. Louis from 1945 to 1965, when business, political, and popular interests aligned to support urban renewal in order to propel St. Louis toward a modern vision of progress.

The 1951 *Post-Dispatch* series “Progress or Decay: St. Louis Must Choose,” urged St. Louis residents to consider the potential consequences of continuing to ignore the deteriorating housing and commercial buildings surrounding the downtown core. In keeping with Harland Bartholomew’s 1947 City Plan recommendations, nearly half of the city’s housing stock was considered “blighted” or “obsolete.” In response, St. Louis voters approved unprecedented funds for “slum clearance” and redevelopment projects in the Mill Creek Valley, Kosciusko, and DeSoto-Carr neighborhoods. These redevelopment projects almost uniformly involved clearance and reconstruction of massive areas, up to 500 acres, and reorganization of the basic streets and infrastructural fabric of the city. These decisions not only impacted the physical condition of neighborhoods and the city but also established a precedent for large-scale redevelopment without a commitment to the original structure of the city.

In this project, I provide a new perspective on St. Louis redevelopment by combining a socio-political analysis of the state of St. Louis government and political players with an architectural analysis of development strategies for the city. Thereby, I help to explain the fraught impact of physical changes to the city, and the complexities of urban redevelopment strategies for the future of St. Louis.
“Model Minority, Model Musicians?”
Asian-American Classical Musicianship in the United States
Annie W. Cai

Mentors: Sunita Parikh, Heidi Kolk, and Patrick Burke

Yo-Yo Ma and Lang Lang are two of the most popular classical musicians today, and it is no mere coincidence that both are of East Asian descent. Asian Americans make up of approximately 5% of the United States population but comprise a disproportionately high number of amateur and professional classical musicians—an unusual phenomenon, considering that the introduction of Western classical music to Asia occurred scarcely a century ago. This thesis explores why East Asian Americans are drawn towards the field of classical music by describing the complex interaction between Asian-American identity, the immigrant experience, and “model minority” theory. Using data gathered from historical research and interviews and surveys with amateur musicians, I argue that the majority of Asian Americans invest in classical music not because of externally-imposed, “model minority” expectations, but rather due to internally-imposed individual and community standards. The diversity of experiences encountered by Asian American classical musicians reveal a multifaceted set of discourses involving Pan-Asian identity, cultural capital and power, Eastern/Western divergences in values, and the East Asian practice of comparing success and achievement within the local community. In the future, Asian-American classical musicians will have to resist increasingly racialized critiques in order to renegotiate their status as interpreters of a historically “Western” art form.

A Cultured Classroom: Exploring Multidimensional Culture in an Urban Charter School
Danielle Rebecca Wallis

Mentors: Bret Gustafson and Heidi Kolk

Taking center stage in contemporary politics and social activism, the apparent tragedy of American public education has earned well its scathing critics and bold defenders, their seething reviews and enterprising reforms. Central to this lively contemporary conversation is a branch of schooling that necessarily expands the popular conception of how to “do” education: U.S. charter school reform opens American education not only to market forces but also, in its very nature and practice, to a cultural reflection of what education can be in this post-modern moment. After studying closely the practices and structures of an urban charter middle school in St. Louis, Missouri, I engage an alternative framework through which to understand education. I implicitly suggest that the way education is popularly discussed and assessed fails to describe the way in which education, at least by one symptomatic example, is contemporarily understood by staff and, to an extent, students. This study of KIPP: Inspire Academy strives to illuminate an institutional focus on culture at KIPP: Inspire, to better understand the organizing substance that seems to motivate and characterize the educational work at play.

Over a two-month period, I conducted 40 hours of ethnographic fieldwork, observing classrooms and meetings, and conducting 10 personal interviews with KIPP: Inspire staff members in an effort to better understand the ways in which KIPP: Inspire staff members implicitly and explicitly represent their own culture. My data speak to three categories—Public/Prominent Self-Description, Structural Culture, and Local Behaviors—that identify the different “vantage points” from which to understand the culture of KIPP: Inspire, and that I then employ as organizing features for the three sections of this work. Via these three categories, I illuminate an alternative understanding of “educating.” This study reveals an admittedly complicated understanding of education that looks to both the awareness and employment of culture that emphasizes community boundaries, connects internal culture to that of the larger educational discourse on charter schools, and works within iconic narratives of what education is traditionally understood to be. This study aims to provide an alternative reading of what education can be, with the hope of prompting new ideas and approaches for contemporary educational assessment and reform.
Anthropology

How to Hunt a Dik-dik:  
Zooarchaeological Analysis of Small Mammal Hunting at Guli Waabayo, Somalia  
Katherine Berger

Mentor: Fiona Marshall

This thesis examines the small bovid assemblage of the Guli Waabayo site in eastern Somalia in order to discuss the impact of climate change on Holocene hunter-gatherers’ diet and social organization. East Africa is a locus for extreme variability in foraging groups and is therefore highly important in our understanding of the complexity of these people and of their interactions with emerging pastoralist societies. Between 12,000 and 2,000 years ago hunter-gatherers used the Buur Heybe inselberg because of its biotic richness and variability; evidence at the site suggests that species from fresh water turtles to camels were in use over the course of the site’s history. However, one animal in particular dominates the faunal assemblage: the dik-diks (*Madoqua sp.*).

Using analyses of bone frequency and body part representation over time, I suggest that these dwarf antelope became a more important source of food during the arid phases of the Holocene when other resources became scarce. Secondly, examination of aging and mortality data from the *Madoqua sp.* bones and ethnoarchaeological analogies with modern hunter-gatherer groups proposes that dik-dik hunting was primarily accomplished using net technologies. These findings clarify patterns of animal use at the site throughout time and suggest that, on the spectrum of hunter-gatherer variability, the foragers at Guli Waabayo were more complex than the completely egalitarian model and may have used the rockshelter in a delayed-return manner.

Anthropology

Nothing Out of the Norm:  
The Army as Educators in an American Inner City  
Danielle Hayes

Mentor: Robert Canfield

The Junior Reserve Officer Training Corps (JROTC) is a United States Army program with the official mission of motivating young people to be better citizens. In more than 3,500 American high schools retired Army servicemen and women coach an extracurricular drill team and teach a class about leadership, general well-being, government and U.S. military history. This thesis complicates the common debate of whether or not JROTC is a thinly disguised recruiting tool disproportionately targeting at-risk youth through a qualitative case study of one program’s implementation in an American inner city.

Through classroom observation and interviews with both cadets and instructors, I was able to investigate the role of JROTC in informing a young person’s conceptions of war, soldiering, citizenship and themselves; challenge the values of discipline and good citizenship as determined by the U.S. Army; and explore the familial bonds that form between inner city youth and their instructors. For youth in search of belonging, purpose, education, adventure and financial security, the Army was presented as a valid option by instructors in a powerful position to both reveal and obscure realities of military service. I ultimately posit that although JROTC can certainly benefit the Army as a part of a multi-faceted marketing campaign, within this school—and likely many other units—retired servicemen and women do not act solely as agents on behalf of the U.S. Army. With diverse loyalties and spheres of obligation, individual instructors become invested in the youth for reasons other than their status as potential soldiers. In exploring the nuances of JROTC and the opportunities available to inner-city youth, I also question the liberal critique that enlisting in the Army places youth in higher-risk circumstances than their current environment and call for further long-term tracking of cadets and further research on the implementation of JROTC programs in both rural and urban settings.
Sustainable Food: Cultural Reactions to the Industrial Food Complex
Jeremy Lai

Mentor: Bradley Stoner

The modern food industrial complex is defined by several themes. In the positive are cheap food, large amounts of food, and transportation technology that is capable of diversifying what we eat. The complex is based, however, on the negatives of consumer ignorance, poor environmental maintenance, and a corporate economic focus over long-term issues of health and sustainability. A result of modern food production methods is the creation of distance between consumer and producer, both literal in the number of miles through the centralization of food sourcing and processing and figurative in the lack of understanding of what constitutes food beyond the supermarket packaging and environment.

The sustainable food movement, which in this thesis is viewed primarily through the lenses of farmers markets, organic, and local food, is a reaction to this distance. The traditions, rituals and symbolism that humanity has developed over the millennia through its relationship with food production have arguably been reduced or even lost in some cases by the present homogenization and monoculture methods of finding food to eat. Food is unique in its place in human history as a biological need and as a catalyst to the development of civilization and culture. These sustainable food movements can be seen as an attempt to reconnect people with the food they eat and as a way to restore traditional bio-culture—the relationship between humans and food that has a direct result on physical, social, and cultural health.

Understanding Adolescent Pregnancy and Motherhood in an Urban Township of KwaZulu-Natal, South Africa
Jenni Lee

Mentor: Carolyn Sargent

This thesis discusses the ways in which youth pregnancy and motherhood is both problematized and normalized in the community of Cato Manor, an urban township in KwaZulu-Natal, South Africa. Through ethnographic research and in-depth interviews with community members, the project situates and explores the lived experiences of young mothers as well as community attitudes towards youth pregnancy and motherhood.

Adolescent pregnancy rates in South Africa have been consistently high in recent years, and public health and education officials, medical professionals, health care providers, and voices within communities present a discourse of adolescent pregnancy as a significant issue. However, women in Cato Manor do not experience pregnancy as simplistically problematic. The women with whom I spoke did not intend to or plan on becoming pregnant at a young age; however, many influences, both individual and structural, compete with a woman’s ability to exercise agency over that particular intention. This thesis explores the many social and historical factors, including shifting family structures and the traditional Zulu practices that are reenacted in a current-day context, that contribute to an understanding of youth pregnancy and motherhood in urban South Africa.
Identifying the Other: The Maintenance of Social Division in Belfast, Northern Ireland
Jacqueline Marie Wagner

Northern Ireland remains one of the most deeply divided societies in the world today. Catholic/Republican/Nationalist and Protestant/Loyalist/Unionist communities have been at conflict since the early days of colonialism several centuries ago. The culmination of this tension was the Northern Ireland "Troubles," a 30-year period of conflict that began around 1969 and ended in 1998 with the Belfast (Good Friday) Agreement. This study reflects on the extent to which social division is present in modern-day Belfast and examines the mechanisms by which this division is maintained. My evidence is based on fieldwork conducted in November 2009 in the cities of Belfast and Derry, subsequent review of the literature, and monitoring of current events in Belfast. I utilized both formal and informal interviewing techniques along with participant observation during my time in Northern Ireland. In this study, I explore four main domains of influence: 1) politics and government, 2) economics and employment, 3) residential segregation and its consequences, and 4) social life and its influences. Within each domain, I determine how perceptions and realities function both to make ethno-sectarian differences seem valid and to make social division seem necessary and natural. I examine the objectification of long-standing collective discussions of history, social division, and social differences by presenting the actual social and cultural mechanisms through which people are being reminded of their group's identity in everyday life. In my study, I suggest various means by which reconciliation may be achieved, while also acknowledging the barriers to widespread peace. Attempts at intercommunity understanding and integration are often thwarted by continued violence, distrust, and fear within and between communities. By better understanding the mechanisms reinforcing social division in Northern Ireland, we will be able to modify them in order to create a more tolerant and integrated society.

The Role of Meat in the Ancient Greek Diet
Micaela Carignano

In this paper I examine the role of meat in the Ancient Greek diet. I combine textual and archaeological evidence in order to investigate whether or not meat was only consumed in the context of sacrifice. By selecting texts and archaeological sites that span a broad range of Greek history, I am able to see changes in meat consumption over time. The data show that Greek meat consumption is not necessarily tied to religious ritual but that it varied over time, probably as a result of changing population size and resource availability.
The patriarchal foundation of Surrealism in the 1920s is widely accepted as problematic. However, the relationship of women artists to the movement continues to complicate our understanding of Surrealism as a whole. Despite the blatantly sexist work produced by the male Surrealists, Surrealism was the first avant-garde movement to attract a group of ambitious women artists, who chose to work within its philosophical framework beginning in the 1930s. The goal of this thesis is to establish a middleground perspective between the scholarship critiquing the patriarchal elements of Surrealism and the scholarship celebrating the women who managed to develop careers as artists in the face of sexual and institutional oppression. Emphasizing the free expression of ideas that characterized the professional and personal interactions among the men and women of the Surrealist movement, the present study seeks to complicate our received understanding of the movement as divided between a dominant male voice and a suppressed female voice. In particular, the women who interacted with the male Surrealists, experimenting with their ideas and using their methods, stood to gain a lot from this free expression. A movement based on psychic exploration, Surrealism encouraged women to explore the potential of their sex in the entirely unfamiliar environment of the public sphere and to develop a new self-consciousness. Born into a society in which gender expectations were deeply ingrained, these rebellious women were strangers to themselves in their careers as artists. Surrealism enabled their attempts, however tentative, to discover how women could fit into the male-dominated world of art, politics, and intellectual debate. An evaluation of the work of the women Surrealists shows that they adopted and adapted the artistic methods of Surrealism to produce art that addresses these significant aspects of human culture.
The concept of visual escapism from war is not a new one. Violence and fighting have long given artists a certain license to change the direction of their work, and it is almost an unspoken critical expectation that they will do so. But the way each artist chooses to respond to loss, destruction, and trauma varies tremendously. In the case of American artist Ralston Crawford (1906–1978), World War II led to a profound change in the form and content of his work, and transformed his career until his death in the 1970s. In this thesis, I aim to debunk the myth of Ralston Crawford, American Precisionist, by exploring his work during, directly following, and six years after the end of World War II. Placing his career in conversation with the rich history of the time, I argue that the artist used geometric abstraction to both personalize and mitigate his own wartime and postwar trauma. In chapter one, I examine Ralston Crawford’s personal and professional work in the United States’ Army Air Force (1942–1945), concentrating specifically on his new use of fragmented forms in painting. Chapter two examines the artist’s fragmented style directly after the war (1946), at which time he was invited to witness and paint atomic tests “Able” and “Baker” at Bikini Atoll in the Marshall Islands for Fortune magazine. In chapter three I assess the artist’s life and work six years after the war, at which time he produced a set of lithographs of the bombed-out Cologne landscape in Germany (1951–1952). This new assessment of Crawford’s work illuminates several aspects of the artist not addressed in previous scholarship, including the artist’s experiences with and responses to trauma, and the blurring of intellect and emotion in the face of abject destruction.
In the late nineteenth and early twentieth centuries in France, the use of what were considered “feminine” modes of expression, color and decoration, became more commonplace as the Academy began to lose influence. Accordingly, the way many art critics and artists began to write about art re-categorized and reassessed color and decorativeness as potentially serious and praiseworthy qualities. Although an increasing acceptance of “feminine” aspects of art appears to be progressive at the surface level, critics and artists continued both explicitly and implicitly, intentionally and unintentionally, to use the conventional gender hierarchy to describe the relative merit of artistic practices. As a consequence, it becomes apparent that the reassessment of color and decoration necessarily reconstructed these “feminine” modes of expression as “masculine.” From emphasis on the intellectual qualities and patriotism of a painting to alluding to the artist’s own masculinity, critics and artists alike emphasized a variety of so-called “masculine” qualities in order to legitimize the colorful, decorative paintings of the avant-garde from Impressionism onward. In order to illustrate such a shifting of gendering, the art and criticism of Claude Monet, Paul Gauguin, and Henri Matisse will serve as case studies. Monet, not a prolific writer, was characterized as independent, intelligent, and patriotic. Gauguin was described, and described himself, as rebellious, erotic, and “savage.” Matisse was called industrious, theoretical, and “a wild beast,” but considered himself, above all, a seeker of “a condensation of sensations.” A concluding section considers the Pattern and Decoration Movement of the 1970s and how the artists of this group, such as Miriam Schapiro, confront the dominant discourses about art, questioning both the mythology of the exclusively male artistic “genius” and the sexist nature of art terminology.
City or Empire?: Civic Identity and The Tyche of Antioch in the Roman East

Mentor: Susan Rotroff

This thesis examines the use of The Tyche of Antioch prototype to express and create civic identity in the Greek East under Roman rule. When the Romans conquered the former Seleucid regions of Syria and Anatolia, they caused the Greek and Semitic residents of these regions to reconsider their relationships with both local traditions and their new position as subjects of an international empire. This changing identity can be seen in the use of The Tyche of Antioch, a statue created in 300 BCE by Eutychides of Sikyon. The personification of the protective fortune of the city of Antioch, The Tyche of Antioch was copied frequently after the arrival of the Romans, indicating a resurgence of local and regional pride in Syria and Anatolia. The Tyche of Antioch was also adapted to represent the protective fortune of other cities. This thesis explores the use of this prototype in Dura-Europos, a city located on the eastern edge of the Roman Empire. In several works of art found in the city, Eutychides’ statue is used as a model for both The Tyche of Dura-Europos and The Tyche of Palmyra, a nearby city that traded with Dura-Europos. By examining the changes made to Eutychides’ prototype in the creation of these localized Tyches, one can detect the ways in which the residents of Dura-Europos understood their city and their relation to the larger Roman Empire.
Crossing the River Stone by Stone: 
An Evaluation of the Chinese Currency Debate 
Christopher Brennan 

Mentor: Lingchei Letty Chen 

Chinese currency valuation came to the forefront of American politics once more in 2010. With a Democratic House, Senate, and President presiding over a nation recovering from the worst financial crisis since the Great Depression, and a Republican Party (aided by a strong Tea Party constituency) threatening to take over the House and Senate during midterm elections, both parties were pressed to outline their solutions for the struggling economy and the lingering 10% unemployment rate. 

Politicians saw China’s exchange rate policy as one contributor to the U.S.’s slow economic recovery. Politicians argued that China’s government was artificially holding its currency undervalued in order to make Chinese goods more competitive. Most economists agree that the yuan is undervalued by between 15% and 40% against the dollar. With Chinese goods effectively being sold at a discount, competitor firms, including those in America, compete with Chinese goods that are cheaper than their inputs would otherwise suggest, increasing global demand for Chinese goods and decreasing demand for other countries’ exports. In the eyes of many Americans, the exchange rate policy has exacerbated the U.S.’s unemployment rate, setting the stage for politicians to argue for China to allow the RMB to float. 

The debate, however, is far more complex than this simple argument suggests. This report explains the various economic and philosophical underpinnings of the Chinese currency debate, beginning with a history of Chinese currency policy since 1949, followed by an explanation of the economics of a fixed exchange rate, and the potential outcomes of China changing its exchange rate policy. I argue that it would be economically beneficial for the U.S., China, and the world economy if China pursued a floating exchange rate regime. This move would allow yet another part of its economy to be determined by market forces, a transition described by Deng Xiaoping as “crossing the river stone by stone.”

Regulation of Amyloid Plaque Deposition by PCSK9 in a Mouse Model of Alzheimer’s Disease 
Devika Bagchi 

Mentor: David M. Holtzman 

Alzheimer’s disease (AD) is a neurodegenerative disease that impairs cognition and causes dementia. It is believed that accumulation of amyloid β (Aβ) peptide into amyloid plaques leads to a cascade of neurotoxic events, ultimately resulting in neuronal cell death. Apolipoprotein E (apoE) genotype is recognized as an important genetic risk factor for Alzheimer’s disease with apoE4 increasing risk for disease. Recent studies in our laboratory demonstrated that increased levels of the low-density lipoprotein receptor (LDLR)—an apoE receptor—in the brain results in a marked decrease in apoE levels and also a significant reduction in Aβ aggregation. Therefore, modulation of LDLR levels is a potential strategy for reducing amyloid plaque levels and preventing AD. Proprotein convertase subtilisin/kexin type 9 (PCSK9) is a secreted protein that regulates LDLR levels in peripheral tissue by inducing its degradation. In this study, we considered the possibility that a decrease in PCSK9 levels in the brain may lead to higher LDLR levels and, consequently, a reduction in apoE levels and Aβ plaque formation. We assessed the levels of apoE and Aβ, as well as amyloid plaque load, in PCSK9+/+ and PCSK9-/- mice that express high amounts of the human Aβ peptide. PCSK9-/- mice had significantly lower levels of apoE in the plasma compared to PCSK9+/+ mice. PCSK9-/- mice also displayed significantly lower levels of Aβ in the cortex. Histological analysis of Aβ deposition into amyloid plaques demonstrated that PCSK9-/- mice had significantly reduced levels of amyloid in the brain compared to PCSK9+/+ mice. Decreased Aβ levels and plaque load in the brain of PCSK9-/- mice suggest that PCSK9 may play a key role in regulating plaque formation and Alzheimer’s disease pathogenesis. Although the precise mechanism by which this occurs remains to be elucidated, these results offer exciting research directions for developing new treatments for AD.
The Effect of Orthographic Neighborhood Size on the Extent of Priming

Adeetee Bhide

Mentor: Bradley Schlaggar

A balance between fast and accurate reading may be achieved by having tighter coding for words with high neighborhood densities (N) (where many words can be formed by changing one letter in the target word) and looser coding for low N words. Masked priming paradigms in adults have shown facilitation on lexical decision tasks when form primes (e.g., obey) precede low N (e.g., obey) but not high N targets, suggesting competition between orthographic neighbors and the target. In contrast, children up to grade 6 showed form priming for low N and high N (i.e., > 4 neighbors) words. However, it is unclear whether these high N stimuli were effectively low N stimuli for younger children (i.e., whether children knew the target’s neighbors). This study used targets with very high N (i.e., > 10 neighbors), assessed children’s knowledge for orthographic neighbors, and tested the developmental trajectory of form priming for low N (i.e., 0 neighbors) and high N (i.e., > 10 neighbors) stimuli using a masked priming, lexical decision paradigm with children (8-12 years), adolescents (13-17 years), and adults (18-23 years). Post-experiment testing indicated that children knew approximately 9.6 of the neighbors for high N words, confirming that these stimuli were high N for children. During form priming, adults, adolescents, and children showed facilitation for the low N word targets. Children also showed facilitation for the high N targets, whereas adolescents showed non-significant inhibition and adults showed inhibition trending towards significance. Form priming became adult-like around age thirteen. Thus, developmental differences in high N form priming are not the result of smaller effective N in children, suggesting a possible developmental change in how orthographic neighbors of a target word inhibit the target or compete with the target during lexical decision.

Validity of a Novel Non-Motor Symptom Scale and [11C]-DTBZ PET-based Measures as Tools for Tracking Disease Severity in MPTP Primates

Christopher Brown

Mentor: Joel Perlmutter

Parkinson disease (PD) is a progressive neurodegenerative disorder, characterized by marked dopaminergic loss within the midbrain and presence of Lewy bodies post-mortem. It is important to determine a way to quantify disease progression through both clinical ratings and measures of dopamine function within the brain. Using the MPTP model in the non-human primate, [11C]-DTBZ PET-based measures of binding potential in the nucleus accumbens were used to assess disease progression in living primates. DTBZ binds to VMAT-2, a presynaptic vesicular transporter in dopamine neurons, which could be a potential biomarker of disease progression. This measure was compared to a novel non-motor scale (NMS) of manifestations that assesses apathy and anxiety rather than the more traditional motor manifestations. To understand the ability of the measures to characterize PD progression, variable doses of MPTP were given to primates, and the measures were compared to each other and post-mortem cell counts of dopamine neurons in the ventral tegmental area (VTA), the part of the midbrain that connects with limbic areas important for emotion processing. We found that the NMS was reproducible between intra-rater ratings for apathy and anxiety (r=0.68, 0.53 respectively), and that ratings following MPTP were significantly higher based on a paired t-test (p<.05). We found apathy ratings had a strong correlation with DTBZ binding potential in the NAcc (r=-0.76, p<.05). Binding potential also had a strong correlation with cell counts in the VTA (r=-0.79, p<.05). Cell counts, binding potential, and apathy ratings all significantly correlated with MPTP dosage (r=-0.63, -0.90, 0.92; p<.05). These data suggest that using the NMS and DTBZ PET measures could potentially be used to better assess a patient’s disease progression, particularly of these non-motor manifestations.
Axon degeneration is a process that occurs during many neurodegenerative diseases, leading to motor dysfunction, cognitive impairments, and lack of bodily control. Axons can degenerate from a variety of different catalysts such as acute injury, protein aggregation, and drugs, to name a few. Whether the mechanism of degeneration is standard among different injuries is largely unknown. Wallerian degeneration, the defined cascade of events from injury to axon demise distal to the site of injury, induces cellular problems relating to transport through the axon, mitochondrial dysfunction, calcium concentration levels, and membrane fragmentation. There was a molecule discovered that seems to protect against multiple insults, suggesting that the degenerative pathway has conserved components.

We performed a forward genetic screen in *D. melanogaster* to identify molecules that protect against degeneration when knocked down or over expressed, as any identified could inform treatment strategies for a variety of neurodegenerative diseases. We induced degeneration with paclitaxel, a chemotherapy drug that disrupts microtubule dynamics and induces peripheral neuropathy. To see neurodegeneration, we looked at the microtubule architecture and neuronal membranes in the entire nervous system, as well as a tagged subset of sensory neurons in transgenic flies. We found genes that show both more intact axons and dendrites when certain genes are knocked down or over expressed.

A few genes discovered to be protective from the screen are genes that have been implicated in dendrite pruning in the scientific literature. Upon further research, we discovered that many of the processes thought to be involved in neurodegeneration are also used in dendrite pruning, such as microtubule destabilization, branch severing, retraction, and debris clearance. I researched the connection between dendrite pruning and neurodegeneration, hypothesizing that there are elements in the pathway present in both mechanisms. I tested more specific pruning genes in the degeneration assay and looked at whether any genes from the screen may be involved in dendrite pruning. I identified a number of dendrite pruning genes required for axon degeneration, confirming my hypothesis about the conservation of mechanism. Since dendrite pruning is better characterized than neurodegeneration, further analysis could lead to a better understanding of the mechanisms of neurodegeneration.
Late-Zygotic MicroRNAs in *Chlamydomonas reinhardtii*
Elizabeth Freeman

Mentor: Ursula Goodenough

MicroRNAs (miRNAs) are a class of small RNAs that are known to be highly involved in post-transcriptional regulation in animals and plants. These short RNA sequences, usually between 21 and 24 nucleotides in length, are derived from longer, hairpin-containing transcripts, and work by binding to a target transcript and preventing it from being translated into protein. MiRNAs have recently been discovered in the unicellular green soil algae *Chlamydomonas reinhardtii*, contradicting the previously held belief that such activity was restricted to multicellular organisms. However, little is known about the specific roles of miRNA in *Chlamydomonas*. In this study, we hoped to classify some of these *Chlamydomonas* miRNAs of unknown function. We analyzed the *in vivo* activity of 6 pairs of putative miRNAs from different parts of the *Chlamydomonas* genome that accumulate between 2 and 8 hours after gametes fuse, which corresponds to the late-zygotic stage of *Chlamydomonas*'s life cycle. To do this, we designed a luciferase bioassay in which complementary sequences to two putative late-zygotic miRNAs derived from the same transcript were placed in the 3' untranslated region (UTR) of the luciferase gene. The constructs were placed under the control of a zygotic promoter and transformed into *Chlamydomonas*, and the resulting transformed colonies were analyzed for luciferase activity. In 2 of the 6 constructs that we analyzed, the change in luciferase activity between the vegetative and late-zygotic stages was significantly smaller than that in the positive control, which did not contain putative miRNA targets. This implies that miRNAs do in fact suppress gene expression in *Chlamydomonas* during zygote development.

Rearrangement of M Element-like Sequences in *Tetrahymena thermophila*
Kevin Gao

Mentor: Douglas Chalker

*Tetrahymena thermophila* is a ciliate, a group of single-celled eukaryotes that possess nuclear dimorphism. *Tetrahymena* has both a silent, germ-line micronucleus and an actively expressed macronucleus that develops from a copy of the micronucleus through an intricate mechanism where thousands of repetitive sequences are physically eliminated. To recognize these sequences to be deleted, *Tetrahymena* relies on a mechanism related to RNA interference where small RNAs homologous to the internal eliminated sequences (IES) search the developing macronucleus, and mark IES loci for methylation. One of these internal eliminated sequences called the M Element rearranges very efficiently among predictable borders. Interestingly, a class of sequences that are up to 95 percent homologous to ~200bp of the M Element (dubbed M-like sequences, or MLSs) undergo inefficient rearrangement in their native genomic contexts, despite their homology to efficiently eliminated IES. When one MLS was cloned out of its native environment into a high-copy number artificial chromosome, it rearranged with significantly higher efficiency. This conforms to the hypothesis that MLSs in their native chromosomal loci have chromatin modifications or other epigenetic factors that hide these IES-like sequences from the rearrangement machinery. Furthermore, when the M Element homologous region is absent in the plasmid-based constructs that become artificial chromosomes, the M-like sequences are still rearranged, but with even less efficiency. Although the specific epigenetic modifications are still not known, preliminary rtPCR evidence suggests that these M-like sequences are still transcribed. These results may suggest that MLSs have the potential to behave like IESs, but their native genomic contexts suppress their IES behavior. The project has the potential to improve the understanding of how *Tetrahymena* determines which sequences should be rearranged, which can improve knowledge of molecular genetics and potentially have future applications in gene therapy and DNA-targeting drugs.
The Role of PICALM and Clathrin-mediated Endocytosis in Alzheimer’s Disease
So Chon Gil

Mentor: Jin-Moo Lee

Alzheimer’s Disease (AD) is a neurodegenerative disease characterized by loss of memory, progressive cognitive decline and eventual death. The pathological hallmark of the disease is the accumulation of amyloid plaques in the extracellular space in the brain. Amyloid plaques are composed of tightly aggregated amyloid beta peptide (Aβ). Aβ is a proteolytic fragment of the Amyloid Precursor Protein (APP), a transmembrane protein, which resides on the plasma membranes of neurons. APP is cleaved into Aβ in endosomes following internalization into the cell. A recent Genome Wide Association Studies (GWAS) reported that a single nucleotide polymorphism in the PICALM gene was significantly associated with AD. PICALM (phosphatidylinositol clathrin assembly lymphoid-myeloid leukemia) is a protein that is involved in clathrin-mediated endocytosis. Due to its critical role in endocytosis, we hypothesized that PICALM might play a role in APP endocytosis and subsequent Aβ generation. Because PICALM gene deletion results in embryonic lethality, we took a gene knockdown approach using shRNA. Knock down and over expression of PICALM were performed in Neuroblastoma N2a-APP695 cells. APP internalization was measured after labeling cell surface proteins with biotin. Western blotting was used to detect internalized APP. Extracellular Aβ levels were measured using ELISA. PICALM co-localized with APP in intracellular vesicles of N2a-APP695 cells only after endocytosis was initiated. PICALM knock down in N2a-APP695 cells resulted in reduced APP internalization and Aβ generation, as measured in conditioned medium. Conversely, PICALM over expression increased APP internalization and Aβ production. In vivo, PICALM expression was altered using AAV8 viral gene transfer of PICALM shRNA or PICALM cDNA into the hippocampus of 6-month-old APP/PS1 mice. Four months later, PICALM knock down decreased PBS-soluble Aβ levels and amyloid plaque load in the hippocampus. Conversely, over expression of PICALM increased Aβ levels and amyloid plaque load. These data indicate that PICALM regulates APP internalization and subsequent Aβ generation. Therefore, PICALM may provide a novel therapeutic target for AD.

A Comprehensive Transposon Screen Reveals Universal Biofilm Effectors in Uropathogenic Escherichia coli
Alice P. Gu

Mentors: Scott J. Hultgren and Maria Hadjifrangiskou

In the urinary tract, bacterial biofilms can develop extracellularly, intracellularly and on virtually all artificial implants, producing chronic and often intractable infections. Understanding the mechanisms of biofilm development will aid in the identification of therapeutic targets for effective disruption or prevention of biofilm formation by uropathogens. Uropathogenic Escherichia coli (UPEC) account for most cases of urinary tract infections (UTI) and can form in vitro and in vivo biofilms. We used UPEC as a model organism to engage fundamental biological questions about the roles of biofilm effectors in niche establishment and pathogenesis. First, we generated a UPEC mutant library by transposon mutagenesis and screened it in multiple conditions for factors that influence biofilm formation, including biofilm assays using luria broth and Yeast Extract/Casamino Acids (YESCA) broth. We identified 180 mutants with altered biofilm properties, of which 66 were defective in every condition tested. Using a genetic approach, mapping 57/66 transpositions identified 41 factors, the disruption of which affects UPEC biofilm formation in all conditions tested. We categorized these universal biofilm factors into 6 categories: flagellar components, extracellular adhesive fibers, exopolysaccharide formation, cell maintenance, regulators, and hypothetical. We then characterized the corresponding mutants from each class, testing their ability to swim and to form adhesive organelles such as Type 1 pili and curli, factors which have previously been associated with in vivo biofilm formation and UPEC virulence. Our findings revealed mutants, including Tn::yfiLRNB, Tn41::ylbF and Tn97::rfe, that had novel, significant defects in swimming motility and adhesive organelle formation and may also be defective in their ability to cause infection. More importantly, the contribution of these mutants in UPEC pathogenesis has not been investigated. We are currently investigating the role of these 3 factors in UPEC pathogenesis. Collectively, these studies identified important factors involved in biofilm formation in UPEC that could play various roles in the establishment of infection.
ROLE OF BONE MESENCHYMAL STROMAL CELLS AND ABNORMAL BONE MATRIX IN PROMOTING INCREASED OSTEOCLAST FORMATION AND BONE RESORPTION IN Brtl OSTEOMEGENESIS IMPERFECTA MICE
Matthew Kwong

Mentor: Philip Osdoby

Osteogenesis Imperfecta (OI) is an inherited disorder of collagen that causes reduced bone mass, increased numbers of bone resorbing osteoclasts (OCs), and brittle bones prone to fracture. We used heterozygous Brtl OI mice, which contain a glycine substitution (G349C) in half of their type I collagen α1(I) chains and exhibit the hallmark characteristics of human Type IV OI, to help determine the mechanism(s) responsible for this increase in OCs. Past studies showed that the expression ratio of RANKL to OPG, key OC differentiation molecules produced by osteoblasts and their bone marrow mesenchymal stromal cell (MSC) precursors, was not altered and therefore not the reason for increased OCs in Brtl mice. Here, we isolated and directly co-cultured wild-type (WT) or Brtl bone marrow MSC populations with WT or Brtl bone marrow pre-OC populations in the presence of VD3 to promote OC development to learn which population(s) were responsible for increased OC formation in OI. We found that co-cultures containing Brtl MSCs significantly stimulated more OC formation both on plastic and on a bone substrate compared to WT MSCs, regardless of the pre-OC origin. This strongly indicates that MSC-derived regulatory signals dictate the extent of OC formation and bone resorption. Consistent with this, RT-PCR microarray analysis revealed substantial differences between Brtl and WT in the expression of various key signaling molecules by MSCs. Moreover, while we found that the abnormal bone matrix produced by Brtl MSCs does not affect OC development in terms of size and number, it may independently contribute to the elevation of bone resorption seen in Brtl OI mice. Deciphering the molecular mechanisms responsible for increased bone loss in OI brittle bone disease may reveal new targets for the future development of more effective therapies to combat OI bone fragility.

ASSESSING THE ROLE OF QUANTITATIVE VARIATION IN THE ADAPTIVE CYANOGENESIS POLYMORPHISM IN WHITE CLOVER (TRIFOLIUM REPENS)
Joseph Lampe

Mentor: Kenneth Olsen

A major goal of evolutionary biology is to understand the underlying genetics of ecologically adaptive traits. The polymorphism for cyanogenesis (the production of hydrogen cyanide in response to tissue damage) that occurs in Trifolium repens is a useful model system for understanding how an adaptive polymorphism is maintained in natural populations. However, previous studies have examined this polymorphism solely in qualitative terms, i.e., the presence or absence of the underlying cyanogenic components, which may lead to inaccurate conclusions regarding the targets of selection and mechanisms of adaptation. Here we develop a semi-quantitative measure of HCN production and use this method to investigate both how quantitative variation in cyanogenesis correlates with gene copy number variation at two underlying cyanogenesis genes, and how quantitative variation is distributed geographically. We use a pedigree of molecularly well-characterized individuals to correlate variation in quantities of two cyanogenic components (cyanogenic glucosides and their hydrolyzing enzyme) with gene copy number variation at their two corresponding loci (CYP79D15 and Li). Further, we examine quantitative variation in HCN production in individuals collected across a latitudinal transect in the central U.S. to provide insight into the mechanism of local adaptation in wild populations. This study finds that quantitative variation in both the enzyme and the cyanogenic glucosides is highly heritable and that gene copy number has additive effects on HCN production. Furthermore, there are significant differences between populations in HCN production, but the production levels do not entirely fit with the clinal distribution predicted by allele frequencies alone. These results reveal subtleties in selection pressures that are not apparent through qualitative phenotype analysis alone, and they suggest that the target of selection may be more complicated than formerly assumed in the cyanogenesis system.
Dendritic cells (DCs) play a key role in the mucosal immune response, activating and inducing gut-homing in naïve T Cells, and inducing class switch in naïve B Cells. These actions are mediated in great part by signaling via retinoids—Vitamin A derivatives produced from dietary beta-carotene and/or retinyl ester. The importance of Vitamin A has long been established, but only recently have DCs been identified as important to its processing. In this study, we demonstrate that DCs isolated from the lamina propria of mice express a range of proteins necessary for the interconversion and processing of various retinoids and that they do indeed demonstrate these abilities in vitro and in vivo. Among DCs, it was a particular subset characterized by the expression of CD103+ that demonstrated this retinoid-processing capacity. These CD103+ DCs were shown to be the subset involved in B Cell class switch to become IgA producing plasma cells, and their retinoid-processing ability was shown to be augmented with retinoid treatment both at both the gene and functional levels. CRBPII and RALDH2 were identified as two key proteins necessary for this RA processing. We also identified α4β7 integrin as necessary for DC migration to the intestinal epithelium; the expression of this integrin is known to be selectively imprinted through RA signaling. Our results show that CD103+ DCs are a key player in Vitamin A processing in the intestine and that retinoids are important to their function in promoting the adaptive immune response.

The p19ARF tumor suppressor is well known for its role as an upstream regulator of p53-dependent cell cycle arrest and apoptosis. Studies have elucidated ARF's role as a cell growth regulator independent of the p53 pathway in mouse embryonic fibroblasts (MEFs). In order to examine ARF's role in cellular growth independent of p53, it is important to uncouple cellular growth and cellular division. Thus, post-mitotic, bone-resorbing osteoclasts (OCs) were chosen as a system in which to study ARF's role in growth regulation. Bone marrow macrophages (BMMs) were harvested from wild-type and Arf-/- mice and differentiated in vitro into mature osteoclasts. TRAP-staining osteoclasts after 5 days allowed for the assessment of osteoclastogenesis. Real-time PCR and Western blots were also used to assess osteoclastogenesis. We also determined rates of protein synthesis between wild-type and Arf-/- BMMs, preOCs, and OCs to determine if accelerated osteoclastogenesis was a result of enhanced protein production. Finally, wild-type or Arf-/- bone marrow was injected into lethally-irradiated wild-type mice to determine if ARF loss has an in vivo effect on osteoclast activity. These mice were then assessed by vivaCT scan to quantify bone resorption. Arf loss resulted in an increase in size and number of osteoclasts, accelerated osteoclastogenesis, and as a result, increased osteoclast activity in vivo should be observed. This study marks new characterization of ARF's role in post-mitotic cells and serves to broaden our understanding of diseases such as osteoporosis and osteolytic bone metastasis.
RNAi, an evolutionarily conserved mechanism for gene silencing at the RNA level, offers enormous potential for functional genomics research and for designing a whole new class of medicine to alleviating human suffering from a broad range of diseases. However, the cell membrane is a key barrier for siRNA molecules both as a research technology as well as for siRNA-based therapeutics. Surprisingly, very little is known about the mechanisms underlying cell uptake of siRNAs. This thesis project was undertaken to research this key issue of broad theoretical and practical implications.

To investigate siRNA uptake in cancer cells, a cancer cell line and a normal cell line were compared. NCM460 is comprised of immortalized cells obtained from a non-cancerous human colon, while SW480 cells are from human colon cancer tissue of the same section of colon as the NCM460 cells. The siRNAs were applied either directly as naked siRNA or transfected with lipofection. Because of the high metabolic needs and high mutation rate of a cancer cell, I hypothesize that cancer cells may uptake siRNA at a faster rate than similar normal cells.

The cells were examined with flow cytometry to visualize and quantify the results. The flow cytometry data shows that both cell lines were roughly equal in fluorescence in the Lipofectamine samples and showed a time-dependent increase in fluorescence. These data suggest that both cell lines can uptake siRNAs approximately equally in the presence of lipofectamine.

My experiment showed significant fluorescence uptake by the NCM460 cells within 2 hours after naked siRNA molecules are added. This result suggests that normal cells uptake naked siRNA molecules significantly.
Investigation of Fourth Chromosome Reporter Expression

Perry Morocco

Mentors: Sarah C.R. Elgin and Nicole C. Riddle

Cells must be able to silence and activate lineage-specific genes. In Drosophila melanogaster, this process is controlled in part by Polycomb (Pc) and trithorax (trx) group proteins. Among other targets, Pc group proteins act upon homeotic genes to maintain a silenced genetic state, while trx group proteins act upon these same genes at different developmental times and cell types to activate them. We have available a set of reporter transgenes which show a red eye when inserted into euchromatin but a variegating eye (partial silencing) when inserted into heterochromatic domains. The majority of the reporters inserted into the small fourth chromosome variegate, as anticipated for a largely heterochromatic domain controlled by the HP1a system, whose silencing system is independent of Pc. When investigating the chromatin environment of fourth reporters using data produced by the modENCODE consortium, we observed a correlation between the insertion site of \( P \)-element reporter lines showing a red eye and domains enriched for Polycomb protein. We hypothesized that Pc or trx group proteins might control gene regulation for red-eyed fourth chromosome reporters. I introduced mutations in Pc and trx group genes into several reporter strains to determine how reporter expression would be affected. Only mutations in \( ash1 \), encoding a trx group protein with histone dimethyltransferase activity, consistently decreased expression from red-eyed fourth chromosome reporters. I then tested whether the observed trend represented a global effect on gene expression or was unique to fourth chromosome reporters. I discovered that the effect of the \( ash1 \) mutation extends to reporters in addition to those on the fourth but is highly dependent on the insertion site of the transgene reporter. My current work includes chromatin immunoprecipitation experiments and additional genetic analyses using double-mutants. Preliminary results indicate that \( ash1 \) mutations are capable of influencing the transcriptional state of red-eyed and variegating reporters on numerous chromosomes.

Bone Marrow Transplantation Increases Efficacy of Central Nervous System-Directed Enzyme Replacement Therapy in the Murine Model of Globoid Cell Leukodystrophy

Elizabeth Y. Qin

Mentor: Mark S. Sands

Globoid cell leukodystrophy (GLD), or Krabbe disease, is an autosomal recessive, neurodegenerative disease caused by the deficiency of the lysosomal enzyme galactocerebrosidase (GALC). In the absence of GALC, the toxic metabolite psychosine accumulates in the brain and causes the death of the myelin-producing cells, oligodendrocytes. Currently, the only clinically approved therapy for GLD is hematopoietic stem cell transplantation using bone marrow (BMT) or umbilical cord blood. However, these are only partially effective. Previous studies have shown that enzyme replacement therapy (ERT) provides some therapeutic effect in the murine model of GLD, the Twitcher mouse. Experiments have also shown that two disparate therapies can produce synergistic effects when used together. The current study tests the hypothesis that BMT will increase the therapeutic effects of ERT when these two treatments are combined in neonatal Twitcher mice.

Twitcher mice were treated with either ERT alone or both ERT and BMT during the first 2-4 days of life. In animals receiving ERT, either alone or in combination, enzyme was delivered by intracerebroventricular (ICV) and intrathecal (IT) injections. The experimental and control animals were assessed every 5 days for body weight and motor function (rotarod and wire hang performance), as well as for lifespan. Several mice from each group were also analyzed for GALC activity in the brain. Twitcher animals receiving ERT showed supraphysiological levels of GALC activity in the brain 30 hours after injection. Twitcher mice treated with both ERT and BMT also showed significantly increased motor function and lifespan compared to untreated and ERT-treated Twitcher mice. Together, these results indicate that BMT enhances the efficacy of ERT in globoid cell leukodystrophy.
Podokinetic stimulation shifts perception of straight ahead
John Thomas Scott

Podokinetic after-rotation (PKAR) is a phenomenon in which subjects inadvertently rotate when instructed to step in place after a period of walking on a rotating treadmill. PKAR has been shown to transfer between different forms of locomotion but has not been tested in a non-locomotor task. The study consisted of two experiments to assess effects of PKAR on perception of subjective straight ahead and on quiet standing posture. Twenty-one healthy young right-handed subjects pointed to what they perceived as their subjective straight ahead with a laser pointer while they were recorded by a motion capture system both before and after a training period on the rotating treadmill. Subjects performed the pointing task while standing, sitting on a chair without a back, and sitting on a chair with a back. After the training period, subjects demonstrated a significant shift in subjective straight ahead, pointing an average of 29.1 ± 10.6 degrees off of center. The effect was direction-specific, depending on whether subjects had trained in the clockwise or counter-clockwise direction. Postures that limited subjects’ ability to rotate the body in space resulted in reduction, but not elimination, of the effect. These results were consistent with those obtained from studies where subjects stepped on an inclined plane to induce an after effect. The effect was present in quiet standing and even in sitting postures where locomotion was not possible. The robust transfer of PKAR to non-locomotor tasks, and across locomotor forms as demonstrated previously, is in contrast to split-belt adaptations that show limited transfer. Therefore, it is proposed that, unlike split-belt adaptations, podokinetic adaptations are mediated at supraspinal, spatial orientation areas that influence spinal-level circuits for locomotion. A model is proposed that accounts for the different effects that are observed from PKAR and split-belt adaptations.

Unique TGFβI fragment in granular corneal dystrophy types 1 and 2
Austin Sim

Granular Corneal Dystrophies (GCD) are part of a larger class of hereditary disorders that are characterized by bilateral granular opacities and erosion of the cornea, which interfere with normal vision. Specifically, GCD Types 1 and 2 are associated with the deposition of non-amyloid aggregates of the R555W and the R124H mutants of transforming growth factor β1-induced protein (TGFβIp), respectively. Although this disease has been mapped to a specific protein product, the specific components responsible for the pathology of the deposits remain unknown. As such, this study attempts to identify unique TGFβIp products that could be responsible for the pathogenesis of GCD.

Recombinant TGFβIp corresponding to the wild type (wt), and three different mutants (R124C, R124H, and R555W) were collected as both secreted protein samples and cell lysates from transfected HEK293FT cells, which were then put through immunoblot analysis using four different commercial antibodies raised against different portions of the wt TGFβIp. Despite the fact that these proteins are prone to aggregation in vitro, results showed that they had different reactivities with respect to the different antibodies. One in particular was able to detect a unique 35 kD fragment only in lysate samples of R555W and R124H.

Based on these results, the fragment of interest is most probably a degredation product from the central portion of TGFβIp in the two mutants associated with GCD and may play a role in forming the non-amyloid granular deposits that are the hallmark of GCD. Since this fragment is unique to these mutants, it can potentially be used as a molecular marker of GCD to differentiate it from other TGFβIp corneal dystrophies.
Gene Expression Profiling of Archival Tumors from the Collaborative Ocular Melanoma Study: Association with Clinical Outcomes

Aeron Small

Mentor: William Harbour

Uveal melanoma is the most common primary cancer of the eye. While there exist multiple treatment options to remove or destroy the primary ocular tumor, about half of patients develop metastatic disease, often in the liver, which is almost always fatal. We have previously developed a 15-gene PCR assay that can accurately assess the risk of metastasis for primary tumors. While this test has been positively evaluated on fine needle aspirate biopsy (FNAB) samples, there are no data to confirm whether our test can accurately classify formalin fixed, paraffin embedded (FFPE) archival samples. Such an analysis is of particular importance for uveal melanoma patients who had the affected eye removed, but fresh tissue could not be obtained. Here, in collaboration with the Collaborative Ocular Melanoma Study (COMS), we evaluate the accuracy of our 15-gene PCR assay on 117 archival COMS FFPE samples along with an additional 46 more recent FFPE samples collected at Barnes Jewish Hospital over the past ten years. Our results indicate a reduced accuracy of classification observed in FFPE samples compared to the original larger study of FNAB tumor samples. This reduction was tied to the misclassification of a handful of Class 2 tumors. We explore the possibilities that tumor heterogeneity and RNA degradation by FFPE might be the underlying factors obscuring the accuracy of our test and conclude that the RNA degradation is likely the dominant force responsible for the misclassifications observed.

Spatiotemporal Distribution of the VIP Receptor, VPAC2R, in the Suprachiasmatic Nucleus

Connie Tsai

Mentor: Erik D. Herzog

The suprachiasmatic nucleus (SCN), the master circadian pacemaker in mammals, is located in the hypothalamus. SCN neurons must synchronize their circadian rhythms to coordinate daily rhythms in physiology and behavior. Vasoactive intestinal polypeptide (VIP) is a candidate synchronizing factor implicated in the maintenance of circadian rhythms and entrainment to external cues. SCN neurons release VIP in a circadian manner and both VIP and its cognate receptor, vasoactive intestinal polypeptide receptor 2 (VPAC2R), are necessary to maintain synchrony among SCN neurons. We found that daily VIP application to organotypic SCN slices entrains Period2 expression with a phase response curve that accurately predicts the time and rate of entrainment. Based on previous reports of diurnal variation in Vipr2 mRNA levels, we hypothesized that the time-dependent differential response to VIP was due to changes in VPAC2R expression. We, therefore, sought to characterize the spatiotemporal expression of VPAC2R protein in the brain. We immunolabeled coronal sections of C57BL/6 mice brains with a new antibody specific to VPAC2R and observed low VPAC2R expression throughout the rostral to caudal extent of the SCN with higher intensity staining in the dorsal regions. VPAC2R was primarily expressed on the cell body and dendrites of neurons and colocalized with a variety of cell types, including arginine vasopressin and VIP neurons, in the SCN. The receptor abundance and regional localization in the SCN did not change, however, with time of day in a 12 hour-12 hour light-dark cycle or in constant darkness. These results suggest that VPAC2R is broadly expressed among SCN neurons throughout the day so that it is well positioned to mediate circadian synchrony among SCN neurons.
**Dissection of the Role of K\(_{\text{ATP}}\) in Early Reperfusion Arrhythmogenesis**  
*Keita Uchida*

**Mentor: Colin G. Nichols**

ATP-sensitive K\(^+\) (K\(_{\text{ATP}}\)) channels are densely expressed throughout the heart and couple metabolic activity with cellular electrical activity by opening of low [ATP], high [ADP] ratios. Cardiac K\(_{\text{ATP}}\) channels have been thought to be composed of Kir6.2 and SUR2A subunits, but recent work has shown that SUR1 subunits are actually the predominant SUR isoform in the mouse atria. Functionally, sarcolemmal K\(_{\text{ATP}}\) channels have been shown to activate in ischemic conditions to shorten action potential duration (APD) and can play a role in arrhythmogenesis. The roles of various K\(_{\text{ATP}}\) subunits in the response to ischemia-reperfusion were examined in isolated hearts from mice with genetic manipulation of K\(_{\text{ATP}}\) subunit. Langendorff-perfused hearts from WT, Kir6.2 knockout (Kir6.2\(^{-/-}\)), SUR1\(^{-/-}\) and αMHC-cre driven gain-of-function Kir6.2\(\Delta\)N30,K185Q (GOF) mice were subjected to global ischemia and reperfusion. During the control period, the GOF mice displayed a significantly prolonged PR interval (44.8ms) compared to the WT mice (38.4ms). There was a significantly greater PR prolongation after 5 minutes of ischemia in Kir6.2\(^{-/-}\) (from 43.0ms to 104.2ms) and SUR1\(^{-/-}\) hearts (from 42.3ms to 105.2ms) than in WT (54.7ms) or GOF hearts (49.7ms). After reperfusion, fewer incidences of ventricular tachycardia were found in Kir6.2\(^{-/-}\) (1 of 9) hearts than in WT (4 of 8), SUR1\(^{-/-}\) (5 of 8) and GOF (2 of 5). GOF hearts had more incidences of premature ventricular beats following reperfusion for longer duration compared to WT suggesting that K\(_{\text{ATP}}\) activation may play a role in the regulation of non-atrial pacemaker activity and in the generation of ectopic beats. Taken together, the results demonstrate a role for SUR1 and Kir6.2 subunits for maintaining atrioventricular conduction time during the initial phase of ischemia and for ventricular K\(_{\text{ATP}}\) in arrhythmogenesis during reperfusion in globally ischemic hearts.

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**Mmp-9 Attenuates Amyloid Plaque Pathogenesis in APP/PS1 Mice**  
*Yan Wang*

**Mentor: Jin-Moo Lee**

Alzheimer’s disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline, memory loss, and ultimately death. One of the pathological hallmarks is the accumulation of amyloid plaques. Plaques are primarily composed of tightly aggregated amyloid beta (Aβ) fibrils, which are thought to be resistant to degradation and clearance. However, we have previously found that some proteases are capable of degrading not only the Aβ peptide but Aβ fibrils as well. One of these proteases, matrix metalloproteinase-9 (MMP-9), is expressed in activated astrocytes surrounding amyloid plaques, but not in quiescent astrocytes of control mice. In this study, we examined the relationship between MMP-9 expression and plaque pathogenesis in vivo by deleting the mmp-9 gene in APP/PS1 mice (a mouse model of AD). To assess plaque pathogenesis at early and later stages, mice were sacrificed at 6 and 8 months of age. APP/PS1 mmp9\(^{-/-}\) mice had significantly greater plaque deposits in the cortex and hippocampus than APP/PS1 mmp9\(^{+/+}\) mice at 8-month but not at 6-month of age, suggesting that initial plaque appearance was not affected by mmp9 deletion, but later plaque accumulation was. Mmp-9 gene deletion also altered the distribution of plaque sizes; APP/PS1 mmp9\(^{-/-}\) mice had more large sized plaques than APP/PS1 mmp9\(^{+/+}\) mice. Although the number of astrocytes in mice of both genotypes was similar, astrocytes in APP/PS1 mmp9\(^{-/-}\) mice were smaller, contained fewer primary processes, and exhibited markedly diminished plaque infiltration. These results suggest that MMP-9, expressed in activated astrocytes surrounding plaques, may play a role in limiting plaque growth. Moreover, the effect of gene deletion on astrocyte interaction with plaques suggests that close contact between astrocytes and plaques may be important for this activity.
The Influence of Social Cues on Feeding Behavior in Drosophila melanogaster

Eliana D. Weisz

Mentors: Angie LaMora and Yehuda Ben-Shahar

The relationship between individuals within groups and the collective action of organisms in nature has long inspired scientific inquiry. One goal of the Ben-Shahar lab is to understand the mechanism by which individual behaviors are coordinated to result in collective decision-making. My research project studies the extent to which the process of social cognition regulates feeding choices in the fruit fly Drosophila melanogaster.

Inspiration for this project comes from prior knowledge that many animals living in groups communicate about the location of resources such as food. This communication is advantageous when resources are scarce. Further, it has been shown that social insects such as ants, termites, and some species of bees and wasps have evolved signaling mechanisms to disseminate information to locate food sources. Drosophila melanogaster is an excellent model organism for the study of complex behaviors such as learning and memory, courtship, and food search. Drosophila food search behavior entails groups of flies swarming around and aggregating on food. Previous studies have demonstrated that adult flies do not sample all available food resources when making feeding decisions, suggesting that interactions between flies may influence feeding behavior.

We hypothesized that Drosophila melanogaster use the feeding patterns of other conspecifics to inform their own feeding decisions. To test this hypothesis, I implemented several different variations of behavioral assays in which flies were given a choice between food previously exposed to other flies and novel food. Additionally, I conducted experiments to determine whether flies feeding in the same environment tend to disperse or whether they cluster and feed in groups. The results of my experiments agree with previous studies in that they suggest that flies do not appear to feed randomly. Moreover, my data suggest that there are differences between the feeding patterns of males and females. These studies contribute to our understanding of the influence of social cues on feeding behavior in flies and demonstrate the utility of this model system in the study of complex behaviors.

Comparing the Effects of Invader4 with 1360 on Heterochromatin Targeting

Hao Yang

Mentor: Monica Sentmanat

Position Effect Variegation (PEV) in Drosophila, characterized by stochastic silencing of a gene in some of the cells where it is typically active, is associated with heterochromatin formation. Previous experiments have shown an enhancement of PEV at reporters flanking pericentric heterochromatin and in the fourth chromosome in the presence of 1360, a DNA transposable element. These findings suggest that 1360 might be a target for heterochromatin formation, but only effective in repeat-rich regions of the genome. While the 1360 element has been shown to be effective in supporting heterochromatin formation in this assay, the impact of other transposable elements is still unknown. Thus, this study aims to determine whether enhancement of heterochromatin formation is a phenomenon specific to 1360, or whether an unrelated transposable element such as the Invader4 retrotransposon can induce similar effects.

In this study, I aimed to explore the effects of the retrotransposon Invader4 at 1360-sensitive genomic loci. Lines with an appropriate landing-pad construct, a 1360 containing P-element capable of undergoing ϕC31-mediated cassette exchange, inserted in different genomic regions in Drosophila melanogaster, were recovered from screening. The phiC31-mediated cassette exchange technique was then used for site-specific integration of donor constructs that swap Invader4 for 1360 at sites of interest. Here we show that Invader4 also supports heterochromatin formation at 1360-sensitive sites. In addition, the lines were analyzed for suppression or enhancement of PEV in the presence of second-site mutations known to affect 1360-sensitive PEV. The results indicate comparable pigment levels between Invader4 lines and the corresponding 1360 lines. This initial study suggests that an alternative transposable element can support heterochromatin formation at 1360-sensitive sites, and supports the idea that both DNA transposons and retrotransposons are silenced by a similar targeting mechanism.
Testing the Hygiene Hypothesis: The Role of Bacteria in Promoting Atopy in a Mouse Model of Atopic Dermatitis

Laura Yockey

Mentor: Raphael Kapan

The prevalence of asthma and other allergic diseases has increased significantly in the last 30 years. One of the proposed mechanisms for this trend posits that an over-emphasis on hygiene and increased use of antibiotics results in decreased exposure to bacteria during the early years of life which leads to increased risk of allergic disease. This is referred to as the "Hygiene Hypothesis." One of the allergic diseases that is on the rise is atopic dermatitis (AD). AD is an allergic inflammatory skin disease that affects over 17% of children in the United States. We have generated a mouse model of AD that lacks Notch signaling in the skin. These mice show many of the hallmarks of AD including skin inflammation, systemic allergic bias, and an increased susceptibility to asthma. To assess the role that bacteria play in altering the severity of the atopic response, we re-derived our Notch signaling-deficient mice into a germ free facility.

The Notch signaling-deficient germ free (GF) mice showed an increased and more variable level of cytokines associated with allergic inflammation and a higher bias towards Th2 cells compared to their conventionally-raised (CR) counterparts. However, these mice did not develop higher serum IgE levels or a significantly more severe skin inflammation. In addition, GF animals responded to asthma challenges similarly to their CR counterparts. Based on these findings, we conclude that although lack of bacteria leads to a more pronounced Th2 bias in mice with Notch-deficient skin, this bias does not translate to more severe symptoms of allergic disease.

On Hope: Subjectivity, Freedom, and Oppression in Three Manifestations of the Faustian Tradition

Maxwell Woods

Mentor: Stephan Schindler

Just prior to the seventeenth century, the story of the scientist Johann Faustus was transformed into a legend which would transcend the Lutheranism and transitory period in which it was generated. From the foundational chapbook in which the story was originally published, the story of Doctor Faustus would become the basis for three influential works of the capitalist epoch: The Tragicall History of Doctor Faustus by Christopher Marlowe, Faust by Johann von Goethe, and Doktor Faustus by Thomas Mann. The development of this legend, first published in 1587 and still varied up until today, coincided hand in hand with the development of the capitalist mode of production. Along with the birth of the Faustian legend, the human subject and the concept of freedom were redefined in the midst of capitalism. This work analyzes how freedom and the human subject function in each of these three particular versions of the Faustian legend. The works are chosen not only because they are canonical adaptations of the Faust story, but because each represents a separate era in the Faustian tradition—early religious Faustus, the heroic Faust, and the return of the tragic Faustus—and in capitalism—the transition into capitalism, the rise of the bourgeoisie, and the rise of fascism. In analyzing a specific literary tradition's line of development, I come to the following conclusions regarding the human subject and freedom: 1.) Freedom is a historical and dialectical concept which is intrinsically intertwined with the concept of oppression. That is, the idea of freedom changes in each historical epoch and one cannot have freedom without oppression. 2.) The human, bourgeois subject, while being necessary to the historical epoch in which it was developed, must be abandoned.
The oceanic subsurface biosphere houses a diverse but poorly characterized microbiota. Particularly lacking is information on biota away from hot hydrothermal vents. Mixing of basement fluids (63°C, 250 bar, reducing) from the Juan de Fuca Ridge flanks with seawater (2°C, 250 bar, oxidizing) was modeled in Geochemist's Workbench®. Thermodynamic data at elevated temperature and pressure were used to compute Gibbs free energies of reaction of potential microbial metabolisms involving S, C, H, N, O, Fe, and Mn chemical species. The oxidants O₂, Mn⁴⁺, and NO₃⁻, and the reductants H₂, NH₄⁺, acetate, and lactate, yield the most energy per kg fluid. Reactions involving dissolved Fe are favorable but yield little energy. Several chemolithoautotrophic metabolisms are favorable enough to be supported at the site. Differences from typical oxidant use depth profiles in natural systems suggest that oxidant use sequence may be chemistry-dependent.

Spring-derived tufa deposits, widespread in the Quaternary sedimentary record, are demonstrated archives of paleoclimatic information. However, the nature of the transfer functions relating tufa chemistry to paleoenvironment may vary with both time, space, and, confoundingly, climate. In order to examine geochemical variation in tufas across a range of climatic conditions, we analyzed the stable isotope (δ¹⁸O and δ¹³C), minor element (Mg/Ca), and trace element (Sr/Ca, Ba/Ca) geochemistry of modern tufas from the Mopan River, Belize (tropical), the Krka River, Croatia (temperate), and Pleistocene tufas from Kharga Oasis, Egypt (arid to semi-arid). Significant correlations exist between these geochemical parameters, but trends are not consistent in the three field locations. Covariance trends are most similar in the Egyptian and Croatian tufa data. Spatial variability in carbonate geochemistry was evaluated in the Belizean and Croatian tufas. The Belizean tufas demonstrate negligible along-flow variation in tufa geochemistry, which suggests that their chemistry may be controlled predominantly by climate. The Croatian tufas exhibit larger, potentially significant along-flow variation. This high variance in tufa geochemistry is likely caused by rapid CO₂ degassing, calcite precipitation, and evaporation at the numerous waterfalls along the Krka River. Spatial evolution of tufa geochemistry could not be assessed from the Egyptian tufa samples; these samples are all from fossil systems and, in addition to spatial variation, record a significant amount of temporal variation. The range of variation in the Egyptian data is much larger than that in the Belizean and even the Croatian tufa datasets, which suggests that the geochemistry of the Egyptian tufas represents both "noise" (i.e., along flow processes) and fundamental climatic controls.
Acquisition, Analysis, and Modeling of Emission Data for Gypsum Deposits in White Sands National Monument, and Implications for Separation of Mineralogical and Textural Parameters

Kirsten Leigh Siebach

Mentor: Raymond Arvidson

Emission spectroscopy of particulate minerals is governed by the mineralogical and textural characteristics of the observed sample. The gypsum sand dunes at White Sands National Monument are uniquely adapted for spectrologic investigation because the mineralogy of the dunes is homogeneous, but eolian and hydrologic processes differentiate a variety of textural regimes across each dune. This study uses 2-20 µm spectral radiance data collected with field spectrometers at 17 sites along a dune traverse at White Sands, in conjunction with a Hapke radiative transfer model, to characterize the textural contributions to emission spectra. The semi-empirical Hapke radiative transfer model is used with gypsum’s refractive indices, assumed isotropic reflection, and lab measurements of site grain sizes and maximum porosities to indicate that sample porosity has a much stronger effect on spectral character than grain size. Comparison of Hapke model spectra, field spectra, and library spectra confirms that the mineralogy of the site is homogeneously gypsum, so the spectral differences between sites result from textural variations. The grain size is shown to have minimal effects on the emission spectra, indicating that the sand-sized particles are large enough in all regimes to act as Fresnel emitters. The spectral variation between sites is correlated most strongly to the degree of induration or crustiness of the surface, with the most indurated surfaces producing the deepest band depths. This can be applied to the determination of textural characteristics of remotely sensed planetary bodies, for example the north polar gypsum erg on Mars and dunes in the path of the Opportunity Mars Exploration Rover.

Spectral Reflectance of Gypsum Sands, White Sands National Monument: Baseline for Monitoring Landscape Evolution Due to Greenhouse Warming

Stephanie Spera

Mentor: Raymond Arvidson

The extensive gypsum eolian dune field at White Sands National Monument, New Mexico, is ideal for monitoring the extent to which the landscape becomes more arid as the region becomes warmer and dryer over the next several decades due to greenhouse warming. The areal extent of the dune field should expand and the interdune areas should become drier as the perched water tables lower. Further, the mono-mineralogical nature of the field makes mapping of textural changes within the dunes and interdune areas feasible using reflectance spectroscopy. This study seeks to establish a baseline set of spectral reflectance measurements for these future global monitoring studies. In August 2010, samples, images and reflectance field spectra (0.4 to 2.5µm spectra) were taken at 17 sites along an interdune-transverse dune traverse. Grain size and porosity were determined in the laboratory along with microscopic images of grain textures and shapes. Lab spectra were also acquired after drying the samples. Hapke’s bidirectional reflectance model was used with gypsum’s optical constants and textural parameters to replicate the field spectra. The model replicates the general shape of the field spectra but only accurately replicates band depths of the interdune data. Gypsum is extremely soft and quickly anneals in water. The sand on the active dune exhibit frosted surfaces due to repeated impacts by saltating grains. The frosting produces Fresnel reflections that the Hapke model cannot replicate. The interdune areas are often damp and lead to annealing of grain surfaces to produce translucent particles and spectra that can be modeled. As the region becomes warmer and drier the water table will lower and the ability of the system to anneal grains will decrease. Thus the dune field should not only expand but also brighten overall.
The paper seeks a general understanding of the causes of civil wars in the developing world. It first presents a theoretical framework that attempts to capture the macro-economic, ideological, and tactical aspects of a potential rebel leader’s decision to start an armed conflict. The main goals of this framework are comprehensiveness, simplicity, and testability. This model aims to explain the known stylized facts of civil war and inform the search for new ones as well as yield a general understanding of the relationship between characteristics of a state and the likelihood of civil war. Additionally, this paper attempts to provide a theoretical explanation for the pattern of rebel behavior described by Jeffrey Herbst in 2000. Recounting many civil wars that took place in Sub-Saharan Africa, Herbst notes that in weaker states, the rebels tend to pillage more resources. The model in this paper tries to account for this pattern as well as make predictions about five other variables. The predictions derived from the model are then tested against the current data in a standard pooled binary logit setting. Special attention is paid to duration dependence, which, as Beck, Katz and Tucker formally show, is a particular danger for this type of binary time series cross-sectional analysis. The results indicate that four out of five predictions are supported by the data. The main contributions of this paper are a theoretical model of civil war onset that also explains the ideas set out by Herbst and the statistical test of certain important explanatory variables with an updated dataset and accounting for duration dependence.

**Do Underwater Mortgages Make People Prisoners in Their Own Homes? An Analysis of the Impact of House Prices on Homeowner Mobility**

Selena He

Mentor: Steven Fazzari

The housing market meltdown beginning in 2006 not only triggered a financial crisis but also possibly reduced homeowners’ mobility in search of better job opportunities, contributing to a slow recovery in the labor market. This paper investigates the impact of house prices on homeowner mobility using panel data from 2004 to 2008 across the fifty states and District of Columbia. I estimate a statistically significant decrease of 9.58% in migration outflow from a state if the house price index in the state declines by 10% below its previous maximum. This result is consistent with the hypothesis that the underwater mortgage problem may slow labor market adjustment following the Great Recession.
An Examination of Private Investment in Infrastructure in Brazil, Russia, India, and China

David Klein

Mentor: Pamela Jakiela

Brazil, Russia, India, and China are widely recognized to be emerging economic superpowers. Despite their massive growth rates in recent years, these four countries still have severe infrastructure deficiencies. Since the 1990s, much of the developing world has turned to private corporations to meet its infrastructure needs. I estimate a model of private investment in four main infrastructure sectors in these countries as a function of per capita income, urbanization, and other economic and political factors that past academic literature has shown to be relevant to investment decisions. I also look at the relative sensitivities of investment in different infrastructure sectors to the host political environment and find that investments are most sensitive in the water and sanitation sectors, which historically involve the most public-private cooperation.

The Pursuit of Higher Education: Evidence from Transitional Bulgaria

Karina Kocemba

Mentor: Sebastian Galiani

This paper investigates the impact of the 1999 Amendment to the Education Act in Bulgaria to the pursuit of higher education. The reform introduced tuition fees to public universities in Bulgaria, effectively eliminating free education at the university level. I apply a probit model to data from the 1995 and 2001 Bulgaria Integrated Household Surveys to examine the impact of the reform on the probability of pursuing university education. I find that income becomes a significant positive predictor for the binary outcome of university attendance in 2001, suggesting that the introduction of tuition fees decreased access to university education for lower income households, and that educational decisions may be influenced by short run constraints.
Has the Internet and File Sharing Reduced Variety in the Music Industry?
Timothy Krah

Mentor: Bruce Petersen

The popular music industry changed following the rise of the Internet and file sharing. In economics studies, most researchers focus on the relation between file sharing and declining CD sales with a consensus that Napster and its offspring are responsible for lower industry revenues. But the sharp decline in revenues and profits is not the only major change in the industry. A potentially equally important change is a sharp decline in the entry costs for new artists, in large part due to the rise of the Internet and lower costs of quality music recording. While the sharp decline in revenues suggests that entry of new artists (and therefore new variety) may have fallen in the industry, the decline in entry costs suggests the opposite may have occurred. Thus, it is an empirical question whether the Internet and other related changes in technology have brought about a decrease or increase in variety in the industry. Using data from the Billboard charts, I find that between 1993 and 2008, there has been more than a twofold increase in the number of new artists entering the commercial music market. And in regression analysis, I find that the increasing number of Internet users in the United States and the declining prices of personal computers offer a suggestive explanation of the upward trend in musical variety. Such a result suggests that the rise of the Internet (and the decline in property rights and revenues) has not led to a decline in entry of new artists. Therefore, my results should have important implications for intellectual property law.

Incentives for the Small Entrepreneur: Effects of Public Policy on Innovation and Self-Employment
Teddy Mekonnen

Mentor: Bart Hamilton

This paper investigates how federal R&D funding, unemployment benefits, and state income taxes affect the level of small/individual-based entrepreneurial activities within a given U.S. state. To avoid endogeneity issues and dynamic panel bias, I use a dynamic System GMM model with two-step robust cluster errors. The results suggest a positive relationship between federal R&D funding and innovative entrepreneurial activities as well as a negative quadratic relationship between unemployment benefits and replicative entrepreneurship. Although state income tax levels were not statistically significant, having no state income taxes is tied to higher levels of innovative entrepreneurial activities.
**Economics**

**Do Labor Market Conditions Affect College Graduation Rates? United States as a Case**

*Henry Peng*

This paper investigates the impact of labor market conditions on college graduation rates. Using panel data of 436 four-year public colleges across the fifty states spanning five years, I examine the impact of both national and state unemployment on the difference between a school’s four-year and six-year graduation rate by cohorts. I use different models to compare the impact of both the national unemployment rate and the state unemployment rate on the graduation rates. A robust model controlling for both time and school fixed effects result in a positive relationship between both the national and state unemployment rate by bachelor’s degree and higher and the difference between a school’s four-year and six-year graduation rate. Credible assessment of the impact of labor market conditions on college graduation rates can provide important insight into what factors college students consider when graduating.

**Economics**

**Learning Initiatives in Public Schooling: How Parents Value Technology-Based Education**

*Elizabeth Rose*

Mentor: Juan Pantano

This paper explores how the introduction of technology-based learning impacts housing prices within the Middlesex District in Massachusetts. Based on the notion that parental assessment of school value is capitalized through housing prices, I utilized a district-level fixed effects model to circumvent omitted variable bias at the district level, specifically concerning neighborhood-level characteristics. My results suggest a significant rise in the housing prices following the shift to technology-based learning. Further, the paper assesses the use of the technology introduction as an instrument for test scores, which has been a critical indicator of school quality in previous literature. This paper investigates the value of a potential policy initiative while attempting to correct problems of omitted variables present in previous papers.
Economics

**English-Only Laws and English Language Proficiency: An Ineffective Public Policy**

*Daniel Weiss*

Mentor: Juan Pantano

Politicians concerned about the decline of the English language have pushed for laws declaring English the official language at both the state and federal level. While no federal legislation has passed, over the past thirty years, 25 states have declared English as their official language. This paper aims to provide one of the first empirical tests of the laws’ effect on immigrants’ proficiency in English and wages. Using census bureau data I find no significant impact of the laws on English proficiency in probit and ordered probit regressions, a small effect using a linear probability model, and no significant effect on wages from an instrumental variables regression. I also provide evidence of the exogeneity of the laws.

Education

**Examining the Relationship Between Student Engagement and Civic Engagement Through Extracurricular Activities and Service: A Review**

*David Zachary Cohen*

Mentors: William F. Tate, Anne Newman, and Rowhea Elmesky

In light of declining civic engagement and increased political polarization, this thesis explored what actions might be taken to strengthen civic engagement. In particular, the project examined several informal learning pathways to determine their indirect and direct influence on civic engagement. Processes in public schools but outside of the classroom setting were identified, including extracurricular activities, community service, and service learning. A literature search of ERIC and other research repositories was conducted to find relevant articles. My review found articles which suggested that a positive relationship exists between extracurricular participation and academic success. A relationship between extracurricular participation and positive peer networks was documented. Positive adolescent development outcomes were related to extracurricular participation. A relationship linking both community service and service learning with academic success also was found. The limitations of these conclusions were discussed. I then hypothesized about the relationship between selected student participation factors and civic engagement. Suggestions for future research were included, such as greater differentiation of extracurricular activities in survey research and more research focused on the relationship between student engagement and civic engagement.
The School-to-Prison Pipeline in the United States: Where Are We Headed—Education or Incarceration?
Judith Sarah Margolin

Mentor: Garrett Albert Duncan

This thesis examines why the United States has spent significantly more money on incarcerating its youth, rather than on educating them. In addition, this thesis examines the arguments behind the education and economic rationale of sending youth to jail in unprecedented numbers. In this study, I focus my research on the literature relating to the school-to-prison pipeline. A broad literature search was conducted, using several databases, including ERIC, Academic Search Premier, SAGE Journals Online, and the Law Journal Library. I argue that our prison system places a large swath of American youth at a distinct disadvantage and, consequently, impacts the lives of every citizen across the country. What has now become the prison-industrial complex consumes an excessive amount of the domestic budget, as more money is allocated to the incarceration of people, instead of to provisions for housing, food, and education. In this thesis, I conclude that children are at a special disadvantage, and reforms must be implemented in order to curb this trend of their incarceration, as our future as a viable nation depends on their success and future.

The Culture of Collegiate Achievement: A Comprehensive Study of the “Graduation Gap” in Higher Education
Kara Hendrickson

Mentor: Garrett Albert Duncan

One of the most troubling issues in higher education is the retention and completion of the hundreds of thousands of students who enroll in four-year colleges and universities. The method of inquiry in this thesis to study college graduation rates includes a comprehensive analysis of literatures from the fields of education and journalism and the disciplines of economics, political science and sociology. The methodology includes statistical analysis of data compiled by the National Center for Educational Statistics and trend analysis of demographics and culture on college campuses. The findings suggest that students who identify with certain racial minorities or classify themselves as low-income and first-generation students are the most “at-risk” of not graduating within four years or at all. The statistics show a distinct gap in the graduation rates between these students and the rest of the collegiate population. Data find the root of this discrepancy in achievement to be a myriad of factors, including familial background, state differences, finances, the type of institution, and prevailing attitudes on campus of students and professors. The discussion of the findings focuses on possible solutions as well as the important implications. The conclusion states that educators must continue to consider ways of erasing the gap in graduation rates through various academic and social methods.
“Writing in Bed”: Naked, Ill, and Vulnerable Selfhoods in D.H. Lawrence and Virginia Woolf

Michael Dango

Mentor: Vincent Sherry

This thesis discusses how the writings of D.H. Lawrence and Virginia Woolf foreground human vulnerability as a way of conceptualizing selfhood in opposition to identities of sexuality ascending during the modernist period. Against Freudian psychoanalysis and other professional discourses, Woolf and Lawrence use vulnerability to resist an idea of the self as autonomous, discrete, and stable. Especially in his late collection of poems, *More Pansies*, Lawrence explores vulnerability through a concept of nakedness, which opens up the self to natural and sensual influences. Lawrence’s nakedness demands social intervention, and vulnerability at once critiques and alters apparently problematic social discourses. In her extended essay *On Being Ill*, Woolf is similarly interested in how the self in illness may be a productive physical state that alters, for the better, our understanding of the world by opening up new bodily ontologies. But illness also foregrounds the feminist question of which subjects are disadvantaged by social thinking and for whom a destabilization of the subject may not be a means toward liberation at all. For Woolf, vulnerability is neither means nor end is never simply a position of critique. It requires responsiveness beyond the subject position altogether, a decentralization of the subject that does not erase it.

“A Desire to Get Something Definite”: Self-Identification Through Commodities in Fitzgerald’s This Side of Paradise

Anne Kainic

Mentor: Dirk Killen

This essay investigates the creation of identity as informed by the values and practices of early 20th century American capitalism. Amory Blaine, the central figure of F. Scott Fitzgerald’s first novel, *This Side of Paradise* (1920), identifies himself through commodities in order to establish a definite valuation of himself that can be easily communicated to others. By communicating his personal value, he hopes to draw social admiration from those with whom he interacts. The consequence of this mode of self-identification is that, being unable to define himself outside of the realm of commodities, Amory isolates himself within them and is incapable of establishing long-lasting relationships. In turning to Marx and the later Marxist theories of primarily Baudrillard, Sohn-Rethel, and Žižek, as well as the literary critiques of Godden and the historical analysis of Trachtenberg, this essay situates Amory’s journey within the framework of capitalism in order to understand how a culture of consumption results in “inhuman” human beings (Baudrillard). The first chapter establishes the model by which we can understand Amory’s development, the second chapter analyzes the consequences of adhering to this model, and the third chapter investigates in greater detail the failure of Amory’s most meaningful romantic relationship in order to understand the problems that arise from purely commodity-oriented self-identification.
The Words Which Come Through Them: Non-Speech and Referentiality in the Drama of Harold Pinter

Eli Keehn

Mentor: Julia Walker

This project examines the language of the British playwright Harold Pinter, known for his frequent use of pauses and silences within the scripts of his plays and for the circuitous and tangential nature of his spoken dialogue. In the years surrounding the first productions of Pinter’s works, critics were unable to elucidate how his language functioned, other than to say that it was not referential. In 1975, Austin Quigley’s The Pinter Problem introduced the idea that the language of the plays, rather than working referentially, instead actively constructs relationships among characters; he calls this notion the “interrelational function of language,” and in the years since the publication of his study, it has become accepted as the most accurate and rewarding lens through which to view and analyze Pinter’s dialogue. In advancing the interrelational function, however, Quigley denigrates readings which rely upon referential interpretations of the language, arguing that such analyses are not grounded in any concrete, textual evidence.

My close readings of Pinter’s early dramatic works extend the concept of the interrelational function of language beyond spoken dialogue into the elements of the plays which I categorize as “non-speech”: scripted pauses and silences, the act of listening to another character speak, and the subtextual information which is referred to by explicitly stated dialogue. I demonstrate how these moments contribute to the construction of relationships, and I recuperate the idea of referentiality from Quigley, illustrating that interrelationality and referentiality cannot in fact be cleanly separated from one another.

Critiquing the Postmodern: Fredric Jameson and the Problem of Distance

Kevin Stephenson

Mentor: Wolfram Schmidgen

This paper seeks to investigate the form and methodology of Fredric Jameson’s attempt to grapple with the postmodern in his influential Postmodernism, or, The Cultural Logic of Late Capitalism. Jameson attempts in various ways to establish critical distance from the contemporary cultural reality he calls postmodernism, a term he uses to describe a multitude of cultural characteristics ranging from an emphasis on surfaces to a schizophrenic sense of time. Through analysis of several prominent methodological and formal choices—namely his decision to periodize, his focus on a vast array of examples, his employment of the hermeneutical model of manifest and latent content, and his eventual gesture toward the Lacanian Symbolic—I will demonstrate that Jameson does not achieve such critical distance but rather that these choices work to intimately articulate the postmodern. I will show that his eventual move to the Symbolic demonstrates an openness toward a new form of embedded critique more appropriate for a truly dialectic view of the postmodern. With hesitation, Jameson’s work eventually suggests a new form of dynamic criticism that forgoes the ideological distance previously necessary, recognizing the loss of critical depth and the gain of a liberating dynamism in its immersion in the postmodern.
“The Uncreated Conscience of My Race”: The Harlem Renaissance Künstlerroman

Victor Thomas

Mentor: William Maxwell

The Künstlerroman, the subgenre of the novel depicting an artist character’s coming of age, is a narrative tradition that reaches as far back as Goethe and German Romanticism. Throughout the 19th century, this novelistic type saw many adaptations, ultimately reemerging most memorably in the modernist era in James Joyce’s A Portrait of the Artist as a Young Man (1916). This thesis explores three African-American variations of the modernist Künstlerroman whose authors were directly influenced by Joyce’s work: Jean Toomer’s Cane (1923), Wallace Thurman’s Infants of the Spring (1932), and Jessie Fauset’s There Is Confusion (1924). These writers use the narrative vehicle of the Künstlerroman to reflect on the Harlem Renaissance, the modernist movement in which they self-consciously participated, confronting demands and establishing parameters for authentic representation of African-American life.

In Toomer’s Cane, a northern mulatto writer character returns to the South in search of inspiration for his work, and ultimately refutes ideas of racial authenticity premised on southern folk consciousness. Thurman’s Infants of the Spring depicts a variety of artist characters who struggle against the vogueh fascination with primitivism perpetuated by white audiences as well as black race leaders. Fauset’s female artist character, an aspiring stage performer, finally confronts issues of gender and racial identity that result in a double marginalization of the black female artist. In the Harlem Renaissance’s search for a viable African-American literary tradition, the black Künstlerroman thus becomes a genre in which writers question the feasibility of racial representation, offering instead the process of creation as more indicative of racial art than the finished aesthetic product.

The Art of Failure: An Analysis of Unsuccessful Suitors in Jane Austen’s Novels

Lily Zhu

Mentor: Steven Zwicker

This paper examines the peripheral, unsuccessful suitors in Jane Austen’s six canonical novels and how their actions reflect Austen’s social critique of marriage traditions and the resulting marginalization of women. I conclude that though the men can be divided into two main categories—those who are motivated by material ambitions and those who are motivated by emotions—they are all united in their attempts to superimpose their own desires on top of the heroines’. Despite receiving repeated protests (against their assumptions) and rejections (to their proposals), the would-be paramours see only their own constructed images of who the heroines are and, as a result, believe they know what the women’s answers will be. What is left is not a proposal of love or even affection, but the indulgence of narcissistic fantasies which transform the heroines into mere vessels with no agency of their own. Austen emphasizes that no matter how charismatic or sincere these suitors can be, their inevitable failures arise from the inability to accept that the world does not cater to their whims, much less that “delicate” females have the capacity and inclination to defy their expectations.
The Relative Strength of Top-Down and Bottom-Up Trophic Dynamics in the Context of Habitat Isolation

Michelle V. Evans

Mentor: Jonathan M. Chase

Habitat isolation is rapidly increasing, due, in part, to habitat fragmentation. While isolation’s effects on species richness, genetic diversity, predator:prey ratios, etc. have been well studied, little is known about isolation’s effect on trophic dynamics. Isolation can potentially alter both top-down and bottom-up dynamics through its effects on local processes, such as predation and herbivory, that influence trophic dynamics. In order to investigate the impact of isolation on trophic dynamics, I conducted an experiment in aquatic mesocosms manipulating isolation and bottom-up and top-down dynamics, through the addition of nutrients and fish, respectively. The strengths of top-down and bottom-up dynamics were differentially affected by isolation. Generally, isolation weakened top-down processes relative to bottom-up processes, which were not significantly altered by isolation. I found predator communities to consist of less efficient predators at high isolation, while herbivore community composition was relatively unaffected by isolation. This suggests that a possible mechanism behind the differential shift in trophic dynamics over isolation may be a change in predator community composition. My experiment illustrated that isolation could indirectly affect communities through its effects on trophic dynamics and suggests further that top-down and bottom-up dynamics do not respond equally to isolation.

Characterization of Microbial Mats in a Hydrothermally-influenced, Sulfur-rich Brine Pool

Jasmine Berg

Mentor: Jan P. Amend

Hydrothermal systems have been implicated in origin of life theories and may host some of Earth’s most primitive organisms. Studies of these extreme environments can help to provide a context for the origin of life, to determine the chemical and physical limits to life, and to evaluate the compatibility of life on other planets. This study uses a 16S rDNA gene survey to analyze the microbial community in the white mats at Hot Lake, a hydrothermally-influenced, shallow-sea, submarine brine pool. Phylogenetic trees based on the comparison environmental DNA show that the Hot Lake microbial mat diversity is dominated by sulfur-metabolizing bacteria, and some thermophilic and hyperthermophilic archaea are also present. Overall, the data show that the microbiology is intricately tied to the geochemistry of Hot Lake; elemental sulfur filaments in the white mats are likely biologically precipitated as part of a microbially-mediated sulfur cycle. Future investigations using quantitative approaches and culturing can help better assess the microbial abundances, community structure, and metabolic activities at Hot Lake.
**Germanic Languages and Literatures**

**The Fußball Gap: How a Legacy of State Control Crippled East German Soccer**

*Alexander Miller*

At the time of reunification, East Germany possessed a diverse and thriving soccer scene. Top-level clubs drew the support of a variety of elements within the state, and teams like Dynamo Dresden, Dynamo Berlin and Hansa Rostock formed a core of elite talent in the DDR-Oberliga. However, in the years following the fall of the Wall, most of these organizations have struggled, with many dropping as low as the semi-pro regional leagues. This decline has been so precipitous that by the 2010-11 season no team located in the East took the field to compete for Germany's highest soccer title, the first time since Dresden and Rostock joined in the early 1990s that the Bundesliga had been concentrated solely in the West.

This research seeks to explain the sudden and surprising descent of the prominent East German soccer clubs in the aftermath of reunification. Most popular commentary ascribes this fall to socioeconomic shifts in the East, and I examine this account through one of the most extreme examples of the difficulties faced by the eastern clubs: Dynamo Dresden. The club’s unique history embodies the major challenges faced by East German teams over the last twenty years, and it reveals how complex the relationship between East Germans and soccer became under Communist rule.

Drawing on the psychological insights of Thomas Brussig’s play Leben bis Männer, I argue that the problems experienced by the sport are a result of this legacy, with fan sentiment mirroring a larger societal unease with institutions once intertwined with the state apparatus.

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**Environmental Studies**

**Coordinated Regionalism: A Potential Answer to America’s Climate Change Policy Challenge**

*Greg Schweizer*

*Mentor: William R. Lowry*

Global Climate Change is an important environmental issue facing the United States and the world, yet the United States has thus far failed to enact substantial national legislation to tackle its greenhouse gas emissions. In the absence of federal policy, some states have joined together to form regional cap and trade systems in an effort to inform the national debate, prompt federal action, and begin emissions reductions. This project explores the economic, business, legal, political, logistical, and environmental facets of the three existing regional agreements in order to understand how they can provide a viable framework for an American emissions policy. Subnational cap and trade regimes allow policymakers to tailor each system to the specific circumstances associated with more manageable and homogeneous regions of the large and geographically variable terrain of the United States. Unfortunately, regional policies face problems associated with state-level electoral volatility and subsequent policy instability, while a one-size-fits-all national solution encounters staunch political opposition and daunting logistical hurdles. Consequently, a paradigm shift among policymakers is necessary in order to craft a workable solution. This project proposes the Coordinated Regionalism approach under which a national mandate to states would require specific emissions reductions while retaining the regional flexibility of implementation through subnational cap and trade regimes. This proposal takes advantage of the regional specificity of a decentralized approach, and it uses federal enforcement power to eliminate policy instability and ensure overall emissions reductions. Hence, Coordinated Regionalism emerges as an innovative cap and trade policy blueprint that overcomes the impediments of existing regional plans and promotes national climate change goals. Ultimately, deferring to the wisdom of states and regions allows for maximum environmental impact with minimum economic distress in a way that is more politically viable and regionally deferential than a national cap and trade regime.
Roman Law in the Long Fourth Century

**Mentor: Mark Gregory Pegg**

One of the most enduring legacies of the Roman Empire was its legal system. Roman law codified the values of an empire stretching across three continents and containing a quarter of the global population. My thesis covers the legal changes of the Dominate, spanning from the reforms of Diocletian in 293 to 450. My thesis will analyze the creation and execution of the law during this period in order to understand its purpose and use in an empire such as Rome. I will argue that the complex and myriad processes for creating the law, which stemmed from a society torn between centralization and local control, resulted in a flawed system unable to meet the demands of powerful constituencies within the empire. These groups, the Church, the aristocratic elite and eventually the barbarian settlements, adapted the law to fit their own purposes during the chaotic fifth century. Roman law endured for centuries after the collapse of the Roman state but was still used for very different reasons than originally intended.

The first chapter traces the legal changes of the fourth century and explains how and why they occurred, with an emphasis on how competing social and political forces within the empire shaped the law. The second chapter covers the nature of Roman law in practice after these changes had occurred. The legal system had many flaws and problems that limited the implementation of a just legal apparatus. Some of these imperfections were to be expected of any judiciary, but others were inherently Roman in the way they affected the justice of the system and in the reaction they drew from the public. The last chapter addresses the consequences of late Roman law on the empire by assessing the legal and extralegal alternatives that developed and the legacy of Roman law in late antiquity.

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Art Both Valued and Condemned: German Reactions to French Impressionism, 1870-1945

**Mentor: Steven Hause**

Much has been written on the looting of European countries by the Nazi regime during World War II. Not only did the Nazi regime confiscate artwork during the occupation of France, they also worked with dealers to trade large numbers of “degenerate“ artworks including French Impressionist paintings for a few desired and officially-approved works (fifteenth-century Italian paintings, for example). Analysis of these exchanges reveals the extent of the Nazis’ ideological hypocrisy towards French Impressionism in rejecting it as a valid aesthetic yet benefitting from its prominent standing on the international art market. Few studies have addressed these exchanges in depth and traced why, when and how French Impressionism came to be labeled as “degenerate” by the Third Reich. French Impressionist artworks were first seen in imperial Germany during the culturally conservative reign of Kaiser Wilhelm II; the paintings were both admired and perceived as a threat to Germany’s national culture. The debate about French Impressionism in Germany incorporated many social issues including nationalism, anti-Semitism and Francophobia; Germany’s defeat in World War I and struggles during the Weimar Republic intensified these issues. French Impressionism was not initially well-received in France either as it was confusing to contemporary viewers in its variance from artistic tradition. Despite the debates in France and Germany and thanks to the work of dealers, French Impressionism grew in status on the international art market during the late nineteenth century and into the twentieth. By the time the Third Reich came to power, French Impressionist paintings were highly valued on the international art market but officially condemned as “degenerate” in Germany. This project provides perspective on the subsequent manipulative exchanges of “degenerate” art made during the occupation of France through an examination of the political and cultural context of French Impressionism’s reception in Germany.
A Packed Court: The Role of Conflict in the First Amendment Jurisprudence of the Stone Court

Daniel J. Caldera

Mentor: David Konig

During the tenure of Chief Justice Harlan Fiske Stone in the early 1940s, the Supreme Court established important new precedents in the First Amendment areas of freedom of speech and free exercise of religion. Footnote 4 of United States v. Carolene Products in 1938 had just explicitly suggested that the Court might apply different standards of review to laws that affected civil liberties than to laws regulating the economy. At the same time, members of the Jehovah’s Witnesses began challenging state and local ordinances that regulated their doctrinally-mandated public proselytizing activities or that compelled them to salute the flag in violation of their religious beliefs. These cases forced the Court to further define the meaning and scope of the Free Speech and Free Exercise Clauses.

Between 1937 and 1943, Franklin Roosevelt had the opportunity to reshape the Court by making eight appointments. Among his appointments were Justices Hugo Black, Felix Frankfurter, William O. Douglas, and Robert H. Jackson. These four men were four of the most prolific justices of the twentieth century. Each was an economic New Dealer who believed that the Congress and the states had broad authority to legislate in the economic arena. At the same time, each had a different judicial philosophy and a different view about the extent to which the Bill of Rights curtailed the state’s legislative power. The First Amendment cases that came before these justices focused on the very constitutional issues that they fervently disagreed about. These constitutional conflicts combined with their bitter personal disputes and the emotion and uncertainty brought on by the ongoing world war played an important role in shaping the opinions, and thus the legal precedent, that the Court handed down in these fundamental First Amendment cases. While the result of the decisions was increased protection for speech and religious exercise, the constant conflict bred deep suspicion and resentment that made cooperation and moderation extremely difficult. Furthermore, because the Court drastically shifted course in its Free Exercise Doctrine and changed its mind about the extent that religious activity was protected from regulation, the law in this area remained unstable for decades.

Our Land, Our Jewel, Our Possession: Franciscans, Mexica Leaders, and Inquisition, 1536–1540

Andrew Collings

Mentor: Mark Gregory Pegg

Spaniards who made the Atlantic crossing to conquer, colonize, and Christianize the Americas brought with them their conceptions, ideas, and institutions, seeking to create a New World much like the one they had left. One of these institutions, considered instrumental to the conversion of the Americas through the extirpation of heresy and idolatry, was the Holy Office of the Inquisition. This thesis investigates the "Mexican Inquisition" in the early sixteenth century, focusing primarily on sixteen trials of Mexica (Aztecs) from 1536 to 1540 by the Franciscan bishop Don Fray Juan de Zumárraga. Early inquisitorial activity is placed within the colonizing and missionary efforts in the Valley of Mexico in the decades following Cortés’ conquest of the Aztec Triple Alliance in 1521, as well as within current scholarly trends concerning New Spain and the Inquisition. Inquisitorial organization and activity is analyzed, showing that in early colonial New Spain, its functioning was more akin to medieval, ad-hoc inquisitions than the contemporary, self-perpetuating tribunal in Spain. The trial records themselves are evaluated, demonstrating how these sources can reveal the deep religious convictions, expectations, hopes, and fears of the friar-inquisitors regarding their native subjects. Then, from a close reading of the trial of Don Carlos of Texcoco (who was executed in 1539), this thesis seeks to better understand the Mexica, particularly indigenous leaders who played a crucial role as intermediaries between Spanish authorities and the vast indigenous populations they ruled. Finally, after a consideration of the aftermath of Zumárraga’s inquisition—the natives’ 1571 exclusion from the jurisdiction of the Holy Office, the creation of native disciplinary tribunals, and the development of the earliest American ethnography—this work argues that, while Zumárraga and his inquisition belonged to a medieval world, the conflicts and changes arising over the following decades were indicative of a different world altogether.
**History**

**A Special Situation in The Straits: The Turkish Straits Crisis of 1945 and 1946 and the Cold War**

*M. Harry Hartfield*

*Mentor: Krister Knapp*

The thesis focuses on the Turkish Straits crisis in 1945-1946, and America’s role in the crisis. The Turkish Straits crisis revolved around Soviet demands for joint control over the Turkish-held Bosphorous and Dardanelles. It argues that the Soviet policy in regards had been the same since 1921, and that the creation of that U.S. foreign policy towards the Straits did not reflect history, but a new cold war mentality within the Truman administration. The thesis demonstrates that as early at 1921 the Soviets had made clear that they wanted greater control over the Straits. Furthermore, during World War II the U.S. and Britain, disappointed with Turkey’s neutrality, repeatedly hinted to the Soviets that they would receive greater rights to the Bosphorous and Dardanelles when the war ended. At the end of the war the U.S. had no policy towards the Straits, and its initial attempts to create one failed. Discussions at the conference at Potsdam, and Soviet actions, demonstrated that by 1945 the crisis over the Turkish Straits had begun but that the U.S. was conflicted over how to react. Policy makers had grown uneasy about the Soviets by 1945 but wanted to negotiate a solution that rewarded Soviet sacrifices in the war. Finally, it will demonstrate the change in U.S. foreign policy in regards to the Straits in 1946 and from where those changes emerged. America’s final policy was far more aggressive than any previous policy, and its creation represented the first assertive Cold War-inspired policy that recommended force if necessary. The U.S. changes in foreign policy in regards to the Straits were the first time cold war mentalities created foreign policy. Overall the thesis will maintain the critical importance of the Straits in the start of the Cold War, and how the evolution of U.S. policy represented the change not in the crisis of the Straits but in the mindset of American policy makers.

**Public Space and the Civic-Minded Woman: Roots of City Planning in the Early Twentieth Century**

*Martin Mintz*

*Mentor: Margaret Garb*

This thesis traces the rise of professional urban planning and argues that the roots of such practices originated from voluntary women’s reform work in the early twentieth century. In 1901, a group of mainly women reformers opened their first of many open air playgrounds in St. Louis’ dense, diverse immigrant district known as the North End. Situated near the river, the playgrounds were designed to integrate the immigrant children into American life. The playgrounds grew in popularity, both with the immigrants and the municipal government over the first fifteen years of the twentieth century. The work of the reformers developed into a transformative vision of St. Louis that affected the city socially, culturally and physically.

Examination of the early stages of city planning demonstrates the hurdles faced by women in the public sphere. As the city took greater control over the playgrounds, the female reformers who helped to develop the theories and practice of public space in the immigrant district of St. Louis were questioned and eventually marginalized. Despite such challenges, the women reformers shaped the future of city planning in the twentieth century.
In the first years of the 1960s, debate over the de facto segregated nature of local public schools dominated Chicago headlines. Angered by widening racial inequalities, civil rights activists—led by the NAACP and the Community Council of Coordinating Organization—held system-wide boycotts and marches downtown, while white resistance groups, eager to preserve the status quo, responded with lobbying efforts, publicity campaigns, and protests of their own. The pro-integration faction thundered against the overcrowded and underfunded black schools that sometimes sat mere blocks away from white ones. The anti-integration faction, in the face of such criticism, had a remarkably simple response: in letters and telegrams sent to Benjamin Willis, the superintendent of schools, Chicagoans intoned, “We don’t want any interference with neighborhood school policies.” Willis and the Board of Education agreed, arguing that the city’s strict attendance boundaries, which kept students confined to their own neighborhood from elementary through secondary school, was not only racially-neutral and central to Chicago’s proud sense of community, but that it also respected historical local precedent. Yet the neighborhood school ideology was, in fact, a recent incarnation that had gained widespread support only in the post-Brown era. This paper argues that the policy of neighborhood schooling did not reflect the realities of community in Chicago, that it was used as a smokescreen for racial intent, and that it grew to become a flashpoint issue during the Willis years. The central role played by the ideology then guided the school crisis, allowing the white resistance to come across as more moderate, more local, and less politically-motivated than the progressive activists who derided the neighborhood school and seemed more detached from “real Chicago” as a result. When Benjamin Willis left office in 1966, the segregated nature of Chicago education was—thanks to the neighborhood school—contentiously secure.
History

Making History: How Standards Debates and Textbooks Have Shaped High School History Classrooms in the United States

Monica Rude

Mentor: Mary Ann Dzuback

The focus of my project is on the history of high school history teaching through textbooks, standards setting, and political debates. My chapters work together to show how textbooks and standards debates interact through a case study that revolves around both. I open by introducing players who have affected national debates about high school history instruction. Chronologically, the story of standards opens in 1892 with the Committee of Ten and works forward to show how different interest groups including the NEA, AHA, immigrant organizations, the College Board, and NCHS have attempted to set standards in high school history classrooms. An understanding of standards debates is helpful, but only tells one side of the story. A fuller picture of what was happening in high school classrooms can be gained from examining textbooks. My second chapter focuses on textbook development in the field of American history and recognizes the changes that took place over time as textbooks shifted from being traditionally sized with few illustrations to behemoths filled with glossy photos and cartoon-like illustrations. Textbooks are remarkable because they offer a glimpse at the type of instructional tools teachers and students used everyday. Included is research I conducted at Harvard University’s Gutman Library in the Archives and Special Collections. While in Cambridge I was able to work with historic textbooks published by authors like Emma Willard, Edward Channing, and David Muzzey. Having an understanding of both standards debates and textbook trends prefaces the final chapter, which is a case study of both. In this chapter, the untold story of project social studies emerges from a series of interviews and original research. The project was the brainchild of Ted Fenton and began in the early 1960s. For the next ten years, a dedicated group of researchers, many of who were former classroom teachers, attempted to change how history was taught to high school students. With grants from the Department of Education and support from the Carnegie Institute of Technology, the team embarked on project social studies with the idea that high school students should be exposed to history with the same document-based approach used by historians.

History

An African Awakening: SNCC’s 1964 Delegation to Africa and Globalizing the Struggle for Freedom in the Wake of Freedom Summer

Howard Rudnick

Mentor: Jean Allman

Challenging the traditional periodization of internationalism within the Student Nonviolent Coordinating Committee (SNCC), this study tells the story of SNCC’s 1964 delegation to Guinea and John Lewis’ and Donald Harris’ extended trip around the African continent that followed, elucidating how the African experience ignited a desire among members of SNCC to engage in the international arena. Emerging from the triumphs and heartache of Freedom Summer, the organization was searching for answers and reassessing the core of its approach. Some in SNCC sought solutions internally and others looked across the Atlantic to an emerging independent Africa for guidance. In Guinea, the group of eleven seasoned American activists found a thriving independent black nation and inspiration to improve the lives of blacks in the cities and towns of the South from whence they had come. A respite and reawakening, the group’s time in Africa offered them a political education and emersion in the international black struggle for emancipation and empowerment. The trip marked a critical moment in the evolving political and philosophical trajectory of the organization and a broadening of consciousness for the young men and women who comprised it. The trip also gave birth to a short-lived collaboration with Malcolm X, and though Malcolm was assassinated in February of the following year, SNCC continued to build on the lessons of the trip and develop its international profile. Historians have largely understood SNCC’s internationalism as a product of its latter years of organizing, treating the trip a mere footnote and neglecting to discuss the importance of internationalism to the organization’s mentality and program before 1966. Using SNCC’s internal documents, the memoirs of its staffers, newspaper accounts, and interviews, this thesis argues that to the contrary the trip was a transformational moment in the historical trajectory of the organization and the entire black rights struggle.
**History**

**The Decline of the Academy: The History of the American Academy of Political and Social Science, 1945–2000**

*Dave Spandorfer*

*Mentor: Krister Knapp*

My thesis examines the extraordinary rise of the American Academy of Political and Social Science following the Second World War and its sudden and swift downturn after 1968. Since its inception in 1892, the Academy has been one of the most influential and recognized institutions of scholarly work: its membership spans the globe, and the authors of its flagship journal, the *Annals of the American Academy of Political and Social Science*, have included luminaries such as Mahatma Gandhi, Ted Kennedy, and W.E.B DuBois and academic scholars such as Talcott Parsons, John Kenneth Galbraith, and Robert Dahl. Since its inception, the Academy has advocated the importance of employing social science research in policy formation. It has championed this belief through the *Annals*, its Annual Meetings, and its diverse membership and readership, which have included not just scholars, but journalists, clergymen, businessmen, politicians, and government officials. These features make the Academy the perfect institution to study the American public’s faith in applying social science as a public policy tool. Using primary sources from the organization’s extensive historical archives, this thesis—the first comprehensive study of the Academy’s history—answers how the organization fell from 25,155 members in 1968 to 2,323 by 2000. The thesis charts both developments within the Academy and larger developments outside it in order to identify the catalysts of decline. I argue that the American Academy of Political and Social Science’s fall was a consequence of mismanagement, an inability to adapt during the 1970s and 1980s, the fragmentation of the social science disciplines, and America’s waning belief that the social sciences could cure both the country and world’s vast policy problems.

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**History**

**“God and Posterity Will Show Me Favor”: A Search for the Historical Lady Jane Dudley in Light of Her Later Portrayals**

*Rachel Wisdom*

*Mentor: Derek Hirst*

The sixteen-year-old Lady Jane Dudley, born Grey, was pushed onto the throne for nine days in July 1553, a last-minute effort in retaining a Protestant monarch. She was quickly toppled by the rightful heir, the Catholic Queen Mary I, giving Jane the shortest reign in English history. Shortly thereafter, Jane was beheaded for treason.

For the next four and a half centuries, Jane’s story would be told over and over again—vastly more often than her relative insignificance in history would suggest—casting her as a saint, a martyr, a child prodigy, an airheaded girl with little interest in religious or academic matters, an innocent young victim, a heroine of romantic legend, a Victorian role model of meek womanhood, or a religious fanatic. Some of these portrayals are outlandish; nearly all at least stretch the truth. Generally, fictional and “historical” accounts of Jane have said more about the era in which they were written than they have about Jane.

This thesis attempts to reach a better understanding of Jane, examining how she saw and presented herself, how she was later portrayed, and how she might be most accurately seen. It argues that Jane should be portrayed first and foremost in light of her religion—not as a martyr, but as a faithful Protestant very much consumed with spiritual matters. She had a remarkably strong faith for someone so young, and she meant to be remembered as someone whose faith strengthened her at the end and who relied continually on her God. Her story does not have much meaning outside of its religious context. Jane can also be accurately seen as an exceptionally strong woman who was exceptionally bold, especially in light of her youth. Jane, this thesis concludes, is best viewed as an excessively outspoken girl and a faithful Protestant.
**They Do The Ring in Different Voices: E.M. Forster, Virginia Woolf, and the Echoes of Wagnerism in Modernist England**

*Stuart Fraser*

Mentor: Vincent Sherry

British Modernist prose is saturated with music. The interaction between the two art forms, although prominent in 19th Century Romantic musical debates, became epitomized in the operas of German composer Richard Wagner. In this paper, I apply Wagner’s musical aesthetics to the concerns and experimental structures of novelists E.M. Forster and Virginia Woolf. Through the incorporation and discussion of the musical conceptions of the "Total work of art" and the leitmotif, these novelists were able to depict the contemporary state of English modernity in a new, more resonant manner.

This thesis is divided into three chapters. The first lays out the 19th Century development of Wagnerism in order to provide the contextual background for how early 20th Century literary circles and popular audiences received and understood the composer. My second chapter elaborates on the role of Wagner’s “Total work of art” during two scenes in Forster’s *Howards End*: a concert and subsequent debate over musical aesthetics. My third chapter discusses the way in which Woolf employed and discussed literary leitmotivic rhythm to solve a problem of biographic and symbolic representation which she saw inherent in prose characterization.

Through these discussions, I attempt to establish a richer connection between Modernist prose writing and the language of music. While this relationship is often discussed with vague, impressionistic language or with regards to the novels of Mann, Proust, and Joyce, this thesis draws on Forster’s and Woolf’s conscious use of specific Wagnerian aesthetic structures to draw attention to problems of representation evident in both music and literature. In doing so, I explore how Wagner can be seen as an important influence on British Modernist prose and a useful figure for understanding the Modernists’ experimentations with musicality.

**Ceci n’est pas Égypte: Knowledge, Imagination and the Orient of Flaubert and Du Camp**

*Laura Jensen*

Mentor: Stamos Metzidakis

In 1849, Gustave Flaubert and Maxime Du Camp set off on a tour of Egypt. There the two played the double role of tourists and chargés de mission en Orient for the French government: Flaubert sought investment opportunities for French chambers of commerce, while Du Camp was to create a “scrupulously exact” photographic record of Egyptian monuments for the Académie des Inscriptions et Belles-lettres. Just months after their return Du Camp published his supposedly objective documentary photographs as an album. Flaubert, on the other hand, slaved over his dramatic novel, *La Tentation de Saint Antoine*, the story of a fourth-century monk plagued by demons, until 1874.

Little work has been done to compare these two seemingly antithetical responses to a single Egyptian voyage. Scholarship on Du Camp’s album tends to emphasize the scientific aims of his mission and concentrates on the album’s contributions to what Jennifer Yee calls “the Orientalist conquest of knowledge.” Contemporary reviews, however, praise the album not for its objectivity but for its capacity to transport readers into imagined Oriental journeys. Nineteenth-century responses suggest a paradoxical relationship between knowledge and fantasy: the more we learn, the more we imagine.

This conception of the imagination corresponds to that developed by Michel Foucault in his “Bibliothèque Fantastique,” a critical essay on *La Tentation de Saint Antoine*. In the novel, Saint Antoine’s satanic visions begin when he opens his Bible, a supposedly instructive text for the monk. Through Foucault’s essay, we come to see the seemingly objective album and the phantasmagorical novel are not, as one might assume at first glance, diametrically opposed in their representations of Egypt. Ultimately, the two express a similar relationship between knowledge and imagination in which erudition begets fantasy—a model that serves to undermine the very epistemology of realism in which both men participated.
Within psychoanalytic discourse, agency, or intrapsychic motivation, is often treated in one of two ways. Some analysts conflate the ego and consciousness, and therefore treat agency as a function of the conscious ego; others look to the unconscious as a way to disentangle psychoanalysis and "Cartesian" agency. Those who do discuss agency often do so only from the perspective of metapsychology. I attempt to understand the concept of agency in Freud's writing from an explicitly clinical perspective. Then, I look to the ways in which Jacques Lacan resolved many issues in Freudian theory, while simultaneously creating new complications for a complete understanding of agency in psychoanalysis.

In my first chapter, I discuss Freud's Papers on Technique, Rat Man analysis, and Wolf Man analysis. By focusing on Freud's discussion of bravery, transference and productive moments in the analyses, I attempt to show that the language of the conscious and unconscious is not adequate to describe the dynamics of agency in Freud's clinical theory. I propose a new language of interstitial agency and moments of bravery in order to better understand it. My second chapter concerns Lacan's importation of structuralism into the unconscious and the practice of "scansion," wherein the analyst determines the length of the session. I attempt to show how Lacan creates a place for agency in the unconscious, but how this place is nonetheless problematic.

Ultimately, I hope that my thesis will be a step towards a more nuanced and consistent approach to agency in psychoanalysis, wherein implicit assumptions are further laid bare and addressed. Beyond the issue of how Freud and Lacan saw their own analytic practices, at stake in such an explanation are both the nature of analytic technique and the impact of such technique on the analyst's respect for the patient.

Much work has been done on the material conditions of both the rising middle-class man and the wealthy dandy in fin-de-siècle England, but the story of the normative aristocratic gentleman and his particular aesthetic concerns has been largely ignored. In the spring of 1898, the first men's fashion magazine appeared in London's West End, called simply Fashion: The West End Gentleman's Magazine and Dress Guide. Fashion paints a complex picture of the relationships which existed amongst gender, class, and aesthetic identities, and the ways in which the typical West End gentleman might have constructed his own identity in turn. In the second half of the long nineteenth century, the physical space of London and its accompanying social space were changing rapidly. Ready-to-wear clothing began to dominate custom-made clothing, Palladian department stores opened for business, and the socio-cultural composition of Society life was diversifying.

Various sociologists, including Thorstein Veblen, Pierre Bourdieu, and Georg Simmel, have proposed explanations for the ways in which dress and material life are bound up with the class anxieties felt in the face of such change. By looking at the editorials, advertisements, and illustrations contained in Fashion, one finds material that both endorses such sociological readings and challenges their tendency towards overly broad theorizing.

While Fashion's subtitle is West End Gentleman's Magazine, the fin-de-siècle gentleman did not live his life exclusively within the metropolis. The class and gender concerns that shaped his identity in Mayfair were just as pressing on the battlefield of the Boer War, at the traditionally aristocratic country house, and during travel abroad. Fashion illuminates the intricate and multi-faceted system of signs and symbols through which the fin-de-siècle gentleman constructed his identity, and clearly dispels the myth that Victorian men neither cared about clothing nor talked about it.
**Slaughter and the Sign: Painting Animal Flesh in the Twentieth Century**

*Nathan Stobaugh*

Mentor: Elizabeth C. Childs

The representation of meat in oil paint has a rich legacy. Animal flesh has remained a source of fascination for visual artists from the invention of the medium to the present day. In the past century, meat as subject matter has taken on special significance in relation to the formal concerns of modern painting. Occupying a liminal space between complete body and formless mass, meat lends itself to painterly explorations of the fluid boundary between figuration and abstraction and the dual nature of paint as mimetic agent and coagulated, physically present matter. The potency of this subject for painting in the twentieth century, however, is the result of ideological developments concerning animals as much as aesthetics. In this thesis, I argue that paintings of meat in the past 100 years have been deeply influenced by shifting relationships between humans and the creatures they consume.

My analysis of the role of meat in modern painting proceeds through a series of case studies. First, I explore how Chaim Soutine’s work was impacted by a dialogue between the dietary laws of his Jewish upbringing and the emergence of the institutional slaughterhouse in modern France. I then turn to the paintings of Francis Bacon, arguing that the centrality of flesh in Bacon’s work enacts an interrogation of the very divide that separates human and non-human animals. Finally, I confront the Vienna Actionists, investigating the role of animal slaughter in these artists’ work within the context of their larger projects of post-war cultural critique.

Animal studies, an emerging line of academic inquiry, promises to pose new questions for the human sciences. This thesis is a dual effort to explore how this developing discipline might illuminate art historical analysis and, conversely, how the history of painting offers new throughways for understanding the evolution of human-animal relationships.

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**Empty Pedestals: The Removal of Francoist Monuments in Democratic Spain and the Role of Transnational Transitional Justice**

*Sophie Adelman*

Mentor: Tabea Alexa Linhard

The passage of the Spanish Law of Historical Memory in 2007 was a contentious yet groundbreaking move in retroactive justice that seeks to address human rights atrocities committed under Francisco Franco’s authoritarian regime. However, the law additionally intends to remove all aesthetic remainders of Franco’s regime, including such iconic monuments such as the Valley of the Fallen. This particular aspect of the law has provoked intense debate, not only surrounding the relevance of such monuments in modern Spanish society, but also on the greater role of monuments in other post-authoritarian transitional states. This project traces the rising influence of transnational transitional justice on the removal of Francoist monuments in democratic Spain. Drawing from modern studies of collective memory, art history, Spanish politics, human rights, and transnational law, this work examines the factors, both national and transnational, that contributed to the Law of Historical Memory and the profound impact that it has had in regards to Spanish conceptions of memory and contemporary history. As symbols of a bygone political era, monuments created under Franco’s regime seem to have lost their relevance. However, I argue that the aftershocks of Francoism still linger in Spanish society today, and that the removal of such monuments belies the Spanish responsibility to nearly four decades of history. Instead of removing vestiges of Franco’s regime, monuments should be recontextualized to allow for the ongoing conversation that accompanies perception of history and memory. Given the recent nature of the law, very little has been written regarding this aspect of the Law of Historical Memory. However, this study will shed light on the perception of Spanish history through visual culture, and the role that transnational transitional justice has played in this reimagining of modern history.
International and Area Studies


Mollie Bradlee

Mentor: Luis H. Zayas

In 2010, approximately three-quarters of children born to undocumented immigrants in the United States were born on American soil. While these children are constitutionally American citizens, they do not enjoy the rights and privileges that citizenship entails. Over the past few decades, policymakers have failed to account for this vulnerable sector, enacting laws that focus on excluding undocumented immigrants rather than including their citizen-children. Unlike children born to U.S. citizens, this group of citizen-children suffers the constant effects of fear, family dissolution, and at times their own *de facto* deportation, often forfeiting either their right to residency in the U.S. or their right to parental companionship. Through an examination of current immigration laws, court proceedings, and case studies, this paper examines the effects of immigration policy on the citizen-child’s educational, social, and emotional wellbeing. As demonstrated, this harsh reality both contradicts American values and hinders investment in the nation’s future.

International and Area Studies

**Public Space in Paris and Its Periphery**

Colleen Brady

Mentor: Seth Graebner

This project examines the creation and use of public spaces between Paris’ center and periphery in the post-colonial era. It specifically looks at how public spaces become imbued with meaning through their interactions with the collective memory of the former French empire and the current immigrant population. Through various cultural studies on central and peripheral spaces, spanning from monuments and street names to graffiti and parkour, this project demonstrates how spaces’ opposing treatments of the colonial and postcolonial collective memory create two starkly disparate spaces. The city center commemorates the former empire with official memorials, street names, and grand monuments; yet spatial indications of the empire’s downfall and the realities of contemporary postcolonial society are limited to the periphery, where they exist in ways that are everything but official. Observing peripheral and central sites side by side highlights how central Paris represents only a partial rendition of the more inclusive history manifested on the periphery, but the message of the periphery is removed from mainstream discourse due to the stigmatization of peripheral spaces and the physical distancing between periphery and center. These cultural studies demonstrate the need to foster an inclusive collective memory through public space in order for Paris to project an encompassing French national narrative to its residents and to the world at large.
Zhuangzi’s Moderation: A Study of Zhuangzi’s Views on Death

Elizabeth Cayne

Mentor: Pauline Lee

This thesis involves a two-step examination of Zhuangzi’s conception of death. First, I explore Zhuangzi’s views on the inconsistencies and shortcomings inherent in language and perspective. I then expand my consideration of Zhuangzi’s views on death through a comparison of Confucius’ and Mozi’s divergent views on death, the afterlife, mourning and funerary ritual. I observe that Zhuangzi does not expressly reject Confucius’ rigid support of funerary ritual according to achieved social status or Mozi’s effort to limit excessive funerary ritual. However, analysis of Zhuangzi’s writing highlights the limitations and biased implications, such as baseless preferences for life over death, inherent in Confucius’ and Mozi’s teachings. Similarly, careful scrutiny of Zhuangzi’s writing reveals that Confucius’ and Mozi’s relatively inflexible positions fail to address the wide breadth of varied experience available to individuals due to the variability of context and circumstance.

Taken as a whole, my examination suggests that Zhuangzi, in contrast to Confucius and Mozi, emphasizes the importance of allowing things to follow their natural course free from the restraints of arbitrary social convention. I argue therefore, that Zhuangzi’s views on and responses to death represent a more moderate approach and mirror the ever-changing essence of the natural world. Accordingly, Zhuangzi encourages responses to death that express authentic emotion according to the specifics of distinct situations, rather than an edited thought process reflecting social values. Therefore, this thesis concludes with the argument that Zhuangzi’s ability to alter his behavior in one context—the death of his wife—serves as a metaphor for how he views death and, on a broader scale, how he interacts with the world. In all contexts, Zhuangzi suggests ways for contending with variability, encouraging a harmonization with the ever-changing quality of the natural world.

International and Area Studies

Food and the Feminization of Agriculture: Land Grab Practices and the Future of Food in Jordan

Kate Deming

Mentor: Winifred Poster

This paper addresses the globalized agricultural practice of land grabbing and demonstrates the negative impacts of such neoimperialistic schemes on rural women farmers. International land grab practices occur when a government purchases farmland in another country, usually displacing the local subsistence farmers in the process, in order to ship the resulting food directly back to its own citizens. Taking Jordan as a case study, this paper argues that agricultural development should be focused internally through the economic and social empowerment of Jordanian women farmers. Based on theories of development and ecofeminism, together with the author’s research in Jordan, the connection between women and sustainable development are made clear. With recent protests and demands for freedom and equality in the Middle East and North Africa, it is essential that the Jordanian government provide food for its own people in a sustainable and self-sufficient manner.
Translation, Trauma, and Film: A Reading of Magical Realism in Chinese-Language Cinema

Wenny Dong

Mentor: Shuli Chen

In 2007, Chinese director Jiang Wen released *The Sun Also Rises*, the first magical realist text in Chinese-language cinema. The film is set around the Cultural Revolution, 1966-1976, when factional struggles within the Communist Party saw tens of millions suffer persecution and silencing. After 1976, there was a catharsis of trauma in *shanghen wenxue*, or “scar literature,” and “scar drama” in film. What significance can a contemporary magical realist film lend to reading previous (re)presentations of traumatic history? To read a relation between *The Sun Also Rises* and two examples of scar drama, this project suggests the metaphor of testimony and translation for filmic (re)presentations of trauma. Ambiguous images that collectivize memory, violence, and injustice in the story break away from film narrative, opening a visual space for negotiating and challenging trauma at the national level.

“Atenco Vive, La Lucha Sigue”: Symbolic Violence and the Creation of a Disjunctive Democracy

Laura Guzman

Mentor: Derek Pardue

In May 2006 federal and state police marched into the town of San Salvador Atenco, Mexico. They illegally detained, beat, and arrested hundreds of villagers and members of the People’s Front in Defense of the Land (FPDT), an organization dedicated to protecting the rights of the agrarian town’s people. This paper explores the symbolic violence perpetrated by national media institutions and systems of justice during the years following the attack on Atenco. This symbolic violence includes a negation of the right to protest carried out through a systematic misrepresentation by national newspapers, such as *Reforma* and *La Jornada*. Only physical violations of rights are considered by these institutions, therefore perpetuating the systematic nature of the country’s repression of the poor. Through a reading of newspaper articles, blog postings, documentaries, personal accounts, and theoretical considerations of democracy, human rights and justice, I show the ways in which the FPDT and the agrarian poor of Mexico are denied a legitimized sphere of discourse. As a result, they are excluded from the national project of democracy and suffer systematic political, social and economic injustices. Finally, I consider blogs as growing spaces for dialogue for the otherwise marginalized agrarian, indigenous poor of Mexico. The blogs of social movements like the FPDT illustrate more truly the opinions and needs of the sectors of the population that they represent. Therefore, I use the FPDT blog to provide contrasting accounts of events that the mainstream newspapers also treat. Through this comparison, the negation of an open sphere of discourse becomes evident.
Parent Resistance to Intercultural Bilingual Education:
A Cross-Cultural Analysis of the Navajo and Quechua Communities
Laura Hoffner

Mentor: Bret Gustafson

This project examines the parent resistance to the implementation of intercultural bilingual education in the classroom. More specifically, it is a cross-cultural analysis that explores the Navajo of the United States and the Quechua parents of Peru in which heritage language programs have been incorporated into the classroom based on a federal mandate. Drawing from a series of case studies and field research conducted by both North American and South American anthropologists, it argues that the resistance must be understood within the complexity of the political, economic, and social contexts in which these communities have existed since the time of colonialism. While most research is based on one culture or the other, this project examines the histories and struggles of the Navajo and Quechua communities together and makes a direct comparison between the two. It explores and develops greater conclusions regarding the effects of colonialism, marginalization, and exclusion of the indigenous cultures and how they view the importance of language within the lens of educational and cultural rights.

Breaking the Silence in Contemporary Russian and South Korean Literature
Lana Jaffe

Mentor: Ji-Eun Lee

This project explores the theme of gender as a national allegory in Russian literature after the beginning of glasnost (1985) and South Korean literature after the end of Chun Doo Hwan’s authoritarian regime (1987). Through analyses of literary works by Ch’oe Yun, Kang Sŏk-kyŏng, Tatiana Nabatnikova, Dina Rubina, and Liudmila Ulitskaya, this project demonstrates how gender and the nation are intertwined through the issues of identity, silence as a mode of representation, and social marginalization. These stories detail the lives of female characters who suffer hardships—emotional and physical—and whose bodies serve as symbols of national crisis, mirroring evolving national identities in the transition to democracy. The purpose of this project is twofold: first, this project seeks to bring Russian and Korean literature into greater academic regard, as these authors generally enjoy a readership confined to their own countries; second, this project brings these literatures of two seemingly disparate societies into literary conversation, encouraging greater cultural awareness and sensitivity.
Differences in biomedical and traditional medical methods for the alleviation of sickness have sparked debates regarding the efficacy of both forms of treatment. In addition, medical practice has evolved to include medical pluralism, the amalgamation of biomedical and traditional medical spaces and instruments. This project considers the debate for the legitimacy of indigenous medicine as a treatment for mental illness. More specifically, it takes an in-depth look at the use of shamanism as a treatment for depression in Chile. Through exploration of the shamanic healing practices of the Mapuche, an ethnic group indigenous to Chile and parts of Argentina, this project provides a basis of comparison for globally employed biomedical treatments for depression such as pharmaceuticals and psychotherapy. Furthermore, it surveys the national and international influences shaping the Chilean mental health care reforms of the last decade which include a more biopsychosocial model of health care.

Mitigating the impacts of environmental degradation on human society is one of today’s most urgent policy issues, especially in light of the growing consequences of climate change for communities and economies across the world. The answers to what should be done and by whom have evolved into contentious and complex arguments, as the industries that fuel the global economy both depend on natural resources and are the primary culprits of current environmental damage. Neoliberal policymakers promote harnessing international capital markets to address environmental issues such as deforestation, but the rise of the market as a solution has become highly controversial, as it has deeper implications about the regulating forces in human society, and how these forces either strengthen or undermine existing inequalities.

Through comparing the implementation of, discourse on, and resistance to the latest UN climate change scheme, Reducing Emissions from Deforestation and Degradation (REDD), in Indonesia and Bolivia, this thesis examines how proposals for creating carbon markets influence power structures at both the national and global levels. I analyze public political discourse, project documents and opposition movement strategies to better understand how REDD both depoliticizes climate change and forests and opens up space for new kinds of political conflict and struggle. Anthropologists have presented similar critiques of past international development policies; however, little research has been done in applying these critiques to the latest policies on climate change, which ultimately incorporate development as an essential component. I argue that REDD, through creating carbon markets, shifts the focus of policy away from questions of inequality between the Global North and Global South to the economy, excluding discussions of power relations between the Global North and Global South from political negotiations, and ultimately reinforcing current power structures and inequalities.
**The Socioeconomic Consequences of NAFTA on Mexico: An Analysis of Emigration Rates from the Mexican Agricultural and Manufacturing Sectors Between 1990 and 2004**

*Emily Miller*

**Mentor: Guillermo Rosas**

This study uses emigration rates as a lens through which to analyze the socioeconomic effects of the North American Free Trade Agreement (NAFTA) on Mexico. A sectoral division between agriculture and manufacturing is used to demonstrate NAFTA’s differing effects on various areas of production in Mexico, recognizing that, although free trade increases the size of the overall pie, it does not guarantee everyone a bigger slice. Asymmetry in tariff phase-out length under NAFTA for the agricultural and manufacturing sectors creates a natural experiment which allows me to distinguish migration that is directly attributable to NAFTA from that which is merely correlated. Based on differences in design, I analyze changes over the course of NAFTA as well as differences between sectors within Mexico. I use known predictors of migration such as gross state product per capita, minimum distance to the border, area of sown land, and the political turmoil and peso crisis of 1994 and 1995 as control variables in regression models of state-level migration rates. These controls are unique to this study, offering better proof of causality than seen in prior studies. This study concludes that NAFTA caused substantial increases in emigration from the agricultural sector beginning as early as the first period of study under NAFTA, from 1994 to 1997. The study suggests a neutral effect in the manufacturing sector, meaning most likely that NAFTA affected individuals in this sector in countervailing ways, which when examined in the aggregate suggest a nil effect. Studies at the individual level are thus an excellent area for future research.

**Narratives of Water in the Middle East: Scarcity and Culture**

*Martin Nachman*

**Mentor: Seth Graebner**

The growing scarcity of water has a profound effect on the lives of millions in the Middle East. Whether politically, economically, or environmentally, limited water resources define the local realities of daily life in Jordan, Israel, and Palestine. Through analysis of a set of newspaper articles in Arabic and Hebrew published in 2010 from eight influential daily papers, this study shows that the daily conditions of consumption narrowly define citizens’ relationship with water scarcity. As a result, a sustainable peace based on mutual understanding is in peril. Degradation of the regional natural environment will likely continue. While much of the existing scholarly literature on water scarcity in the region focuses on large-scale approaches to the problem, this study refocuses the discussion on the local social landscapes that permeate Jordan, Israel, and Palestine. Journalists tell stories of the ways water scarcity has affected people on the ground. Consequently, this analysis of newspaper articles magnifies the issue with a much-needed human dimension often missing in discourses of regional scarcity.
When people in the United States talk about the story of “Pinocchio,” typically they are referring to the Disney movie. However, before the story was turned into a movie by Walt Disney, it was an Italian children’s story written by C. Collodi and published in serial form in a children’s magazine beginning in 1881. The original novel is greatly influenced by the historical context of post-unification Italy in which it was written, and this thesis examines the changes that were made when Pinocchio was translated from Italian into English. This thesis uses translations and adaptations of Collodi’s original work that were published in English between the years of 1891 and 1920, as well as reviews of these translations as its primary sources. Through a careful reading of these translations and reviews, patterns begin to emerge about the reasons that translators choose to alter the original story. Adaptations for school anthologies tend to feature more changes, as editors try to condense down the original story, and these changes tend to occur for three reasons: to clarify references that are specific to Italian culture, to protect children from some of the harsh realities in the original story, and to make the story more moralistic in order to emphasize the importance of obeying authority. These translations provide a window into how Americans viewed Italian culture in the early 1900s as well as what morals were most valued and emphasized in English versions of the story and were therefore most salient to American culture during this time period.

An estimated 30,000 Argentines were captured, tortured and “disappeared” by the military regime during the Dirty War in Argentina between 1976 and 1983. One facet of the United States’ role in Argentina’s Dirty War is through the military training the U.S. has provided at the U.S. Army School of the Americas (now known as the Western Hemisphere Institute for Security Cooperation) for over 60,000 Latin Americans since its inception. Past School of the Americas manuals evidence the school’s instruction of explicit torture tactics from the use of truth serum to execution. In the cases of human rights concerns in the Dirty War and at the School of the Americas, the use and manipulation of official language has been strategic in shaping the perception of the public in order to justify the actions of those in power.

In my research, I analyze the relationship between official language and reality in U.S.-Latin American relations, with specific emphasis on Argentina. Intuitively one’s actions should be aligned with one’s words. However, in this specific analysis of the discourse of Argentina’s military regime, language of U.S. foreign policy and language surrounding the School of the Americas highlights an important discord between the two. Identifying the paradoxical relationship between official governmental language and related actions sheds important light on how words have been manipulated by those in power in order to convey an intended message to the public, despite not always being one truest to reality.
The Sources of Policy Rigidity and the Failure of Oil Sector Reform in Mexico
Eliana Wilk

Mentor: Brian Crisp

The reform of national oil companies in Latin America has become an increasingly critical issue. Since the early 1990s, the general push throughout the region to “modernize” state-owned oil companies following a market-oriented model has proven to be a lucrative and economically advantageous measure. However, it remains extremely controversial particularly in countries with long histories of resistance to private and foreign involvement in the oil sector. The ability of governments to seriously address this politically charged issue has rested on their ability to refute the powerful argument that a change in the status quo poses a threat to national sovereignty. This study focuses on the case of Mexico, the only Latin American country that has yet to succeed in this effort. Despite an increasing need and desire to adopt a thoroughgoing reform in the oil sector, Mexico’s state-owned oil company Pemex remains an “untouchable” area in Mexican policymaking. I analyze the initiatives for oil reform proposed in Mexico’s Chamber of Deputies between 2000 and 2010 to better understand how Mexico’s political environment has given rise to an unbroken pattern of gridlock in the oil issue area. The failure of policymakers to effectively use the argument that changing the status quo will strengthen national sovereignty has been the primary obstacle in advancing a meaningful reform in the oil sector, and explains the counterintuitive logic of Mexican oil policy in an increasingly competitive economic climate.

Stochastic Methods for the Lotka-Volterra Model with Migration
Alec Koppel

Mentor: Renato Feres

The Lotka-Volterra Model is a classical set of differential equations used to model predator-prey interactions. This model may be generalized in a variety of ways but does not incorporate any spatial-temporal relationships. We examine the spatial element of the model by expanding the system to contain multiple predator-prey sites in a finite linear chain with migrational interactions between them. Modern numerical techniques from chemical kinetics were employed in our analysis and include ODE solvers, the Gillespie SSA arising from Petri Net representations, and the Estimated-Midpoint Langevin Method motivated by Diffusion and Poisson Approximations of the discrete Petri Net description. With these we examine the differences between some deterministic and stochastic formulations of the system with special interest given to disparities in spatial-temporal relationships, periodicity, and extinction rates.
Ramsey Theory: From Finite to Infinite
Jonathan Joseph Marshall

Mentor: Russ Woodroofe

In this paper we present a survey of some results in Ramsey Theory, ranging from classic theorems that form the basis of the subject to recent results that apply combinatorial techniques to the theory of Banach Spaces.

First we will present classical Ramsey Theory as we consider colorings of finite sets and the monochromatic subsets that are so induced, culminating with the full version of Ramsey’s Theorem in the finite case. From there we will move to some extensions of Ramsey’s result, presenting results regarding the induced monochromatic substructures of colorations of the natural numbers and of vector spaces. We will also consider in more detail the subject of partition regular equations, in which we present the idea of the chromatic number of a linear equation or a system of linear equations (i.e., the smallest number of colors needed to ensure any coloring of N yields a solution).

Next we will present a discussion of how the results in finite Ramsey Theory carry over (or fail to carry over) to the infinite case. We will look at colorings of countable and uncountable sets and along the way present Ramsey’s original theorem. Just as finite Ramsey Theory lends itself to results on discrete spaces, infinite Ramsey Theory produces many results on continuous spaces, and we will explore some of these on R and on general metric spaces.

Finally, we will present an application of Ramsey-theoretic combinatorial techniques to a class of Hilbert spaces, which was, somewhat surprisingly, recently used to answer an open question of Banach in functional analysis.

The Hough Transform
Meredith Plumley

Mentor: Victor Wickerhauser

This paper presents a survey of the Hough transform and the description of one implementation in MATLAB of the transform. I focus on the transform for lines and provide details of the method as well as explore the options for different parameter values involved in the transform. I also explain the pre-processing step of edge detection and post-processing step of finding the actual line segments.
**Music**

**Vocal Production in Varying Styles: A Study and Demonstration**

Lindsay Keller

Mentor: Christine Armistead

Are healthy vocal techniques and certain genres of singing mutually exclusive? Ironically, the very aspects of vocal styles that may lead to pathology are the same hallmarks that lend authenticity to the singer’s sound in the genre. My goal for *Vocal Production in Varying Styles* was to justify the necessity for more specific research in the area of vocal health. There is currently insufficient research comparing the vocal health of singers of different genres. A comparative analysis of singers of various musical styles would illuminate the specific performance environments and methods of vocal production that lead to abuse.

By aggregating the current research on vocal production, I determined that singing styles differ according to method of phonation, performance practices and defining features, all of which affect vocal health. But, by far, the largest influence on vocal function is performers’ amount of training and knowledge of their own voices, a factor that varies greatly depending on genre. Future research on vocal health must take into account these important idiomatic differences so that singers can be aware of and minimize vocally abusive behaviors. An increased knowledge of healthy vocal practices and signs of pathology provide singers with the information necessary to have long and fruitful careers in singing, regardless of their genre.

*Vocal Production in Varying Styles* took place on March 6, 2011. In my lecture, I included a vocal demonstration of bel canto, jazz, and popular song styles to demonstrate healthy vocal function in a variety of singing genres.

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**Performing Arts**

**Society of the Spect-actor: Postmodernism and Boal’s Poetics**

Elena Hight

Mentor: Julia Walker

Just as postmodern thought started to emerge in the 1970s and ‘80s, Augusto Boal (1931–2009) was piecing together the foundations for “Theatre of the Oppressed.” Comprised of a wide range of theatrical forms, games and exercises, Theatre of the Oppressed would develop as a model of political theatre that aimed to liberate the spectator from oppressive Western theatrical forms and provide a space in which she or he could participate in “rehearsals of revolution” for transforming society. Yet, while Boal was largely responding to the same social, economic, and cultural phenomena as were postmodern theorists, his contribution to both postmodern theatre and aesthetics has been largely ignored. This thesis thus attempts to situate Boal’s Theatre of the Oppressed within theories of postmodernism, focusing on shared discourses of narrative, agency, and spectacle in order to illustrate how Boal offers a potentially radical response to the problem of postmodernism. In order to demonstrate the postmodern aspects of his work, this thesis provides a comprehensive overview of the development of Boal’s thought and practice, including his critique of “coercive” theatrical forms and his practical experiments, including Forum Theatre, Image Theatre, and Analytical Theatre, and shows how, in both theory and practice, Boal sought to reconstitute the identity of the postmodern subject and provide him or her with a powerful tool to assert agency and effect real change in the postmodern world.
Performing Arts

YouTtube and Theater: An Exploration of Spectator-Performer and Spectator-Spectator Engagement Within and Without the Performance Space

Jonathan Levinson

Mentor: Henry Schvey

Theater is, in the broadest sense of the term and regardless of its cultural context, impossible without the presence of an audience. In this thesis, I compare the feedback loops facilitated by two types of theater spaces: traditional theater and YouTube. YouTube is just like theater in that it relies upon audience participation in order to achieve success as a performance medium. YouTube, however, relies upon an inherently more active and engaged audience, effectively obliterating the distinction between producer and consumer so sacred to the traditional theater. YouTube facilitates the co-creation of the dramatic text, whereas traditional theater facilitates a more passive spectator-performer relationship.

In Chapter 1, I explore both audience-performer and spectator-spectator engagements within the performance space. In YouTube, comments are an essential aspect of the site’s cultural experience and its success as a performance space. Comments serve as a tool for spectators to communicate amongst themselves, for performers and spectators to engage one another, and to subsequently effect changes in a performer’s ongoing YouTube performance. In traditional theater, however, due to spatial constraints and cultural conventions, audiences enjoy a less participatory role than in YouTube. I explore three YouTube case studies to illustrate the necessary role of the audience in the development of the performance.

In Chapter 2, I explore the audience-performer feedback loop from outside the performance space, framing this exploration in Henry Jenkins’ study of Convergence Culture, whereby old and new media forms collide. While the theater has taken advantage of this collision, distributing its message across various media platforms, YouTube has taken it to another level as both the product of and catalyst of convergence. In order to achieve or maintain the status of a “YouTube star,” a person must take advantage of YouTube’s facilitation of convergence.

Performing Arts

To Kill a King: Shakespeare’s Politics on Rebels and Tyrants

Julia B. Mellon

Mentors: Robert Henke and Derek Hirst

In this paper I explore the Renaissance historical and political discourse on rebellion against tyrants in order to determine how Shakespeare’s plays actively responded to royalist thought. I investigate two of Shakespeare’s works in juxtaposition to the Divine Right of Kings: first, Richard III, from the Elizabethan era, and second, Macbeth, written upon the ascension of James I. Essentially, I propose that beneath the overt flattery of Queen Elizabeth I and King James I, Richard III and Macbeth subtly propose that the English people have a right to rebel against a tyrannical usurper, thus subverting the royalist idea of the irresistible monarch and the royal call for popular obedience. On the surface Shakespeare flatters Queen Elizabeth I by adopting the Tudor myth of the deformed, demonic tyrant in Richard III and chronicling the rise of the Tudor family. However, I assert that the play probes at the problematic Tudor mandate of obedience, considering that the Tudor family acquired the throne through disobedient insurrection. Similarly Macbeth traditionally has been regarded as a royal play written to compliment and flatter the Scottish king; however, I demonstrate that the play attempts to tease out the moral difference between regicide and tyrannicide, indicating that Shakespeare was unwilling to accept James’s uniform ban on rebellion.
Performing Arts

The Haunted Stage: The Need for Release in Theatres Populated by Ghosts

Marley Teter

Mentor: Henry Schvey

My thesis takes ghost plays (with particular emphasis on William Shakespeare's *Hamlet*, Tsuruya Nanboku IV's *Yotsuya Ghost Stories*, Stephen Mallatrat's *The Woman in Black*, and Jeffrey Hatcher's stage adaptation of Henry James's *The Turn of the Screw*) and seeks to present a method of reading them as a genre connected not only by their ghostly characters, but also by the intense need of characters to communicate their stories to a theatrical audience in the hopes of finding release from their pasts. A ghost, in its simplest definition, is the spirit of a deceased being that continues to walk the earth. Most importantly, ghosts are unable to move on to rest in peace because they have been left unsatisfied at the moment of their deaths. They may seek revenge or love or understanding or pity—but always they lack some sort of satisfaction. I argue that it is this longing that keeps audiences invested in them; they cease to exist once they have found release.

In my study, I compare the ghosts of Western tradition to those of the East and look at the theatre, itself, as a "haunted" space. I emphasize the importance of storytelling within ghost stories. Sometimes the storytellers have heard the story from another; sometimes they have experienced the haunting firsthand; and sometimes they are, in fact, the ghost of the story, itself. Regardless of the level of proximity to the tale, however, these narrators all share a common desire to find release by sharing their story. I explore how different narrators tell their tales and the different kinds of release they seek. In every case, the underlying human desire to tell a story as a means of unburdening is revealed as the same.

Performing Arts

An Individuated Worldview: One Actor’s Approach to Understanding Shakespeare with the Help of Anthropology

Daniel J. Tobin

Mentors: Henry Schvey, Robert Henke, and Annamaria Pileggi

Both critics and performing artists have long sought to determine Shakespeare's personal worldview by examining his plays and characters. In my thesis, I argue that this search is pointless: Shakespeare wrote a wide array of characters all espousing unique, individual, and sometimes contrasting beliefs. Consequently, even within the same play, critics can reach diametrically opposed conclusions based upon which character they listen to or identify with. Their fundamental flaw comes in then equating a character's views with those of Shakespeare. These characters feel authentic to us precisely because they possess realistic motivations and individuated worldviews, distinct from each other. It is the interaction of these differing worldviews that creates the world of the play, much as a society is an accumulation of its individual members, rather than a regimented culture to which everyone strictly adheres.

To illuminate Shakespeare’s use of individuated character, I conducted an anthropological case study of *The Tempest* based on my portrayal of Caliban at the Globe Theatre in 2010. As an actor, I could not attempt to comprehend the entire society of the play at once, but using a method rooted in anthropology, I could nuance my individual performance of the role in order to force the audience to listen to Caliban's perspective on the world. Subsequently, playing Oberon in *A Midsummer Night's Dream* in Edison Theatre in 2011, my understanding of what a “worldview” actually entails evolved still further. In the play, Oberon fulfills a variety of roles including king, lover, father, and teacher that transform his worldview into a complex multi-faceted perspective. It is in this nuanced complexity, so close to real life, that Shakespeare’s portrayal of character resides.
**Philosophy**

**THE POLITICAL NEUTRALITY OF NIELTSCHEISM: WILL TO POWER, MORAL NIHILISM, AND VIEWS FROM THE NIELTSCHEAN PERSPECTIVE**

Peter Gabrielli

Mentor: Julia Driver

An analysis of Nietzsche’s *will to power*, the most fundamental concept within his philosophy, reveals that Nietzscheism is politically neutral. A drive to dominate and to create new values, *the will to power* is our only motive. Nietzsche’s tracing of the origins of morality to psychological manifestations of this phenomenon uncovers support for the theory that Nietzsche is a moral nihilist—that is, that he denies the existence of moral truths. Thus, I conclude that there is no moral basis upon which political views can be ascribed to Nietzscheism. The only source of value in Nietzsche’s philosophy is prudence, which demands that we pursue power. However, a discussion of Nietzsche’s *perspectivism*, the view that we maintain subjective interpretations of the nature of the universe, demonstrates that there is also no prudential basis for any necessary link between Nietzscheism and political prescriptions. This is because different individuals can satisfy their wills to power in different ways. When adopting the Nietzschean perspective, the will to power and moral nihilism are assumed to be true; consequently, it is also assumed to be true that one benefits from increases in one’s own power, and that one is not constrained by morality in seeking such gains. Any political views endorsed for this purpose may differ depending upon one’s current degree of powerfulness. Finally, Nietzsche’s identification of transcendent creativity as the supreme demonstration of power suggests that Nietzscheism does not advocate a political life as a means of maximizing power, since such a life is not especially conducive to creativity. Rather, it is the life of the artist that generally allows for the type of creative flexibility and commitment to revaluation needed to approach Nietzsche’s ideal of the *Superman*—the symbol of the ultimate maximization of human power.

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**Philosophy**

**JUSTIFICATION FOR CONFining PRISONERS IN GUANTANAMO BAY**

Diana Dickinson

Mentor: Christopher Wellman

The attacks on the United States on September 11, 2001, by al-Qaeda terrorists who commandeered airplanes, crashing them into the World Trade Center, a field in Pennsylvania, and the Pentagon, ushered in a new era of combat for the United States with new rules of engagement, detention, and retribution. Fighting on a battlefield unlike any other, against an enemy wearing civilian clothing rather than uniforms, led the United States into a new paradigm of domestic and international law. In my thesis, I focus specifically on Guantanamo Bay and the military tribunals established by President George W. Bush, examining the major criticisms and problems that arose from these institutions: the problem of labeling prisoners, human rights concerns, the problem of retributive relief, and the question of which venue to use for prosecuting suspected terrorists. After weighing both sides of the argument, I formed my opinion as to the best way to move forward, balancing concerns with the treatment of the detainees and the need for national security. I conclude that this new battlefield and warfare require new rules and definitions, including modifying the Geneva Conventions, establishing an independent commission to investigate potential incidents of abuse, providing detainees access to U.S. courts, and allowing the government to choose between military commissions and federal trials in trying Guantanamo detainees. Due to the to the limited benefits of closing the detention center, I argue that Guantanamo Bay should remain open but the changes I suggest should be implemented in order to best protect detainees’ rights and uphold national security.
Philosophy

Defining Political Legitimacy: Religious Democracy and Human Rights
Elizabeth Merel Klein

“Political legitimacy” refers to three powers of the state: a legitimate state acts permissibly in making coercive demands of its citizens; generates an obligation in its citizens to obey the law; and has a right against external interference. What requirements must a state meet in order to be legitimate, and can a theocracy ever meet those requirements? I defend Simon May’s argument that the parties in the original position would adopt a democratic principle of legitimacy, but not a liberal principle. But legitimacy requires more than democracy, I argue. We often distinguish legitimacy from justice, characterizing legitimacy as related to the mechanism by which political decisions are made and justice as related to their content; if democracy were the only requirement for legitimacy, then the U.S. could (democratically) reinstate slavery and remain legitimate. On the contrary, I argue, such a measure would render a state illegitimate, because legitimacy also depends upon the state’s protection of a minimal set of human rights on behalf of its citizens. So, can a theocracy secure its citizens’ human rights satisfactorily? At least in theory, I argue, it can, since the set of human rights that must be protected for legitimacy is more minimal than the liberal might suppose. I propose the division of human rights into primary and secondary categories: secondary human rights, like the right to work, aim at primary human rights, like the right to a standard of living adequate for basic health. A state is justified in depriving some or all of its citizens of a secondary right, so long as it compensates them by securing on their behalf the primary right(s) at which that secondary right aims. I conclude that since democracy and the protection of minimal human rights are the requirements for legitimacy, a religious democracy may be legitimate.

Philosophy

No Means No: Giving Victims Ownership Over Punishment
David O’Grady Jung

The prosecution of crimes of domestic violence frequently conflicts with victims’ desires. In an effort to take the crime of domestic violence seriously, no-drop policies deny the victim a choice about whether to punish her abuser. To explain why no-drop policies are improper, I provide a justification of punishment based on the theory that individual victims transfer their exclusive right to punish to the state.

This theory goes against other accounts of the state’s right to punish. John Locke provides an explicit account of why the state has the right to punish. His argument has two steps: pre-legally we all have the right to punish any wrongdoer, which we then surrender to the state. I reject the first step in Locke’s argument in favor of an exclusive right to punish held only by victims. As to the second step, I side with A. John Simmons in arguing for a version of consent that allows withholding it: a victim should be able to reject state punishment and still be a citizen.

If the right to punish is exclusive to the victim, then punishment is best viewed as a process by which a victim gets what she deserves. This does not, however, take us away from punishment and towards restitution, as Randy E. Barnett has argued. Rather, hard treatment is an essential component of what the wrongdoer owes the victim.

My theory moves away from the concept of crime as a public wrong. I argue against R.A. Duff and the idea that a crime is the community’s concern. Finally, I acknowledge that this collapses the traditional distinction between tort and crime, a distinction I redraw based solely on differences in the appropriate remedy.
**Accession and Self-determination**  
*Daniel Weltman*

*Mentor: Christopher Wellman*

In this paper I examine whether there is an opposite to the right to secede on the international level: that is, whether a state can join onto another state against that second state’s will. I name this act “accession,” and I advance a permissive theory of accession which holds that the right exists in a wide variety of cases. I defend this theory against the strongest objection, which is the right to political self-determination. If groups have this right to structure their own government, they will be able to choose to block accession. I argue that many of the traditional defenses of political self-determination fail, and I advance a criticism of the right itself by giving an explanation of its value that I claim more accurately captures its importance. I argue that the right should be afforded much less importance than it traditionally has been and that, in light of this, groups have a right to accede in many cases.

**Theta/Gamma Cross Frequency Coupling as a Neural Correlate of Cognition**  
*Sean Fischer*

*Mentor: Lawrence Salkoff*

Over the last decade, numerous studies in both humans and animals have demonstrated theta (~4-10Hz) and gamma (~30-100Hz) frequency oscillations in multiple brain regions during attention and memory cognitive tasks. Cross-frequency coupling (CFC) has recently become a prominent topic in the discussion of neural correlates of consciousness. Specifically, theta/gamma phase-amplitude CFC has been suggested as a means of coding neural information both within and between different neural structures. This type of CFC has been extensively studied in rats during spatial navigation tasks, where increases in CFC occur specifically when the animal is making a decision based on previously learned spatial information. Additionally, numerous electrophysiological studies have demonstrated ion channel and network-level properties which establish resonance frequencies in neurons and brain waves within neural networks. This paper reviews recent evidence suggesting a role for theta/gamma CFC during cognition and supports the plausibility of this mechanism of *communication through neural coherence* with biophysical evidence of these mechanisms in the brain. I conclude by asserting that, although not conclusive, the enormity of the collective findings strongly suggest that CFC plays a prominent role in cognition.
Remembering Mr. B.:
The Forgotten Case of Franz Breundl
Benjamin Graham

Mentor: Carl Craver

This paper examines the case of Franz Breundl, a man who suffered from anterograde amnesia and a severe impairment of working memory. After exposure to carbon monoxide fumes, Breundl could remember no new fact or experience for more than two seconds. His condition is, as far we know, unprecedented in the literature. Gustav Störring and Ernst Grünthal originally documented the case in 1931, and the ensuing debate among German academics lasted nearly three decades. Since then, the case has been largely forgotten. Here we reevaluate Breundl’s condition in light of our current understanding of short-term memory and attentional disorders; offer a tentative neurological profile; and discuss the implication of the case for philosophical questions about the perception of time, personal identity, the distinctive values of human life, and moral agency.

Reevaluating Quantity Sensitive Stress and Rhythm
Kenneth Hofmeister

Mentors: Brett Hyde and Brett Kessler

Quantity-sensitive languages—those that make a weight distinction between syllables—exhibit four salient properties: heavy syllables are almost always stressed; heavy syllables, composed of two morae, usually show first mora prominence; words containing only light syllables exhibit perfect rhythm; and words with both light and heavy syllables frequently exhibit certain types of rhythmic irregularities. In this paper, I explain these characteristics—which can be divided into two categories: stress and rhythm—within an Optimality Theoretic framework, looking specifically at Cahuilla, Fijian, Cayuga, Tubatulabal and Banawá. My account stands in contrast to one that includes a Weight-to-Stress Principle constraint, which demands that heavy syllables be stressed but does not provide a rationale beyond the overwhelming tendency for this to be the case. I first discuss quantity-sensitive stress, particularly that of heavy syllables, and use constraints and their interactions to demonstrate why heavy syllables attract stress, as well as to explain the structure of this stress within the structure of the heavy syllable. Next, I explain the four types of perfect alternation, all of which are attested in the aforementioned languages, differentiating between them with constraint rankings. I also posit rhythmic irregularities in these languages as the result of constraints that act on one level of analysis—either moraic or syllabic—dominating constraints acting on the other level of analysis. For example, co-occurring moraic perfect alternation and syllabic clash is caused by moraic constraints dominating syllabic constraints, simultaneously eliminating candidates that exhibit syllabic perfect alternation and selecting a candidate with moraic perfect alternation. In the final section of this paper, I work through the factorial typology of the proposed constraint set, concluding that, although it fares equally well as one containing a WSP constraint, it is superior inasmuch as it explains why heavy syllables attract stress.
The Role of Emotional Stimuli in Human Memory Reconsolidation

Emily Q. Rosenzweig

Mentors: Henry L. Roediger III, Bridgid Finn, and Brett Kessler

Research suggests that reactivating or retrieving a memory will return it to a labile state from which it can be changed, a phenomenon referred to as memory reconsolidation. A recent study by Finn and Roediger (in press) demonstrated that emotional visual images presented after reactivation of recently learned material could enhance later retention of that material. Such findings have implications for the reconsolidation process, as they indicate that human memory can be changed after retrieval. The present series of studies extended the Finn and Roediger findings by testing whether auditory and positively valenced stimuli would produce similar memory enhancement when presented after retrieval. Participants learned and were tested on Swahili-English word pairs. During an initial test an emotional stimulus, a neutral stimulus, or no stimulus immediately followed the retrieval of each word pair. While negative pictures successfully enhanced later retention of word pairs when presented after retrieval, positive pictures and positive and negative sounds both failed to produce a significant enhancement. Results suggested that the valence and strength of a post-retrieval manipulation influenced whether a memory could be enhanced through retrieval. Findings may help shed light on how human memory reconsolidation works and interacts with emotion, information that may be important for improving learning situations like the classroom.

Does Variation of Contextual Processing at Encoding Improve Memory? A Test of the Encoding Variability Hypothesis

Jacob Brian Sanches

Mentor: Henry L. Roediger III

Since the encoding variability hypothesis was proposed as a possible explanation for the spacing effect, it has come under criticism because many experiments have failed to find a retention benefit via varied encoding strategies. The present experiment provided a novel test of the encoding variability hypothesis by examining whether varied encoding using a variety of contextual processing tasks across repeated study and test phases would lead to better retention of a list of words compared to a condition of constant encoding (the same processing task on each trial). The results failed to support the encoding variability hypothesis: no benefit accrued from varied encoding on retention during initial learning, even after five encoding and retrieval phases in session 1. On a final free recall test two days later, varied encoding not only failed to produce a benefit, but it resulted in lower recall performance than most of the comparison conditions. Despite the inherent appeal of the encoding variability hypothesis, evidence continues to build that varied encoding does not enhance learning and memory.
**Philosophy-Neuroscience-Psychology**

**Difficulty of Tool Use Fails to Affect Distance Perception**  
Anna Shafer-Skelton  
Mentor: Richard Abrams

Previous research has shown that subjects perceive objects as being farther away when they are out of reach than when they are in reach, even if they are actually the same distance away. This experiment was designed to determine whether the effect was due to the increased length of the subject’s reach or to the ease of interacting with the target object. Subjects estimated distances to a ball after moving or pointing to it either with or without a tool. Sometimes it was easier to use the tool, and sometimes it was harder. This is because in one condition subjects had to roll the ball up a ramp, and in the other they could pick it up with the tool. Subjects estimated the ball as being closer after interacting with it using a tool, replicating previous results. However, the ease of using the tool did not affect the estimates. This suggests that targets look closer when subjects use a tool because they are within the subjects’ reach, not because they are easier to interact with.

**Physics**

**Analysis of Stardust Foil Test Shot G080709#2 Using Scanning Electron Microscopy and Auger Spectroscopy**  
Ariel Leonard  
Mentors: Christine Floss and Frank Stadermann

The *Stardust* spacecraft collected dust grains from the coma of comet Wild II and returned them to Earth in January 2006. Although the intended primary collection medium was an array of aerogel blocks, the pieces of aluminum foil surrounding the aerogel blocks can provide useful complementary information: comet particle collisions with the foils created impact craters lined with particle residues. In order to make meaningful conclusions about the make-up of the comet based on the crater residues, it is necessary to investigate the survival rates of various particles under the impact conditions. To this end, an amalgam of particles was shot at a piece of aluminum foil under conditions mimicking the *Stardust* collision. We were able to classify both the projectile material and the residues in the impact craters using a combination of Scanning Electron Microscopy (SEM) imaging and Auger spectroscopy. Classification of the projectile material revealed a mixture of titanium nitride, titanium carbide, silicon nitride, olivine, alumina, and diamond, but no silicon carbide was found, despite its expected presence in the sample. Preliminary analysis of the impact craters using SEM imaging suggested relatively good survival rates for many of the grains, but there were difficulties identifying these in subsequent Auger analysis, particularly with respect to known titanium-rich craters.
**Periodic Trajectories in Complex Classical Mechanics**

*Uriel Morone*

**Mentor: Carl M. Bender**

Previous work has shown that when a classical particle is placed in an analytic potential and given complex energy the resulting trajectory will spiral around in the complex plane, eventually filling up all space. Our investigations found that in fact there are special curves in the complex-energy plane for which the particle’s trajectory will form a closed periodic orbit. These energy curves are reminiscent of energy eigenvalues that arise in quantum mechanics.

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**Phase Transitions in the PT-symmetric Z (3) Model**

*Timothy D. Wiser*

**Mentor: Michael C. Ogilvie**

The nearest-neighbor $Z (3)$ spin model gives a simple model of the quark deconfinement phase transition. If quarks at nonzero chemical potential are included, the model is no longer Hermitian, but retains PT-symmetry. We make a numerical investigation of the PT-symmetric $Z (3)$ model in complex external field and observe three types of two-point correlation function behaviors. Then, a related PT-symmetric $Z (3)$ model with complex coupling is solved exactly in one dimension with zero field. The model has a phase transition in one dimension and two distinct masses.
Mandatory Retirement on the Indian Supreme Court

Sheehan Band

Mentor: Sunita Parikh

What effects can institutional limitations have on judicial behavior? I explore this question with regards to the Supreme Court of India. Specifically, I consider the effects of the mandatory retirement age of justices on their levels of participation in court. With the intention of painting a more accurate picture of judicial behavior on the Indian Supreme Court, I compare different groups of justices who were forced to retire by the mandatory limit with regards to level of participation in order to discover what relationships appear. I compare groups that differ on the basis of tenure length in order to determine whether proximity to retirement could be related to level of participation, and I will argue that such a relationship is in fact supported by the data. I then compare the justices on the basis of whether or not they ever become Chief Justice of India. I find that the differences in participation between these two are much smaller than the differences between justices grouped by length of tenure. Finally, I consider previous high court experience and justices who are elevated from the oldest and most reputable courts as compared to those who were elevated from other state courts. I find that the differences between these two groups are small as well. Ultimately I argue that the strongest factor in determining whether or not a justice will participate more or less is proximity to retirement as measured by length of tenure.

American Polarization and the Impact of Southern Republican Voters

Alexander Bensick

Mentor: Steven S. Smith

The purpose of this study is to evaluate competing explanations of the political polarization within the United States. This study uses data from the American National Election Studies to track partisan polarization in ideological attitudes in order to discern whether the rise of Southern representation and leadership in the House Republican Caucus signaled a change in Republican party values and spread Southern conservative ideology to non-Southern Republicans.
**Education and Trade**

Wen Ting Cai

Mentor: Andrew Sobel

The primary goal of this thesis is to understand the relationship between opinions on international trade and the college experience; primarily whether an individual’s college attendance and economic course study influences how he formulates his trade preferences. Based upon the modern literature on globalization, the source of trade opinion resides less in social-economic status (class, occupation, level of employment) rather depending more on college enrollment. A person with at least one year of college exposure seems to make an individual significantly more likely to support trade than a person without any college education. Within this framework there is debate among competing theories as to the extent that college education influences trade preferences, whether this influence stems from uniqueness associated with general college life or a result of exposure to economic theories. This thesis holds that it is the college culture which shapes individual opinions. College is the first time individuals are exposed to international culture and interact with the outside world at a time when their ideas about these issues are just being formed; whereas individuals who don’t attend college are less exposed to the international community and form more protectionist views. To test this theory, this research experiment uses statistical analysis on specific data collected from college students. In the end, this project seeks to provide more insight into the influences on an individual’s trade preferences and a better understanding of the reason behind the correlation between college exposure and pro-trade sentiments.

**Motivations for Proliferation: Iran’s Nuclear Ambitions**

Alice Goldenberg

Mentor: Andrew Sobel

This paper will focus on the Iranian nuclear development program, describing the reasons why Iran continues to push the line between safely developing nuclear technology for peaceful civilian purposes and developing an active nuclear weapons program. This study will discuss a methodological explanation of why states are driven to develop nuclear weapons by reviewing existing theories on the subject. The contending theories are that states are motivated to proliferate based on a technological imperative, internal pressures of domestic turmoil and public opinion, or external pressures of status concerns and security threats. After discussing these theories, it will then provide a descriptive history of Iran and its nuclear development program in order to illuminate the reasoning behind Iran’s nuclear ambitions. This structure will allow for conclusions to be drawn about Iran’s specific motivations for turning its peaceful nuclear program into a threatening nuclear weapons program. This study claims that Iran is motivated to proliferate primarily by external pressures stemming from its aspiration to become a regional superpower.
A Collegiate Understanding: Economic Knowledge and Trade Opinions
Jennifer Halket

Education is one of the best indicators of a person’s trade preferences. Researchers have found that if a person went to college, he is more likely to be in favor of trade. Past research has found that a college education is a better predictor of trade preferences than sex, age or employment status. But why is this true? In this paper I explore the possible underlying factors of a college education that make a person more likely to be in favor of trade. I test this theory using an internet survey that was administered to a sample of students currently attending Washington University in Saint Louis. My findings prove that an economic understanding of trade is a predictor of a student’s trade preferences.

The Government’s Role in the Start-Up Nation: A Case Study of Israel’s Hi-Tech Sector
Renée Kramer

Israel has gained increasing attention from the international community in regards to its rising economy and position on the global market. Most of the success has been associated with the dynamic hi-tech sector that has Israel leading the world (only second to the United States) in launching innovation and new companies. Despite economical deterrence, like Israel’s ostracized location in relation to its consumers and threats from neighboring enemies, Israel remains an attractive haven for multinational enterprise expansion (like Intel and Microsoft) and foreign direct investment. Much of the hi-tech industry’s prosperity has been attributed to Israel’s talented human capital, noted by their skill set, motivation and maturity learned through their required military service in the Israeli Defense Force, along with educational experience in some of Israel’s top credited universities such as Technion and unique entrepreneurial spirit to continually foster start-ups. Other causal factors include the 1990s influx of Soviet immigrants with engineering backgrounds and the establishment of venture capital in Israel. While existing research has focused primarily on the cultural factors that are believed to have prompted the high tech sector’s rise, economic growth changes occurred following the implementation of new governmental programs enacted by Israel’s Office of the Chief Scientist. Analyzing these policies shows how the government has impacted the business environment but beyond financial means. Furthermore, predicting how the government will help maintain Israel’s comparative edge is important to understand, as other countries compete as alternative hubs for research and development for international companies. Israel’s development sheds light on its future political and economical activity, while setting a model to what other countries may adopt or modify in their own economic policies.
The Politics of Sport: Assessing the Political Impact of Mega-events on Authoritarian Host Countries

Corinne Mitchell

Mentor: Guillermo Rosas

Authoritarian countries are increasingly being selected as hosts for international sporting events. Potential host countries actively pursue the opportunity to host these mega-events because of numerous purported economic and cultural benefits. Due to the scale of these events, they have become inherently political in nature, giving rise to a growing body of literature that analyzes their political effects. Among the more significant conclusions of this literature are hypotheses that assert that hosting a mega-event can have a democratizing influence on an authoritarian host country. In this paper, I analyze these hypotheses using quantitative data of mega-event hosts throughout history. I find evidence to suggest that hosting a mega-event has an effect on the authoritarian nature of authoritarian states and that this effect tends to be towards greater liberalization. The evidence does not support any conclusions about whether the strength of the opposition has an effect on the propensity of an authoritarian host country to democratize, raising questions about the possible causal mechanisms behind this phenomenon. This research is significant as it is one of the first times that these hypotheses have been taken out of a case-study context and quantitatively tested in a cross-case analysis.

Jim Crow’s Middle Class: An Examination of the Socioeconomic Impacts of Devolution on Colorblind Legislation

Monica Smith

Mentor: Gary J. Miller

The GI Bill of 1944 aimed to assimilate World War II veterans into the fragile economy by deferring them from the labor force through a series of military benefits. These benefits resulted in significant socioeconomic mobility for the veterans who chose to take advantage of them. Because the benefits were available to all veterans, even in the context of a racially charged political climate, the GI Bill became known as the first item of “colorblind” legislation. Despite this legacy, African-American veterans faced many difficulties in accessing their benefits, begging the question of how a single piece of colorblind legislation resulted in widely varying outcomes for veterans based on race. This study proposes that state-level implementation of the GI Bill of 1944, as mandated by devolution, permitted local agencies and bureaucratic figures to undermine the provisions of the Bill. To examine one of the least studied but most impactful elements of the bill, access to higher education, a statistical analysis of black veteran representation in higher education confirms the existence of significant state level differences and supports V.O. Key’s black-belt hypothesis regarding the ways a white minority reacts to a large black population. Additionally, a case study of the implementation of GI Bill benefits in the state of Georgia indicates the role of devolution in permitting state-level actors to undermine the tenets of the federal legislation. This study demonstrates that devolution of the GI Bill of 1944 contributed to differential distribution of military benefits based on race, suggesting that devolution may be instrumental in the propagation of discriminatory practices.
**Political Science**

**SOVEREIGNTY AND TERRITORY**

*Daniel Weltman*

*Mentor: Frank Lovett*

In this paper I examine the link between the concept of sovereignty and the concept of territory. I argue that the link between them is a contingent one: sovereignty can be described without territory in some cases, but not in others. I draw on examinations of the concept of sovereignty to argue that sovereignty can be thought of as non-absolute and as divisible, a claim that is in opposition to many classical and contemporary views. I then argue that absolute, Westphalian sovereignty requires the concept of territory as a means of delineating the bounds of the absolute sovereign power, but that alternative conceptions of sovereignty can be described without using territory.

**Psychology**

**THE EFFECTS OF TESTING ON TRUE AND FALSE RECALL**

*Alexandra Mendelle Altholz*

*Mentors: Kathleen McDermott and Yana Weinstein*

This experiment examined the effects of testing on true and false recall. Participants were presented with spoken DRM word lists, each designed to activate a false memory for a given critical lure word. Participants were given between zero and five initial recall tests (based on between-subjects testing group conditions) after hearing each list, and were then, after a five-minute delay/distractor task, given a final recall test on all word lists. We analyzed the data for both true recall and false recall on initial recall tests and on the final recall test, and looked at the data in terms of both individual testing condition and testing group. We found that, on initial recall, false recall—recall for critical lure words—increased as the number of initial recall tests increased, but that true recall—for list words—did not increase to a statistically significant degree. The number of initial recall tests did not affect true or false recall on a final recall test. These findings are not congruent with the findings of previous literature, perhaps because of experimental design differences in timing.
Is It More Difficult to Recruit Participants with Personality Disorders? Aiming for a Non-biased Sample in Epidemiological Studies
Ayse Canan Altindas

Mentor: Thomas Oltmanns

This study used the data of 1,405 participants of an ongoing longitudinal research on the personality changes in later life to look at whether variables such as the presence or the severity of a personality disorder, employment status, annual household income, ethnic group and level of education had an effect on the difficulty of contacting and completing an appointment with a potential participant. Moreover, we also evaluated whether interest in the study varied according to the type of personality disorder of the potential participant. We predicted that participants with personality disorders (PDs) which are characterized by high conscientiousness (Obsessive Compulsive PD) and high attention seeking (Narcissistic and Histrionic PD) would show more interest in the research by returning the reply postcard. Our results showed that there was not an effect of the presence or the severity of the personality disorder on difficulty of contacting the participants. Employment and annual household income had a significant effect on the difficulty of reaching a participant, with longer working hours and higher income predicting more calls to reach the household. The level of education did not have a significant effect on the difficulty of reaching a participant. Moreover, the type of disorder had no predictive value of the potential interest of a participant. The results of the current study suggest that the recruitment methods implemented by the ongoing study is effective in reaching both clinical and non-clinical populations. It also suggests that rigorous recruitment processes with varied contact methods help acquire a non-biased sample in epidemiological studies.

Language and the Outgroup: Examining the Differences Between Monolingual and Bilingual Preschool Children’s Social Group Preferences Based on Language
Michelle Brown

Mentor: Lori Markson

This study examines the differences between monolingual and bilingual preschool children’s social preferences based on language for languages that they are not familiar with. Replicating prior research, monolingual English-speaking children show a clear preference for people who speak English over people who speak a foreign language. Bilingual English-other language speaking children also show a preference for those who speak English over those who speak a foreign language though this preference was not as strong as monolingual English-speaking children’s. Thus, there may be something about being bilingual that leads to a reduction in the bias that is shown in monolingual children for those who speak the same language.
The Effect of Ownership and Possession on Children’s Resource Allocation

Lana Hompluem

Mentor: Lori Markson

The endowment effect proposes that owning a resource affects a person’s economic decisions and thought processes regarding the resource. This study explores how 4- to 5½-year-old children allocate resource in the dictator game and whether sharing behavior is moderated by the sense of ownership of the resources. Participants were assigned to either an endowed or non-endowed condition and were asked to give out 10 stickers between themselves and an anonymous recipient. We predicted that participants in the endowed condition would share fewer stickers than participants in the non-endowed condition. Though results were insignificant, we found that those in the endowed condition shared more on average than those in the non-endowed condition. In addition, participants in both conditions demonstrated some sharing behavior. These results confirm the prevalence of altruism in children’s decision making. These findings also suggest that ownership of the resources should be a consideration in the design of the dictator game.

Personality-Related Learning Experiences

Paul Johannet

Mentor: Simine Vazire

This study investigated a new model for predicting how people learn about an aspect of their personality that they didn’t previously know. According to the personality-related learning experiences (PRLE) model presented here, information learned from the self should be more desirable and associated with higher levels of participant convincedness than information learned from others. To test this model empirically, the authors investigated whether and to what extent self-other knowledge asymmetries predicted the learning process in 117 college students’ narratives discussing an experience when they learned something new about their personality. The authors examined the relative observability of the traits learned as well as the association between (a) the desirability of the information learned and the informational source, (b) the desirability of the information learned and the participants’ level of convincedness, and (c) the informational source and the participants’ level of convincedness. Almost all of the participants recounted learning about a highly observable personality trait. Consistent with the predictions of the PRLE model, both learning about desirable information and high levels of convincedness were associated with learning from the self. In contrast, learning about undesirable information and low levels of convincedness were associated with learning from an informant. These findings improve our understanding of how personality-related learning experiences unfold.
**Psychology**

**Do Our Personal Relationships Affect Our Well-being?**

*Katrina Jongman-Sereno*

Mentor: Simine Vazire

Do our personal relationships affect our well-being? Previous studies have yielded mixed results regarding the connection between personal relationships and well-being. The present study combined different methods of measuring well-being such as the Positive And Negative Affect Schedule (trait version) and the Satisfaction With Life Scale. In addition, the present study examined participants’ perceptions of the quality of their personal relationships with six different people, including parents, friends, and romantic partners. We further examined these six people’s perceptions of the quality of their relationship with the participant. We were interested in how self- and other-perceived qualities of these relationships correlate with self- and other-reports of well-being. In the present study, 191 participants nominated up to 6 informants. We obtained reports from a parent for 128 participants, at least one hometown friend for 75 participants, at least one college friend for 50 participants, and a romantic partner for 33 participants. In general, self-other agreement of relationship quality and well-being was significant. We also found that the qualities of different types of relationships do seem to uniquely contribute to the targets’ levels of well-being. Overall, parents were the one type of informant that were consistently found to be significant when examining self-reports of well-being and self-reports of relationship quality, self-reports of well-being and the other-reports of relationship quality, and other-reports of well-being and self-reports of relationship quality. The connection between personal relationships and well-being is noteworthy because well-being is related to positive living and better health.

**Psychology**

**Differentiation of Writing and Drawing in Preschool Children**

*Shoko Otake*

Mentor: Rebecca Treiman

There has been mixed evidence in terms of whether children, before they enter formal schooling, understand some features that distinguish writing from drawing and, if this is true, if this understanding is cultural or universal across language systems. We tested this issue by asking American preschoolers from ages 2 to 5 to write and draw four different stimuli and by comparing features of their productions to that of Chinese preschoolers aged 2 to 6 years. Although we were not able to find significant results for many of the features that we analyzed, American children did not show a preference for doing the writing task on Chinese grid paper that Chinese children did and tended to refrain more from doing the writing task, suggesting that the differentiation of writing was at least partially made on both a universal and cultural basis.
Psychology

Personality and Flourishing in Middle-aged Adults: How Do We Identify Those Who Are Doing Exceptionally Well?

Katie Lee Salis

Mentor: Thomas Oltmanns

The current study uses two different scales (self-report and a new observer-report) in order to measure flourishing in a subset of 200 participants, selected randomly from a representative sample of adults (55-64 yrs.) living in the greater St. Louis area. The observer-rated measure includes subscales concerned with self-awareness, generativity, resilience and dynamism. Inter-rater reliability for the subscales of the observer-rated measure range from an average of .58 for self-awareness to .78 for dynamism. Internal consistency for the scale is measured as Cronbach’s alpha at .8, and the two flourishing scales have a convergent validity of .33. Discriminant validity, however, is weak between extraversion, the self-report scale and the observer-rated scale, while high between the other four personality factors (openness, conscientiousness, agreeableness and neuroticism). Discriminant validity between the self-report scale and the five factors is also weak, suggesting that perhaps the observer-rated scale may be a better measure of flourishing. Results showed that both the self and observer ratings of flourishing correlate positively with having higher levels of income and education. Both were inversely correlated with neuroticism and Cluster A personality disorders. Self-reported flourishing also showed significant correlations with relationship status, having children, being female, and Cluster C personality disorders. Further research is needed to understand these discrepancies and to gain a deeper understanding of the most effective manner in which to measure flourishing.

Psychology

Group Affiliation, Motivation, and Task Performance in Preschool Children

James Siddall

Mentor: Lori Markson

Social categories have been found to have a large impact on people’s attitudes and behaviors towards others. Previous research has found that even elementary-school-aged children will hold a significant bias against members who are not part of their social group. Other research has also concluded that when children are negatively compared to children of the other gender, they tend to slow down their performance on a novel task and like the task less than children who are negatively compared to children of the same group. The current study aimed to further these lines of research by investigating whether or not the effect described by Rhodes and Brickman (2008) would extend to children if essentially meaningless color teams (green and yellow) were used instead of gender as the two social groups. It was hypothesized that children who were compared to children on the other team would not increase their performance across trials when compared to children on the same team and that they would also tend to have lower self-evaluations and believe that children on the opposite team would like the game more than children on their team. Initial results have found that children’s performance on a novel tracing task was not significantly affected by whether children were compared to a fictional peer on the same team or the other team. Results also indicate no significant interaction of condition on children’s self-evaluations or task-liking. This currently suggests that children do not alter their behavior or beliefs based on whether they were compared to someone on the same team or the other team, though the small number of participants could account for the lack of findings.
National Attitude and Its Effect on Political Beliefs and Concerns

*Julia Smith*

Mentor: Alan Lambert

This research originally set out to investigate different facets of patriotism and nationalism and their potentially varied effects on subsequent dependent measures of national attitude, mood, and political concerns. The study implemented an essay-format priming procedure with four experimental conditions (uncritical/critical vs. patriotism/nationalism) and one control condition. For simplification purposes, the two nationalism conditions were excluded from analyses and the two patriotism inductions were collapsed into one condition. In comparison to the control condition, participants in the patriotism condition felt significantly higher affective pride, support for national security, and anti-free speech sentiments. A follow-up study will explore the inter-relationship among these items, hypothesizing a trade-off between concern over national security and support for civil liberties.

The Internet as a Functional Communication Alternative for Socially Maladapted Individuals

*Aaron C. Weidman*

Mentor: Randy Larsen

In the current research, we examined whether socially adept individuals (i.e., the Rich-Get-Richer hypothesis) or socially maladapted individuals (i.e., the Social Compensation hypothesis) gain the greatest benefits from online social communication. Participants reported the time they spent using online social communication media, self-disclosure styles, feelings and motives regarding online social communication, and a number of relevant personality traits. Consistent with the social compensation hypothesis, socially maladapted individuals reported spending as much time communicating online as their socially adept peers. Further supporting the social compensation hypothesis, socially maladapted participants reported more online self-disclosure—though less offline self-disclosure—less inhibition when communicating online, reduced social pressure when communicating online and a greater motivation to grow their social network through online communication than their socially adept peers. Thus, results suggest that the Internet serves as a functional alternative to face-to-face communication for socially maladapted individuals.
Meditation, with its roots in Asian religion, is no longer an unfamiliar practice in the United States. Focusing on the benefits of meditation and mindfulness practices to calm the mind and the body, the medical community no longer dismisses meditation as a marginal, “new age” practice. Now these practices are being studied scientifically. At the same time, traditional Buddhist practices are being adapted to meet needs other than the purely spiritual. Rather, they are being used primarily for the purpose of stress reduction and pain management. Used in this way, practices that are based on Buddhist meditation are often referred to simply as “mindfulness,” and, in many cases, it is presented with no indication of its Buddhist religious associations or roots. It has become part of the larger discussion in Western medicine on the mind-body connection. Buddhism has often adapted to different cultures as it has spread over the past two millennia. It is most recently being adapted to fit the needs of the American culture that is constantly afflicted by stress. The new Americanized meditation practices show a shift in how we understand the relationship between the mind and the body. This thesis provides a brief overview of the process by which traditional Buddhist meditation practices have become “Americanized” and then discusses three major areas where meditation and mindfulness are becoming increasingly important: hospital pain management care, prison rehabilitation and end-of-life or hospice care. Mindfulness is being integrated into hospital pain management care in order to treat patients in a holistic way while reducing dependence on medication. It is also being used in prisons in order to encourage prisoners to resist the dehumanization that occurs in the prison system and establish a rehabilitation regimen that is sustainable after release. And finally, hospice centers are making use not only of mindfulness but also of Tibetan meditation practices in order to help patients have a peaceful dying process.
The Ages of Chilean Political Literature

Elise Miller

Mentor: Ignacio Sánchez Prado

The military regime of Augusto Pinochet maintained political power in Chile from 1973 to 1989, and over the course of these 17 years committed numerous human rights violations, the worst of which being the political torture and assassination of Chilean citizens. This thesis examines the literary response to these human rights violations by analyzing literature published in varying stages of Chile’s transition from a military regime to a democracy.

In exploring Chilean literature against a changing political milieu, it becomes evident that authors utilize genre to create historical proximity or distance from the dictatorship in their writing. The novels *Lumpérica* and *No pasó nada*, both published during the Pinochet regime, precisely describe the experience of life in a dictatorship, in a way which connects the reader with the protagonists of the novels, and the concrete details of life during this time. Meanwhile, the theatrical play *La muerte y la doncella*, published just after the fall of the military regime, creates more distance between the spectator and the events of the dictatorship, since they are portrayed as characters’ memories rather than displayed in real time. Ultimately, the films *Salvador Allende* and *Machuca*, both produced recently in a stable Chilean democracy, distance the spectator even more from the dictatorship, by emphasizing the positive aspects of the Allende administration which Chile lost after the coup d’état in 1973, rather than the negative aspects of the Pinochet government.

In a study of Chilean political literature through the lens of genre and historical context, we find that the literary techniques employed in novels, theatrical plays, and films to establish distance between the reader and the events of the dictatorship mirror the growing collective desire to separate the dictatorial past from the present in the formation of a new democratic identity.
Devenir-Molina: hacia una lectura reparativa de
El beso de la mujer araña,
de Manuel Puig
Benjamin Murphy

Mentor: Claire Solomon

Published in 1975 during the military dictatorship in Argentina, El beso de la mujer araña de Manuel Puig narra una relación amorosa que sucede entre dos presos en una cárcel en Buenos Aires, y ha sido interpretado casi unánimemente como subversión política radical. Identificando un enlace directo entre la relación homosexual que ocurre en la novela y una política revolucionaria de izquierdas, los críticos de El beso se han enfocado específicamente en la sexualidad del personaje principal, Molina, como fuente del significado político de la novela. Para mi tesis, yo emprendo una reevaluación de esta interpretación. Problematizando el vínculo gratuito entre sexualidad y política, intento recuperar la figura de Molina de las concepciones totalizantes de la homosexualidad proveídas por la crítica políticamente orientada. Para hacer esto, cuento con la práctica interpretativa que Eve Sedgwick ha llamado la “lectura reparativa,” y que conlleva la transición desde una estrategia lectiva basada en la omnisciencia y la anterioridad a una basada en lo inmediato, el desconcierto, y el desconocimiento. En vez de la Homosexualidad fija y siempre-al ya conocida que describe la crítica de El beso, leo la sexualidad de Molina como articulación fragmentada y única que desafía las miradas clasificantes de sus lectores. Partiendo de la trillada narrativa de seducción homosexual fundada en el climax y la exposición al cual Molina ha sido frecuentemente secuestrado, considero Molina en una seducción alternativa fundada en la oclusión, un juego de superficies que ocurre en el tiempo-real del lector. Así, entiendo la figura de Molina dentro del fenómeno del devenir-mujer que describe Gilles Deleuze. Huyéndose de cualquier identidad sexual establecida, Molina se define precisamente al rechazar las definiciones sexuales existentes. La sexualidad de Molina últimamente no es un concepto, sino un movimiento, un devenir que rastrea la fuga de Molina, y que nunca termina.

Becoming Molina: Towards a Reparative Reading of Manuel Puig’s
El beso de la mujer araña
Benjamin Murphy

Mentor: Claire Solomon

Published in 1975 during the military dictatorship in Argentina, Manuel Puig’s El beso de la mujer araña narrates an amorous relationship that takes place between two cellmates in a Buenos Aires prison, and has been interpreted almost unanimously as a case of radical political subversion. Identifying a direct link between the homosexual relationship that occurs in the novel and a revolutionary leftist politics, critics of El beso have focused specifically on the novel’s main character, Molina, as the source of the book’s political meaning. For my thesis, I undertake a reevaluation of this interpretation. Problematizing the gratuitous link between sexuality and politics, I attempt to recuperate the figure of Molina from the totalizing conceptions of homosexuality provided by politically oriented critics. To do this, I draw on an interpretive practice that Eve Sedgwick has called “reparative reading,” which entails the transition from a reading strategy based on omniscience and anteriority to one based on immediacy, disconcertion, and unknowing. In place of the fixed and always-already known homosexuality described by the criticism surrounding El beso, I read Molina’s sexuality as a fragmented and unique articulation that defies the classifying gazes of its readers. Departing from the exhausted narrative of homosexual seduction founded on climax and exposure to which Molina has frequently been sequestered, I consider Molina within an alternative form of seduction founded on occlusion, a play of surfaces that occurs in the real-time of the reader. In this way, I understand Molina within the phenomenon becoming woman described by Gilles Deleuze. Fleeing from any received sexual identity, Molina defines himself precisely by rejecting existing sexual definitions. Molina’s sexuality is, ultimately, not a concept, but rather a movement, a becoming that traces Molina’s flight, and that never ends.
**The Master in America: An Examination of the International Influence on Modern Architecture and Art’s Effect on Life**  
Marc Hajjar  
*Mentor: Carol Camp Yeakey*

When one walks through the gridded streets of an American city, one can easily see many styles of architecture. The average urbanite most likely does not know the architectural history behind the structures they pass by daily. It is time to enlighten the public about the origins of the modern skyscraper.

This project will set out to examine three key topics: first, the time period surrounding the birth of modern architecture; second, three key modern architects—Walter Gropius, Mies van der Rohe, and Le Corbusier (referred to as “The Masters”)—and their design philosophies and architecture that influenced a new generation of American modernists. Finally, the question of why art and architecture exist will be examined in a way that allows the reader to formulate his or her own viewpoint. Art and architecture are not divorced from the social context in which they are conceived. Many of the architects this paper examines have strong social stances towards architecture and design with a purpose. Could art and architecture be created without a purpose? What are the implications of socially ignorant design? These very large questions run throughout this paper, and the reader will hopefully develop his or her own conclusions.

Due to the ingenuity of Walter Gropius, Mies van der Rohe, and Le Corbusier, American urban architecture dramatically changed from 1937 to the mid 1950s. This paper will examine that the current shape of American skyscrapers and how international figures like Gropius, Mies, and Le Corbusier influenced its design, subsequent architects, and New Urbanism.

**To Heat or to Eat: The Detrimental Effects of Competing Commodity Costs on Low-Income Families**  
Madeleine Pannell  
*Mentor: Carol Camp Yeakey*

From 2001 to 2009, food and energy market trends led to the highest prices that United States had seen in decades and profoundly stressed the budgets of low-income families. This paper explores how disruptions in the energy and food sectors led to the co-morbidity of food insecurity and energy insecurity in the United States, and how that co-morbidity differentially affected the health of low-income families. Trends in the production, consumption, and prices of food, natural gas, heating oil and electricity highlight the vulnerability that low-income families face as residential consumers of basic necessities that have volatile supply-chains. The effects of this volatility on low-income families are measured with the results from consumer surveys, reports and data collected primarily by the Energy Information Administration, Department of Health and Human Services and Department of Agriculture. This study found that varying percentages of low-income families struggled to pay for food or for heating their homes, and as a result reduced their consumption of food and energy, as well as other necessities including healthcare and prescription refills. The incidence of these tradeoffs correlated positively with the increases in food and energy prices in all states. While the overarching agents of rising food and energy insecurity have roots in global commodity markets, households in states that had more comprehensive programs for energy assistance made less frequent and less severe sacrifices than families in states that provided less protection. In addition, families with incomes slightly above the poverty line were more likely than households below the federal poverty line to be food insecure, which suggests that broader eligibility policies for food assistance programs could have a great impact on reducing food insecurity. As globalization expands, further research and policy-related attention is needed on the effects of fluctuations in commodity markets on vulnerable populations throughout the world.
Women, Gender, and Sexuality Studies

The Stigma of Male Sexual Fluidity: The Limitations of Conceptualizing Masculinity Within Informal Public Spaces

Ayla Karamustafa

Mentor: Alexis Matza

This study calls attention to the correlation between learned gender norms and the development of sexual identity. The purpose of this research project is to investigate whether the process of conceptualizing masculinity within informal public spaces effectively discourages male sexual fluidity and limits male sexual experience. Sexual fluidity is defined here as identifying with a sexual orientation that is not fixed, due to a rejection of sex and/or gender as the determining factors in an ideal sexual partner. The phenomenon of sexual fluidity is most often associated with female sexuality, as opposed to male sexuality. I conducted interviews with nine men, ages 18-24, who identify with the fixed sexual identities of gay or straight. Analyzing the trends, patterns, and significant comments which emerged in the interviews, I demonstrate how television, pornography, and interpersonal relationships enforce this hegemonic masculine identity and the appropriate sexual behaviors associated with this ideal. This includes the discouragement of sexual fluidity. I then take an in-depth look at each participant’s sexual history, revealing that the gay-identified participants occasionally exhibit sexually fluid behavior, yet strongly identify with their gay sexual orientation. I posit that this sexually fluid behavior is linked to deviating from the hegemonic masculine ideal by coming out of the closet. Still, both the gay and straight men in my study felt strongly connected to their fixed sexual identities and resistant to the label of sexually fluid. I argue that the apparent correlation between learned gender norms and the development of sexual identity serves to dispute the assumption that male and female sexuality are fundamentally different entities.

Crafting Sex and Gender: Intersex Medical Experience in the Early-to Mid-Twentieth Century United States

Wes Sebring

Mentor: Corinna Treitel

Although several works have been written recently about intersex medical management, little attention has been paid to the intersex people themselves who were the subjects of medical management. Scholars thus far have focused on doctors and scientists and have often neglected or overlooked the roles that patients played in the management process. This thesis places patients at the center of the management story. I employ a Foucauldian analysis of the power dynamics of intersex medical management that highlights the diverse roles that patients, parents and doctors played in regulating and creating sexes and genders. Furthermore, this thesis explores how interacting with the medical establishment limited or expanded the opportunities for self-fashioning that were available to intersex individuals. For this research project I traveled to the Alan Mason Chesney Medical Archives at Johns Hopkins University and examined thirty-three patient case files of Dr. Hugh Hampton Young. Dr. Young was a urological surgeon at Johns Hopkins in the first half of the twentieth century who pioneered several methods of performing genital reconstructive surgeries on intersex individuals. The individuals whose files I examined were patients of Dr. Young between 1902 and 1943 and they ranged in age from approximately one year old to over forty years old. The majority of the patients were diagnosed with pseudohermaphroditism, although some were diagnosed with “true” hermaphroditism. This history aims to give voice to an historically silenced population and to shed light on how sex, gender and gender identity were crafted and regulated in the early- to mid-twentieth century United States.
Women, Gender, and Sexuality Studies

Reading “Robert R.”:
The Production of Knowledge about America’s First AIDS Patient
Dan Woznica

Mentor: Shanti Parikh

This report is the outcome of an undergraduate senior honors thesis on the production of knowledge about “Robert R.” Robert was a sexually active, lower-class black male adolescent from St. Louis who died in 1969, and who in 1987 became widely known as America’s first AIDS patient. Data was obtained by way of qualitative text analysis of medical and newspaper, magazine, and television reports, as well as semistructured, in-depth interviews and correspondence with ten scientists and journalists involved with the case or other early AIDS cases. Drawing from a feminist methodology and a theoretical framework of Eve Kosofsky Sedgwick’s method of “reparative reading,” this paper examines how scientists and journalists produced knowledge about the patient, the political implications of this knowledge, and how we can best mitigate these implications’ causes and effects. The argument is made that scientists produced knowledge about the patient via a complex dynamic process of biomedical and biotechnical diagnoses and claims that the patient’s diseases suggest he engaged in homosexual sex. Journalists then connected the patient’s alleged sexual activity with his race, as opposed to his sexual orientation, to establish the theory that Robert was a male prostitute. Scientific and popular knowledge about the patient is political insomuch as the former inscribes heterosexual/homosexual systems of difference on his body and the latter silences discussions of black male homosexuality. We can best mitigate these implications’ causes and effects by deconstructing scientific ideology about similar alleged first AIDS patients and demystifying the history of black male homosexuality in 1960s St. Louis. Most importantly, scientists and journalists produced knowledge about the patient via a hierarchical “translation model” of knowledge production, and the mistranslations between scientists and journalists in this case underscore the need to create a new “negotiation model.” Implications for current research on the history of HIV are discussed.
The Reach of Superstardom: Quantifying the Impact of NBA All-Stars on Ticket Sales and Expected Team Performance
Jeremy Carlson and Andrew Shaw

Mentors: Tat Chan and Bill Bottom

Conventional understanding of outstanding individuals in organizations, defined as "superstars" in various arenas, suggests influence beyond direct action by the individual. In professional basketball, salary regulation and varying measures of performance and notoriety on and off the court problematize an objective and conventional definition of superstardom. Through its All-Star weekend, the National Basketball Association (NBA) honors its best and most popular athletes, with player selection determined by votes from both fans and NBA coaches. If All-Star Game inclusion is the objective measure by which the league defines its superstars each season, what then are the implications for each team of signing an All-Star? Although skill largely determines whether or not a player is an All-Star rather than All-Star inclusion determining skill, we posit that being recognized as a top-tier player impacts perception of an All-Star player's team. To what extent, then, does All-Stardom influence conventional measures of team skill and popularity?

In this thesis, we measure the impact of these All-Star athletes on both ticket sales and expected performance for their respective teams. We use ticket sales as a proxy for team popularity because of the availability of the data, because of its sensitivity as a measure and because of its logical link to overall team profitability. We define expected performance through Point Spreads and Point Totals as anticipated by Las Vegas odds-makers. To strengthen our conclusions, we control for other measures of team popularity in our data. Our data set represents each NBA game played for the greater part of a decade, with games ranging from the 2002-2003 season through the 2007-2008 season. By quantifying direct and indirect influence of superstars in professional basketball, we will explore the broader implications of outstanding individuals beyond direct action.

The Benefit of Corporations: Examining Incommensurability in the Triple Bottom Line
Aaron Samuels

Mentor: Stuart Yoak

This research examines the concept of the Triple Bottom Line as a guideline for the business decisions of publicly traded corporations. The Triple Bottom Line is an emergent concept in sustainability literature aiming to redefine the framework for evaluating the success of business performance. Proponents contend that it is the responsibility of corporations not merely to maximize profit for their shareholders, but to evaluate corporate success based on economic, environmental and social components. I argue that the concept, in its current form, is incomplete because proponents have not thoroughly addressed one of its primary weaknesses: the issue of incommensurability. This theoretical problem prevents the exchange of values across the different components of the Triple Bottom Line and therefore prevents the concept from being action-guiding.

This paper has three objectives. First, I clarify this potentially toxic problem with the Triple Bottom Line. Second, I examine the business jargon describing the Triple Bottom Line and re-describe the concept with a philosophically robust conceptual foundation. Third, I provide direction for sustainability research by proposing potential solutions for the problem of incommensurability.

I argue that, even in the absence of objective standards for the exchange of values between components of the Triple Bottom Line, if structures are created in which businesses can agree on common practices for creating economic, environmental and social value, then the Triple Bottom Line can still be action-guiding for corporations.

I conclude with a case study of B-Corp, a recent attempt to structure this sort of corporate agreement through the creation of a certification system for businesses with a social agenda. I argue that the success of B-Corp confirms that it is possible to shift corporate focus from maximizing shareholder profit to maximizing value for economic, environmental and social stakeholders without an overall loss of efficiency.
Printmaking allows me to use many different processes to create art: silk-screening, mono printing, drawing and painting. I am able to utilize mass, shape, and line in a unique, surprising manner. More importantly, it enables me to print multiples of the same image, design and manipulate them in a different manner at various times. I create flowers, circles, lines, stripes, zigzags, curved forms, and doodles to design striking pieces. These elements are often repeated in an unpredictable way. Predictability is in and of itself an element that I use in conjunction with unsuspected occurrences. I push the work by utilizing traditional design rudiments and couple them with non-traditional doodles, shapes, lines, matrices and color. The pairing of the two allows me to add expression, excitement and color to what began as a simple floral pattern, minimalist plaid or a series of stripes. For example, I have filled a space with stripes that continuously alternate in color and simultaneously encompassed unusual, delicate painterly shapes within the same field, carefully allowing the eye to unite the two contrasting visual elements. Not only do these repetitive forms exist within my work, they are constantly present within our universe. There is a direct link between the forms and space that exist in my work and space that we surround ourselves within each day.
What makes you tick? Who is your master? Who controls your thoughts? How are your thoughts shaped? How do they form? How can they be controlled? Today, those questions and finding their answers are a science. Advertising, news, movies—they all, at their base, center around these questions. Being an artist is also being in the business of changing ideas.

The idea, or more accurately the thought process, I want to change is how the viewer perceives his or herself. My work is about identifying or altering what makes you feel and think as you do through exploring the causes and effects around me. I want to make the viewer aware of what controls them. Is it anxiety, fear? Is it the media, government? At its best, my work challenges how the viewer perceives the self. My work is about identity and discerning who and what shapes it. John Locke once wrote that personal identity consists, “not in the identity of substance, but...in the identity of consciousness.” The identities formed with our own consciousness, however, are fundamentally altered by society. My work is about invoking unease in the viewer so that they question how they perceive themselves and the world around them. I want to make the viewer insecure, uneasy, or confused in order to make them thoughtful. I want to confront the viewer with the greater reality that everything they think and feel is malleable and manipulatable. So I ask you again, WHAT MAKES YOU TICK?
The Function of Omission
Danielle Jackson

Mentor: Noah Kirby

I am constantly affronted by contrived information, limiting my ability to have open interpretations and plans of actions. Excluded information is commonly forgotten and the lethargic mind ceases to question what it was never programmed to know. Ignorance to the functional and mechanical capabilities of new and old technology restricts my access to its innovation as well as to its consequences. To contest the authoritative motives of such processed data, I must gain access to what has been restricted by exploring an object from its atomic level, emotional presence, historical/contextual bias and potential functions. After which, I have the ability to assign and take ownership of the programmed information. I am, thus, no longer limited by the previous iteration of the object or the function.

I am moved to design a system that reassigns the material and placement of objects. I achieve this by coating metal with gauze and glue to allow gestural and organic characteristics, stripping books of their informational data, and defining solids through lightweight wire and gauze. I contrast height and weight proportions to emphasis the reassignment of the object as it functions in space. The distorting of the material coupled with the openness of the structure creates a play on assigned function. By distilling solid information and objects to their structure, I address the importance of the idea over the predefined shape. Through my search to gain access and power over a governed intelligence, I gain access to possible intentions and functions of pre-contrived information. I wish to allow others to gain understanding and motivation to question everything. The awareness of a confined order and predefined truth can allow people ultimate access and experience of their individual interpretations overtaking the majorative.
Art history classes in my experience: the lights go off, the projector turns on, and the snoring commences. But what's boring about the Romans pulling a copy/paste on Greek art, medieval artists putting the “God” in “gaudy,” or painting a pipe and labeling it “Ceci n’est pas une pipe?” Art History Is Actually Hilarious is a satirical guide to 25,000 years of art history for everyone who fell asleep and missed the comedy. Completely unabridged, semi-critically acclaimed, and perhaps a little facetious, the book covers art from the Stone Age through the Postmodern era and raises important questions such as, “Who would win in an (armless) boxing match: the Venus de Milo or the Venus of Willendorf?”
The female body has always been an object of scrutiny and objectification. Cultural views and societal rules have continually managed its acceptable shape, size, style and beauty. These expectations create a disjunction between the ideal figure and the reality that distinguishes individual bodies. Women battle everyday with the delusive standards set by society, striving to attain perfection while searching for satisfaction within their real bodies. The female body is a site for this source of conflict. Beauty and perfection are in battle with internal vulnerability and discomfort.

The images in this series reflect the struggle a woman endures within her body and her psyche. Aberrations, imperfections and frustrations arise through the unidentifiable figures. Some photographs convey a sense of harsh examination and criticism, indecision and anxiety. Others disorient the known observation of the female figure and reinterpret its representation. Rather than a search for the standard, the body is studied through lines, incongruities, and forms.

I strive to challenge and recontextualize the portrayal of the female body in an attempt to redefine expectations of the body for women and reinterpret how the body is appreciated. Although cultural and societal traditions may always remain, I hope to show a glimpse of the perfection of the real woman.
What is it like to be a human being? What does it feel like to be comprised of two different entities of body and conscious, caught somewhere in the middle of the desires and ambitions of the soul and the limitations of the body?

In my work, I explore the disparities that arise between the corporeal body and the individual psyche as they grapple to define our personal experiences of the world and conception of self. In an attempt to generate meaning amidst existential chaos, I allow my marks and imagery to mimic psychological and emotional responses, addressing potential futility, frustration, and wild hope. Vacillating between the theatrical and the blank void of the page, media and mark unite to conceptually explore the lines between the perceived and actual world. Drawing from experiences with autoimmune digestive disorder and psychological dissociation, or separation from one's body, I investigate the self as a product of this duality, where body and psyche struggle to exert order and demand meaning from our life's experiences.
Wii Controlled Gaming for Physical Therapy

Eric Boccio, Tonya An and Andrew Bolaño

Mentor: Jack Engsberg

Each year, about 800,000 people in the United States experience a new or recurrent stroke. About 65% of the people in the United States who have survived a stroke live with minor to severe impairments, such as hemiparesis. The resulting deficits affect a survivor's quality of independent living and ability to perform everyday tasks. In recent years, physical therapists have explored the possibilities of using video games to make the rehabilitation process more interactive and to increase patient motivation. The project outcome is a process which permits a person with stroke to perform effective upper extremity therapy using existing Internet computer games. We have designed a hardware-software interface that successfully translates simple motion plans or movements of the patient into keystrokes and mouse clicks and allows the range of motion of the patient to be calibrated so that the individual can successfully control the game. The Wii Remote's (or “Wiimote”) infrared (IR) sensor detects movements of an IR source attached to the patient, and the Wiimote is wirelessly connected to the PC using Bluetooth software.

The long-term goal of this research is to develop home-based virtual reality computer games to improve function and participation in persons with disabilities. Ultimately, this will be a very powerful tool for the physical therapist to collect electronic patient data and allow for home training, significantly decreasing medical costs. The interface system we have designed is not specific to any type of therapy or class of patients; instead the movement-emulated controls program has the flexibility to be customized by the therapist to fit individual patient needs.

Percutaneous Repair of Mitral Valve in Patients with Mitral Regurgitation

Brendan Cummings, Michael Dunphy and Travis May

Mentor: Traves Crabtree

Mitral Regurgitation is a serious medical condition that results in reduced cardiac output and can lead to various other heart diseases. The condition occurs when blood leaks backwards through the mitral valve into the lungs during a contraction of the left ventricle. There are several ways in which a mitral valve may fail, the most common form occurring when the valve prolapses and the leaflets extend past their closed position. Ordinarily, the chordae tendineae limit the range of motion of the leaflets by acting as a tether, keeping the leaflets from flailing freely. When the chordae tendineae elongate or rupture, the leaflets fail to control blood flow and mitral regurgitation ensues. The goal of the project is to implant an artificial chordae tendineae via catheter to correct mitral valve prolapse. The artificial cord must work in a wide range of patients, many of whom suffer from additional cardiac pathophysiologies, and be less invasive than existing valve repair procedures. The concept must permanently anchor an adjustable length of biocompatible material to both the papillary muscle and leaflet while the heart is beating with minimal biological response. By choosing a catheter-based approach, fewer side effects and quicker recovery times can be expected along with significant financial savings.
AN EEG-BASED BRAIN COMPUTER INTERFACE FOR REHABILITATION AND RESTORATION OF HAND CONTROL FOLLOWING STROKE USING IPSILATERAL CORTICAL PHYSIOLOGY

Sam Fok, Charles Holmes, Raphael Schwartz, Thane Somers, Mark Wronkiewicz and Jessica Zhang

Mentors: David Bundy and Eric Leuthardt

Stroke is the leading cause of severe, long-term disability in the United States. The loss of motor control impedes activities of daily life, and in cases of severe stroke, current therapies fail to provide sufficient restoration of motor control. Development of brain computer interfaces (BCIs) has made possible new devices for countering the effects of a variety of nervous system diseases and injuries, but the conventional BCI paradigm uses signals from primary motor cortex which controls the opposite (contralateral) side of the body to facilitate restoration. It is these same sites that are most likely damaged in stroke leaving the patient hemiparetic. Recent neuroscientific studies, however, have found a distinct cortical physiology associated with same sided, or ipsilateral, hand and limb movements in regions distinct and separable from primary motor cortex. To capitalize on these novel findings, we developed a BCI that uses these novel ipsilateral signals to drive a powered, hand orthotic which opens and closes a hemispheric stroke patient's hand. The BCI device uses electroencephalograph (EEG) recordings associated with ipsilateral hand intentions (the hemisphere opposite the stroke) to control the orthotic on their affect limb. With successful creation and implementation of this project, we will create a fundamentally new approach of restoring function in hemispheric stroke survivors by enabling the unaffected side of the brain to control their stroke impaired hand.