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Foreword

Commencement is the time of year to celebrate and salute the work of our dedicated graduates, and the 2010 edition of Washington University Senior Honors Thesis Abstracts (WUSHTA) aims to do just that. Our student contributors, a group whose number has increased substantially from last year, continue to impress us with the breadth of their talent and depth of their knowledge. A brief perusal of the titles of their projects reflects not only the University's commitment to a varied academic program but also the detail with which our students investigate their chosen topics. Each of these students has taken on the challenge of their own school or department's most rigorous path of study and made their own contribution to a growing body of research. Some of the seniors represented in WUSHTA are recipients of departmental prizes and awards, and many of their projects stem from research performed during prestigious internships and programs abroad. A significant number of these students have also participated in at least one of the University's Undergraduate Research Symposia, presented each fall and spring. The benefits of affording our undergraduates these experiences of compiling, organizing and presenting their original ideas are immeasurable. This professional training will no doubt serve them well into the future, whether they choose to continue their academic careers at the graduate level or to enter the work force upon graduation.

We again owe a great deal of thanks to each academic department and school for encouraging their top students to undertake these in-depth research 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. Funding for WUSHTA comes from the bequest left to the University by the late Kathryn Hoopes, whose far-reaching vision for undergraduate research and its promotion and publication continues to enrich the lives of more and students each year.

Once again, we are pleased and honored to present the work of the students of the class of 2010!

E. HOLLY TASKER
Editor

HENRY BIGGS
Director, Office of Undergraduate Research
Associate Dean, College of Arts & Sciences

Tiffany A. Johnson

Mentor: Korina M. Jocson

The purpose of this research is to analyze the role of schools in shaping the experiences of Black male youth in impoverished, urban areas throughout America. Using the HBO series, The Wire, as a cultural text and case study, I argue that the boys’ work ethics and aspirations, family situations, and performance in schools all play critical roles in contributing to their prospects for the future. Jay MacLeod’s social reproduction theory, which identifies barriers to social mobility that inhibit an individual from achieving American ideals of success, provides the framework for my research. I also draw heavily from Pedro Noguera’s book, The Trouble with Black Boys, which explores ways to improve educational outcomes for historically marginalized students from different backgrounds and restore society’s faith in public education. By examining two adolescent males—Michael Lee and Namond Brice—attitudes toward school and attaining knowledge inside and outside of the classroom, I conclude that schools are pivotal because they can either reinforce or abate said pressures. My argument highlights various ways the boys attempt to mitigate the societal pressures they endure rather than being passive victims of their circumstances. I also provide recommendations for how, substantively, different members of society—including, students, teachers, administrators and policy makers—can make positive strides toward improving the quality of the public education experience.

The Heart of the Matter: Disparities in Morbidity and Mortality Due to Heart Disease in African Americans

Susan Kimiko Kunihiro

Mentor: Garrett A. Duncan

This thesis investigates the reasons behind why African Americans experience a higher incidence and death rate than their non-Hispanic white counterparts when it comes to heart disease, with the purpose of determining how to overcome these disparities. A variety of sources were used in the investigation, from personal interviews with health professionals to a literature review of scientific studies, government pamphlets, and a documentary, among others. African Americans have complex cultural experiences, including the distrust of the medical community as a result of the legacy of exploitation of black bodies by medical professions, most notably in the Tuskegee Syphilis Study. Additionally, the tradition of soul food is a source of pride as well as a source of high blood pressure and high cholesterol. African Americans have decreased access to hospitals, doctors, heart-healthy food options, exercise areas, and medical procedures as compared to whites, which demonstrates racism prevalence in health care. Also, physiological differences in African Americans show salt sensitivity, increasing the likelihood of high blood pressure, a precursor to heart disease.

To reduce these disparities, changes need to be made from the individual to the national level. Meeting community needs starts with training community members to provide health education and requiring physicians to learn how to practice medicine in diverse populations in order to obtain a medical license. To promote participation in cardiovascular research, investigators need to establish a rapport with and illustrate the relevance of the research to African Americans. Greater access to health care services is especially relevant during these times of health care reform. Increased voter registration initiatives empower African Americans to enact changes on municipal, state, and federal levels regarding their health. By understanding the complex sources of heart disease morbidity and mortality, overall health disparities can begin to be addressed.
Home is Where the History Is: Nostalgia, Authenticity, and Identity in American House Museums
Caitlin Whitney Astrue

Mentors: Peter Benson and Heidi Kolk

Historic house museums are often represented as static places, moments frozen in time. While this time capsule image is alluring, it also distorts the reality of the consistent reinterpretation of history based on different forms of evidence. This paper examines the role of nostalgia and authenticity in historic preservation and communicating history to a public audience. In the short history of American historic preservation, homes have been a primary target for preservationists. These homes, often of well-respected and wealthy individuals, are converted from spaces of private habitation to spaces for public consumption. The themes of nostalgia and authenticity play a central role in this process as people used the argument that historic homes can offer a unique perspective on history. House museums also provide insight into the centrality of family in the discussion of American values and identity. I use Mount Vernon, nationally revered home of George Washington, and the Campbell House Museum, a downtown St. Louis home, as case studies examining how these institutions shape national and local identity respectively. I draw on my experience from site visits to Mount Vernon and the Breakers, a Newport Mansion, as well as my summer as an intern at the Campbell House Museum to look at the relationship between the narratives the visitor encounters and the decisions the institutions make about what and how to convey information to the public. Given the wide range of historic homes in the United States, I also review a variety of publications covering historic homes, historic districts, and related policy. The findings in this paper include how historic preservation emerged as a field in the United States, how citizens use nostalgia to argue for preservation, the role of social history in reinterpreting the past, and what challenges historic house museums face moving forward.

Driving Away the American Dream: Sprawl, Social Capital, and New Urbanism
Sam Bear

Mentors: Randall Calvert and Heidi Kolk

This project aims to connect ideas about urban design to the problems related to the decline of social capital that Robert Putnam describes in Bowling Alone. The ascendancy of automobile-oriented suburbs has had an enormous impact on social life in America, in part because suburbs were the first form of development to promote—or even allow—anything but dense, centralized living. This transformation resulted not just in geographic dissolution but also in the psychological and social isolation of the American people. We lost the ties to our former communities, and, in neighborhoods that were built to be driven by at 45 miles per hour, we never felt the need to form bonds to our new ones. In this thesis, I explain how the problem of place and the disappearance of the public realm are inherent attributes of suburban sprawl, and I argue that New Urbanism offers a wellspring of potential social capital and a model for the rejuvenation of American civic life. Through a multidisciplinary approach that includes both a review of existing literature and an original case study of New Town—a community in St. Charles, Missouri, that will eventually be home to 20,000 residents—I explain how New Urbanist design principles like human scale, mixed-uses, mixed-housing types, porches, and public space help to foster social capital within a community. Moreover, I argue that while New Urbanism is most closely associated with greenfield developments like New Town and Seaside and Celebration, Florida, these design principles are readily and frequently applicable to urban infill and public housing projects as well transit-oriented developments.
In sixty years, no redevelopment attempt has yet succeeded in stabilizing North St. Louis. Politicians, urban planners, and area-wide residents allowed, or couldn’t prevent, disinvestment and population decline from consuming the inner city of St. Louis for decades. It is time to change old habits. Experts now agree that the long-term effects of a city in decline are wide-ranging and impact a region’s economic performance.

Developer Paul McKee, joining with other area leaders, has proposed an unprecedented $8.1 billion redevelopment plan, called NorthSide Regeneration, of some of the region’s worst slums in North St. Louis. The potential of this project to re-stabilize St. Louis’ economy and population growth is immense. Equivalently, if improperly executed, this project has the potential to destroy any future hopes for revitalizing the central city. Because of the regional economic proportions of this project and St. Louis’ economic issues, all St. Louisans are staked in the city’s urban problems. We must work together to fend them off.

Inaccessibility of information about the cause of urban decline and the ramifications of proposed developments reduce the likelihood that McKee’s urban redevelopment will succeed. A more knowledgeable population can learn from previous development failures and will be able to help raise questions about how best to ensure the region’s economic rebound. We can reduce the risk of development failure and regional economic collapse by raising awareness about how economic, political, and social issues may negatively impact urban redevelopment.

This project offers residents the resources to become more knowledgeable about urban redevelopment. Developing a knowledge base is the first step to becoming a more informed and engaged community in the region’s issues. With the help of an informed community, we can better guide our city to a more successful future.
Seneca’s Philosophy of the Emotions
Ian August Mosley

Mentor: George Pepe

This essay examines the work of Lucius Annaeus Seneca (4BC – 65AD), concentrating on his philosophy of the emotions, and particularly his seminal work De Ira (On Anger). It begins by attempting to give a systematic account of his principles for understanding the emotions in his intertwining accounts of ethics and psychology—how we are to understand the place of emotions in the soul, and why Seneca holds it to be a moral duty to strictly exclude emotions from one’s mind. The essay explores how these positions are derived from certain fundamental arguments, such as his argument that anger is unnatural for human beings, as well as an argument posing a dilemma between reason and emotion as motive powers in the soul.

This account finished, the essay then turns to examining Seneca’s account of emotions in relationship to other philosophers, particularly those of the Stoic school. The controversy whether his view of the soul is strictly compatible with what we understand as the “orthodox” Stoic view, that the soul is a single whole, is given particular attention. Seneca, much controversy has alleged, understands the soul to have aspects that are both rational and irrational simultaneously—a position called “dualism.” Ultimately, the view is defended that, when understood in the context of the Stoic system, Seneca’s view of the emotions is compatible with the idea that the soul is a single, undivided whole.

Women and Magic in the Greco-Roman World
Elizabeth Pfohl

Mentor: Judith Evans Grubbs

Over a period of one thousand years, fifth century BCE to fifth century CE, people practiced similar forms of magic throughout the Greco-Roman world. Men and women practiced the same kinds of magic, though the evidence of the curse tablets and magical papyri suggest that women practiced magic less frequently and with less variety. In addition to erotic spells, women’s spells concerning medical and economic circumstances typically relate back to sexual matters. Differences between the Greek magical papyri, the curse tablets, and the Demotic magical papyri reveal a more positive attitude toward women within Egyptian culture in comparison with Greco-Roman culture.
Speaking Identity: Language Politics and the Preservation of the Thakali Language in Nepal

Dena Birkenkamp

Mentor: Geoff Childs

This study examines the relationship between village-level language usage and state-level law in Nepal. I address the politics of language and draw upon historical documents and interviews to examine how members of ethnic groups use language to position themselves socially, economically, and politically. In such a linguistically diverse nation as Nepal, language plays a key role in the interrelated issues of marginalization, ethnic identity, culture, and politics. Since the fall of the monarchy in 2008, Nepal has been undergoing significant structural changes. Ethnic activists in the political center of Kathmandu work for social inclusion in the new republic as the government drafts a constitution. Since these activists inform the debates surrounding ethnic minority rights, my research focuses on their personal views of Nepal’s past and future language policy. The concern for linguistic representation at the federal political level must necessarily be general and address the multitude of ethnic minority languages in the same way, leaving me to question how national debates and policy practically affect members of a single ethnic group at a distance from Kathmandu. My research of Thakali language usage in Lower Mustang, Nepal, reveals how variable language usage within the community is but how, nonetheless, language can be used to present an image of group unity. The Thakali primarily speak Nepali, but I find that Thakali leaders promote Thakali language preservation in their effort to position the Thakali in the new structure of the state.

Body-conscious Smokers: Why They Initiate, Why They Continue to Smoke and How to Help Them Quit

Paul Cheh

Mentor: Peter Benson

Tobacco use and unhealthy body image are two major health issues impacting public health today. This paper examines a specific population of individuals—body-conscious smokers—in an effort to prevent others like them from smoking and to improve cessation rates among those who already smoke for body image reasons. By analyzing the literature on smoking and body image, this paper examines why these individuals initiate smoking, why they continue to smoke, and some opportunities to help them quit. Beginning in the 1920s, tobacco companies advertised smoking as a method of suppressing appetite, and as a result people perceive and use cigarettes as a weight control method. And, in fact, scientific research has shown that smoking does correlate with a lower average body mass index (BMI). However, despite smoking’s effect on weight gain, the serious health consequences, poor diet choices, and correlations with psychological eating disorders associated with this coping mechanism are all explanations why smoking for body image reasons should be avoided. Effective holistic interventions and smoking cessation techniques are discussed in light of research that has uncovered a wide range of underlying factors which influence body-conscious smokers to initiate their dangerous and addictive practice.
Anthropology

The Opening and Closing of Space and Belonging: An Examination of Healthcare Access for the Latino Population in St. Louis

Wesley Gibbert

Mentor: Bradley Stoner

This project began as an attempt to evaluate the effects of the closure of La Clinica on its patient population. However, it quickly evolved into a more wide-reaching assessment of healthcare access for the Latino population in St. Louis. In its final iteration, this project evaluates that healthcare access situation through the lens of Anthropology, Sociology and Geography theory in order to provide as deep an understanding as possible not just of the daily realities of healthcare access but also some of the underlying reasons for and mechanisms of those realities.

The foundation of this project is the interviews and surveys conducted to evaluate healthcare access in the St. Louis area. The interviews were conducted with community leaders, healthcare personnel and other interested parties to establish an overview of access in St. Louis. The surveys were conducted with Latino community members who would likely have used La Clinica, and they provided a ground-level portrait of the realities of healthcare access mentioned above. From this foundation, a model of healthcare access in St. Louis showing the importance of community and the availability of community space was constructed, which hopefully provides some new insight into the healthcare access needs and realities of the Latino population of St. Louis.

Anthropology

Male Circumcision as HIV Prevention: The Politics of Local Perceptions and Global Public Health Policy in Uganda

Anupam Kumar

Mentor: Shanti Parikh

Recent studies have shown that medical male circumcision (MMC) reduces HIV transmission by over 50%. However, broad institutionalization of MMC carries profound societal implications. Circumcision has long been practiced as a rite of passage in many communities in Uganda and throughout sub-Saharan Africa. As the government of Uganda seeks to create a nationwide network of MMC sites as part of an effort to combat the spread of HIV, its policies may encounter diverse local responses. Thus, cultural understandings of male circumcision and of non-circumcised men should be illuminated prior to implementation of the MMC policy. During the summer of 2009, I conducted ethnographic research and interviews in Eastern Uganda to examine how men currently understand the procedure of MMC, as it relates to masculinity and adulthood, and how government-sponsored MMC may be received in these communities. The conclusions of this work specify the need to emphasize the importance of empowering men to reflect on personal responsibilities in deciding to get circumcised and practice safe sexual behaviors. This work is a preliminary analysis of the important transition of male circumcision from a cultural practice embedded within a larger coming of age process into state-sponsored public health and medical procedure.
Anthropology

“It’s Just Gay”:
An Analytic Look into the Lives of Black Lesbians in South Carolina
Laura Lane-Steele

Mentor: Shanti Parikh

This research examines the gender identities, coming out narratives, and homophobic attitudes of self-identified Black lesbians in South Carolina. I will show that historical influences of institutionalized racism on Black gender have played a role in many aspects of these women’s lives. The strict expectations in this Black community surrounding appropriate Black gender and sexuality that were created as a response to the hypersexualization of Black women and the emasculation of Black men influence the ways in which these women construct their own Black lesbian gender identities and their sexual relationships. These expectations, supported by Black churches and families, also play a large part in these women’s coming out narratives. While many of these women’s families hold religiously-based homophobic beliefs, they do not disown their daughters but instead adopt an ambivalent “don’t ask, don’t tell policy.” I will show that the homophobic attitudes these women hold towards Black men and other Black lesbians are also rooted in the Black community’s response to institutionalized racism. They view sexual relationships between two masculine people (or what I will call homomasculinity) in a negative light because of historically influenced expectations of Black masculinity. I will also argue that these lesbians both reinforce and resist heteronormativity in their identities and relationships.

Anthropology

The Pueblos Jovenes of Lima: Negotiations for Basic Services in the Squatter Settlements of Lima, Peru
Molly Laverty

Mentor: Bret Gustafson

The shantytowns of Lima, Peru, present a unique topic of study of the role of community identity and its constructive function in marginal settlements. Community action and solidarity are at the core of the reason why the shantytowns have experienced such success and permanency since the initial land invasions of the twentieth century. The residents have discovered and proven that their voice, and not their exit, is what will bring improvement to their settlements. In determining the most effective means of interacting with the government, I have explored how these diverse community groups are organized, who organizes them, where the community resources come from, and how resources are distributed within the community. Through a cohesive community and strong willed actors, the residents of these towns have created a shining example of negotiation for services and amenities from the government, while at the same time creating thriving urban centers where once there was only desert sand.
Health Care Ethics: Anthropology of Youth Workers in Cape Town, South Africa
Nora McCormick

Mentor: Peter Benson

This thesis explores the value of community health care workers, also called "youth workers," employed by the Young Men's Christian Association (YMCA) to work with at-risk youth in Cape Town, South Africa, to address problems of substance abuse. It is an anthropological study of youth workers facing a methamphetamine crisis set against the backdrop of colonial abuse and the racial tensions it left behind. One key problem I witnessed is the apparent lack of training the youth workers receive to work with at-risk youth. Therefore, I question what combination of traits creates a good community health worker: training, empathy, or a similar background to the client? This thesis draws on the works of anthropologists Joao Biehl, Nancy Scheper-Hughes, and Paul Farmer to further question the use of youth workers and points to the need for enriched training and ethical reflection on the social and technical skills necessary to effectively do community-based care and social services delivery in at-risk populations.

Pixka Bat es Mucho, Except When It’s Not: Language Ideologies, Policies, and Use in the Basque Autonomous Community in Spain
Robin A. Meyer

Mentors: Bret Gustafson and Joachim Faust

Euskara, the Basque language, is one of a handful of indigenous European languages, and it is currently spoken by approximately 530,000 people in northern Spain and southern France. Since 1939, the number of monolingual Basque speakers in Spain has dropped to zero. In 1978, a new government declared Euskara co-official with Spanish in the newly-defined Basque Autonomous Community (BAC). Despite thirty years of teaching and promoting Euskara, everyday use of the language has not increased significantly since this time. This thesis seeks to understand popularly held ideas about language and language policy in the BAC in order to investigate possible reasons why knowledge, but not use, of Euskara has increased. Using the framework of language ideologies and linguistic difference developed by Judith T. Irvine and Susan Gal, I explore ideas about the relationship between Euskara and Basque cultural identity held by the Basque government, monolingual Spanish speakers, and native Basque speakers. Language ideologies among these groups contrast sharply, and I argue that the failure of policies and initiatives to increase the use of Euskara is due, in part, to a general lack of recognition and validation of these competing ideas. I demonstrate the differences in these groups’ ideas through an analysis of legal documents, government-sponsored PR materials, personal and organizational blogs and websites, observations and conversations from a month spent living in Donostia-San Sebastian, Spain, and Jacqueline Urla’s observations of language use among radical Basque youth. Understanding the role of language ideologies in shaping public debates over language such as in the BAC can help illuminate a more nuanced understanding of the challenges currently facing multilingual communities and provide a useful lens through which to explore questions of globalization and the politics of multicultural citizenship in the world today.
Alternative Food Initiatives
Sara Rasmussen

Mentor: Peter Benson

From popular media to academic research, food issues are increasingly at the center of public attention. With the rise of chronic disease, foodborne illness, and public concern over the industrial food system, there has never been a more important time to understand food consumption in the United States. This thesis explores how anthropology, rural sociology, public health, urban planning, and racial studies approach the study of food access. The thesis walks a line between models exploring the consumer as the locus of food politics and health and more social models and initiatives that explore food and social justice. I look at how consumer-driven, citizen-driven, and community-driven movements differ in their environmental and social impacts.

Innovations in Identity: The Amazigh Social Movement of Morocco
Nikki Spencer

Mentor: Robert Canfield

This study examines the evolution of the Amazigh social movement of Morocco from an informal group focused on culture to a formal entity that strives for political involvement through manipulations of Amazigh identity. This assessment draws from interviews with Amazigh activists in Rabat conducted in November and December 2008. Through the first-hand accounts of multiple generations of activists, I retrace the origins and evolutions of the social movement in its advocacy for Amazigh/Berber cultural rights in a nation dominated by elite Arab culture. Despite the liberal policies of a new king and the establishment of the Royal Institute for Amazigh Studies, many activists sought to create a formal Amazigh political party as a group-making project. I posit that the resulting debate within the movement required compromises on the different levels of Amazigh identity. Legal hurdles to the establishment of a political party based on ethnicity forced activists to avoid the term and redefine the nature of the Amazigh people to legitimize the need for a political party. Other Amazigh activists, who preferred the traditional focus on cultural demands, also repurposed their identity to include all Moroccans within the Amazigh fold as well as “Amazighize” the pre-existing political parties. Moroccan activists’ involvement in international groups and communities also changed the conception of “Amazighité” to incorporate an international level. Meanwhile, women in the movement were transitioning from their roles as traditional reproducers of culture into political activists. Finally, many activists in the social movement attempted to portray Amazigh demands as equivalent to the democratization of Morocco. Further studies are needed to document the future efforts of Amazigh activists to “Amazighize” Morocco through alternations in the identity of a movement, people, and nation.
The unique ecology of the Bolivian Andes, and the resultant adaptations of the people living there, produced a subsistence system based on complementarity, that is, the production of different products in different altitudinal (ecological) zones and the exchange of those products. Today’s faster, cheaper, and easier mobility challenges established norms of social interaction, economic structures, and subsistence strategies. This thesis examines the effects of improvements and expansions in mechanized transportation on social relations in changing economic and social contexts. Specifically, the social institutions addressed are the desconocido, conocido, casero, and compadrazgo relationships, as well as the position of ayudante. Backed by observations, interviews, in-country experience, and bibliographic sources, this thesis argues that instead of current transformations resulting in a depersonalized and socially stagnant marketplace, social institutions are still impactful in Andean Bolivian economic activities. The social institutions present in these marketplaces are, in some cases, continuations of institutions formed and used during the era of llama caravans. Llama caravans, employed before all-weather highways and high-tonnage trucks, were once the major means of good distribution across long distances and between altitudinal zones. Shifts in technological and economic contexts have not eradicated social interaction; instead, interaction between people is still governed by culturally informed social norms.
Direct-to-Consumer Advertising of Prescription Pharmaceuticals: The Creation of the Informed Patient-Consumer and the Development of a New Sick Role

Michaela Wilson

Mentor: Peter Benson

Direct-to-consumer advertising of prescription pharmaceuticals is a paradoxical concept: the targets of this advertising are incapable of directly purchasing the products being promoted, and demand for the products advertised should be limited by the number of people who need treatment, not consumer desire. Despite this apparent paradox, this form of advertising is ubiquitous in American media. My work explores the logic behind direct-to-consumer pharmaceutical advertising and examines its implications on the expected patient-consumer role, using the idea of biological citizenship as a way of understanding the relationship between the rights and responsibilities associated with pharmaceutical patienthood. Through an examination of public information that is available to patients, this project revealed the ways in which advertising has created the expectation of a confident, informed, pro-active patient, who is in charge of his or her own health. This expectation has created a considerable potential for placing blame on patients who are unable to fit into this new sick role. Because a change in patient roles inevitably impacts the role of physicians, my work also considers the effects of shifting significant healthcare responsibilities from the physician to the patient. Through this analysis I hoped to uncover the obligations associated with being a biological citizen and discover the duties held by those with relationships to these citizens.
Martha Rosler (b. 1943) is an American artist whose work in a variety of media regularly addresses political and social issues. She is known as a political artist because her activism and aesthetics are inextricably bound. She first came to public attention with her politically motivated series of photomontages on the Vietnam War, entitled *Bringing the War Home: House Beautiful* (1967-72). In this series of thirteen photomontages, Rosler integrated details of photographs of the Vietnam War published in *Life* magazine into images of the perfect American home taken from the women’s journal *House Beautiful*. Rosler’s main intention in creating the series, as clearly indicated by its title, was to bring the war home in the minds of American viewers, to make them more fully aware of the conflict that was half a world away. Although this series, which is arguably her seminal contribution to twentieth-century art, has often been included in general discussions of the art that addressed the Vietnam War, it has not been analyzed extensively. A deeper understanding of the series only emerges from a consideration of the work in its full and varied contexts, which include the Vietnam War and the opposition it generated; the history of photomontage; the fledgling feminist movement; the critical debates being conducted in late 1960s America on the nature and functions of art; and the events and circumstances of the artist’s own life. A contextual analysis suggests that the effectiveness of Rosler’s *Bringing the War Home: House Beautiful* series was a unique product of its time and underground political context.
Red Brigades and Bare Feet: The Practice and Study of Medicine During the Cultural Revolution

Oliver Jawitz

Mentor: Robert Hegel

The Great Proletarian Cultural Revolution of the People’s Republic of China (1966-1976) is generally considered a period of misguided political leadership which had disastrous consequences for the country. The many tragic excesses of the Cultural Revolution period, including the burning of cultural artifacts, the brutal persecution of intellectuals and mass killings, are all well documented and beyond dispute. While it is an accepted fact that the Cultural Revolution directly caused the suffering of millions of Chinese, it is important to ask whether the results of the Cultural Revolution were all negative. The purpose of this essay is to take a very detailed look at the practice and study of medicine in China during the period of the Cultural Revolution in order to fairly determine whether anything significantly positive occurred during this period. Beginning with a review of the state of medical education and practice in the decades before the Cultural Revolution, this essay explores then existing dichotomies between urban and rural medicine, prevention and treatment of disease, and Western medicine and traditional Chinese medicine. At the beginning of the Cultural Revolution the Chinese Communist Party proclaimed that only very few Chinese were benefiting at all from the practice of medicine in the country. Radical changes were needed, including a mass exodus of doctors from the cities to the countryside and an overhaul of medical study and training. This essay evaluates these goals in terms of legitimacy and feasibility, concludes that major reform was necessary, and examines whether these goals were achieved in any meaningful way. By examining four of the most significant changes in the Chinese health care system during the Cultural Revolution—reform of the medical education system, the advent of the barefoot doctor, the impact on the practice of traditional Chinese medicine, as well as shifts in the field of medical education and research—this paper demonstrates that significant, positive health care reform did occur during the tumultuous and often unfortunate and damaging period of the Great Proletarian Cultural Revolution.

Sodium Bicarbonate Administration and Outcome in Preterm Infants

Carly Berg

Mentor: Terrie Inder

The treatment of acidosis in the sick newborn with sodium bicarbonate has been debated over many years. In the 1970s, several studies noted an association between rapid sodium bicarbonate infusion and an increased risk for intraventricular hemorrhage (IVH). Since then, the literature on sodium bicarbonate has grown to include potential mechanisms for the increased risk of IVH, analyses of its effectiveness in treating acidosis, and reports on the other consequences of bicarbonate administration. Recent literature has focused on the immediate (<4 hours) physiological and metabolic effects of sodium bicarbonate infusion, but there are few recent large scale studies that further investigate the outcomes of infants who received sodium bicarbonate. The first goal of this study was to describe the characteristics of very low birth weight infants treated with sodium bicarbonate infusions in the first seven days of life in the Neonatal Intensive Care Unit (NICU). In addition, we aimed to explore the association between sodium bicarbonate therapy in very low birth weight infants and immediate (acid-base balance), short-term cardiorespiratory and neurological outcomes. This was achieved by a retrospective analysis of the data collected from a chart review of 994 very low birth weight infants admitted to the St. Louis Children’s Hospital NICU from 2002 to 2006. We found that those (n=165) receiving sodium bicarbonate were more immature at birth and had greater severity of illness. Further, sodium bicarbonate therapy was associated with a raised risk of adverse short-term outcomes (intraventricular hemorrhage, death prior to discharge) even after adjusting for patient illness and immaturity. Sodium bicarbonate therapy did not adjust acid-base status after administration. Thus, the benefit of sodium bicarbonate therapy in preterm infants remains unproven.
Genetic Screen to Identify Regulators of Synapse Formation in Drosophila Melanogaster
Dominic Berns

Mentors: Sarah Naylor and Aaron DiAntonio

The chemical synapse is a highly specialized structure dedicated to the process of intercellular communication, the fundamental basis of nervous system function. All higher order functions of the nervous system depend on precise synaptic contacts between appropriate cells. Understanding the process of synapse formation is therefore essential to understanding neural function in general. At the Drosophila melanogaster neuromuscular junction (NMJ), motor neurons synapse onto muscle cells in a highly stereotyped pattern, indicating a high degree of genetic control.

In order to identify gene products required for normal NMJ development, we performed an anatomical screen on a library of piggyBac insertion elements. Due to the consistent size, shape, and location of individual neuromuscular junctions, insertions affecting NMJ development are easily identified. NMJ structure was visualized using antibodies to the presynaptic active zone protein Bruchpilot, and the postsynaptic glutamate receptor subunit DGluRIII. From this screen, we identified a mutant, 140-245, which exhibits several morphological defects at the NMJ. 140-245 exhibits a 40% decrease in bouton number, a 22% increase in terminal boutons, and a striking bouton spacing defect. When quantified using the postsynaptic marker DLG, this spacing phenotype is manifested as a 2.75-fold increase in discontinuous DLG foci.

140-245 does not appear to exhibit a functional transmission defect, as indicated by electrophysiological measures. The insertion in question is located in the 3’ UTR of a type IV collagen gene, Dcg1. This collagen forms an essential component of basement membranes, which surround nerve and muscle cells, and are present at NMJs. A causal link between Dcg1 disruption and the observed phenotype has yet to be established, due to lethality of deficiency trans-heterozygotes. In order to conclusively demonstrate the Dcg1 dependence of the phenotype, transgenic rescue with wild-type Dcg1 is underway. Pending the outcome of this experiment, further studies of the role of Dcg1 in NMJ formation will be initiated. Future analysis of 140-245 could lead to a more complete understanding of pathways leading to proper synapse formation.

Regulation of Peripheral Nerve Regeneration by the mTOR Pathway
Steven Borson

Mentor: Valeria Cavalli

The peripheral and central nervous systems have clear differences with respect to ability to regenerate. Neurons in the CNS degenerate after injury, while those in the PNS have a remarkable ability to regenerate their axons and reinnervate their targets. The main goal of this work is to determine the molecular differences between the two neuronal types that give rise to the differences in their ability to regenerate. One pathway that is implicated in regulating the intrinsic ability of neurons to regenerate is the mTOR signaling pathway, which regulates cell growth, survival, motility and translation.

Work from Zhigang He’s group has shown that CNS neurons downregulate the mTOR pathway following injury and that this downregulation is correlated with decreased regenerative ability. We find that, in contrast, dorsal root ganglia (DRG), which are sensory neurons in the PNS, upregulate the mTOR pathway following injury. To determine whether mTOR activity is sufficient to increase axonal growth capacity after injury, we took a genetic approach to constitutively upregulate the pathway in sensory neurons. We created a conditional knockout mouse in which the TSC2 gene, an inhibitor of the mTOR pathway, is deleted in all sensory neurons. Our preliminary results show that DRGs dissected from TSC2 conditional knockout mice have enhanced axonal outgrowth in vitro, consistent with the role of the mTOR pathway in regulating axonal growth after injury. We are currently working to determine whether the TSC2 conditional knockout mice show enhanced regeneration in vivo, as well as investigate developmental affects due to this molecular manipulation.
**Channel Conformation Determines DHA Inhibition and Polyamine Block in Kainate Receptors**

*Kevin Chen*

Mentor: James E. Huettner

RNA-edited kainate receptors found in postnatal developing rats exhibit a decrease in current in the presence of /cis/-unsaturated fatty acids such as docosahexanoic acid. A glutamine is normally coded for at the Q/R site, but an arginine is present in edited GluR6 subunits. In the present study, we have performed scanning mutagenesis with arginine across the three transmembrane helices (M1, M2, and M3) of wild type subunits and measured the current before and after application of DHA. In addition, we measured DHA susceptibility in alanine and tryptophan mutants along M2. We discovered that DHA sensitivity is dependent on several factors including size, position, orientation, and functional group property. Mutation to arginine of residues that face away from the membrane bilayer and into another helix frequently confers susceptibility to DHA. Replacing a residue that has a small side chain with one that has a large side chain is also related to increased DHA inhibition, although this is less obvious in the reverse case. In addition, three locations were found where R substitutions caused potentiation in the presence of DHA. Finally, in all mutants, we performed an I-V ramp for each mutant to test for block by polyamines. We found that mutations that increased DHA inhibition were more likely to have resistance to polyamine block. This supports the idea that susceptibility to DHA and resistance to polyamine block are more likely explained by modulation of conformational structure of the channel than by an addition of positive charge in the transmembrane helices per se.

**Differential Expression of 15-lipoxygenase Isozymes in COPD**

*Geoffrey Dang-Vu*

Mentors: Michael Holtzman and Derek Beyers

The levels of arachidonate 15-lipoxygenase (15-LO) are increased in the airways of patients with asthma and may contribute to immune cell recruitment and associated airway pathology via the production of 15- and 12(S)-hydroxyeicosatetraenoic acids (HETEs). Similarly, expression of 12-lipoxygenase (the mouse homolog) is increased in association with IL-13, arginase 1, and related markers of alternatively-activated macrophages in a mouse model of virus-induced chronic airway disease. Two isoforms of 15-lipoxygenase (15-LO-1 and 15-LO-2) with 40% sequence homology have been identified in humans. Although both forms appear to be expressed in airway epithelial cells, the relative expression in chronic lung disease still needs to be defined. Here, we examined the expression of 15-LO-1 and 15-LO-2 in lung samples from patients with COPD. We find that levels of 15-LO-1 and 15-LO-2 mRNA correlate significantly with IL-13 and MUC5AC mRNA levels in lung resection samples from patients with GOLD 0–4 COPD. In addition, we observed that immunostaining for 15-LO-1 is found predominantly in ciliated epithelial cells, whereas 15-LO-2 also localized to subepithelial PMNs and macrophages and vascular endothelial cells. Epithelial immunostaining for 15-LO-1 is more intense in COPD than non-COPD subjects. Moreover, the levels of 15-LO-1, but not 15-LO-2 are markedly increased in cultured human airway epithelial cells stimulated with IL-13, a cytokine that appears to drive the development of COPD. Together, our results indicate that 15-LO-1 and 15-LO-2 expression is increased in COPD, and the distinct pattern of expression for each of these isozymes implies separate roles in the epithelial and immune cell events that contribute to the pathogenesis of COPD. These isozymes therefore represent potential biomarkers to stratify patients with chronic inflammatory lung disease.
Effects of Observation: A Study of Captive Black-tailed Prairie Dog Behavior

Adam E. M. Eltorai

Mentor: Robert W. Sussman

Black-tailed prairie dogs (Cynomys ludovicianus) are diurnal omnivorous rodents that live in intricate cities. Black-tailed prairie dog social complexity rivals that of some primates and, in some respects, resembles the behavior of humans. Due to the rich variety of readily-observable, sophisticated behaviors such as coloniality, infanticide, anti-predator behaviors, kin recognition, cooperation, conflict, and reproductive success, the black-tailed prairie dog is a wonderful model species for the study of behavior. Using a captive population of black-tailed prairie dogs, we were able to quantify the effects of observation on key behaviors. Our findings have potentially significant implications for observational research studies and offer further insights into higher-ordered animal behavior.

The Effect of Dietary Vitamin A on Gut Dendritic Cell Homeostasis

Elyse Hanly

Mentor: Rodney D. Newberry

Previous studies demonstrated a critical role for vitamin A metabolites produced by dendritic cells (DCs) in directing the homing of lymphocytes to the gut and for the production of secretory IgA. However, the direct effect of dietary vitamin A on intestinal DCs has not been previously investigated. In this study we evaluated the direct relationship between dietary vitamin A intake and the presence of intestinal DCs. We hypothesized that reduced dietary vitamin A directly affects intestinal DC populations by inhibiting cell proliferation and/or promoting apoptosis, thus contributing to decreased gut lymphocyte homing and secretory IgA production. To test this hypothesis, we compared the number of DCs found in the gut between mice fed a diet deficient in vitamin A, mice gavaged with all-trans retinoic acid (ATRA, the biologically active vitamin A metabolite), and mice fed a control (vitamin A sufficient) diet. We found that the number of myeloid CD103+ DCs was significantly decreased in the intestines of mice fed a diet deficient in vitamin A and significantly increased in the intestines of mice given ATRA through gavage. In the intestine, the myeloid CD103+ DCs have the property of directing gut lymphocyte homing and inducing IgA class switch. These cells also form clusters associated with intestinal lymphoid tissues and accordingly we observed that the number of DC clusters was significantly decreased in mice fed a vitamin A deficient diet and significantly increased in mice given ATRA by gavage. To evaluate the direct effects of vitamin A on DCs, we generated bone marrow derived myeloid DCs and evaluated their proliferation and apoptosis in response to ATRA. We observed that DC proliferation was increased in response to ATRA. This observation correlated with changes in expression in the apoptotic genes Caspase 2 and Caspase 8. Our findings demonstrate a direct relationship between dietary vitamin A and the maintenance of the gut DC population. Dietary vitamin A promotes the survival and proliferation of a subpopulation of gut DCs, which then facilitate gut lymphocyte homing and secretory IgA production. Further discovery and verification of the role of DCs in the production of IgA could ultimately lead to innovative approaches in lessening the effects of vitamin A deficiency on the population.
A Tale of Two Subfamilies: The Evolution of a Sensory Pathway Mediating Social Communication Behavior in Mormyrid Electric Fish

Saad Hasan

Mentor: Bruce Carlson

The African family Mormyridae consists of over two hundred species of fish that communicate using electric organ discharges (EODs). The EOD waveform is stereotyped within species, but can differ markedly between species in duration and number of phases. The sequence of pulse intervals (SPI) varies, conveying the behavioral state of the sender. Information about the EOD and SPI is first processed in the midbrain exterolateral nucleus (EL), which is generally subdivided into anterior and posterior regions (ELa and ELp). Despite the importance of this pathway in social communication behavior, there has been no attempt to record evolutionary change in its structure. The purpose of this study is to quantify variation in ELa/ELp size throughout the mormyrid family and relate this variation to species and signaling diversity. I have analyzed horizontal sections of fixed brains from fish in the subfamily Mormyrinae, finding a division between ELa and ELp in each species studied. The EL of the subfamily Petrocephalinae, however, generally lacks this subdivision. I calculated the EL volume, normalized by brain mass, and found that the EL in Mormyrinae is much larger than in Petrocephalinae (2-4 mm³/g vs. ~1 mm³/g). However, I discovered that Petrocephalus microphthalmus is an exception, displaying a subdivided EL comparable in volume to the EL of Mormyrinae. This pathway divergence between the Mormyrinae and Petrocephalinae relates to major differences in the diversity of EOD waveforms and distribution of Knollenorgan electroreceptors. Thus, variation in social communication behavior may be related to evolutionary change in the size and complexity of neural circuits that process communicative signals.

The Role of Autophagy in Crohn’s Disease

Aaron L. Hecht

Mentor: Thaddeus Stappenbeck

Recently, genome wide association studies for Crohn’s Disease (CD) identified a susceptibility locus for ATG16L1, a protein involved in the autophagy pathway. CD is an inflammatory, autoimmune disease of the distal small intestine and colon that afflicts one million people in the US. Although the connection has been made between autophagy and CD, a mechanistic understanding remains undetermined. Previous studies indicated that mice deficient in Atg16L1 and humans with CD and homozygous for the susceptibility allele of ATG16L1 contained abnormal Paneth cells in the intestinal epithelium. In addition, mucus-producing goblet cells of the colon in these Atg16L1 deficient mice were defective for secretion. As the loss of mucus layer in the colon has implications for predisposition to CD, we further examined the nature of this goblet cell defect. To gain a better understanding of the role of autophagy in the secretory function of colonic goblet cells, I developed two experimental approaches. First, utilizing a lentiviral/shRNA system, I created a stable knockdown of an autophagy gene in a human goblet cell line. Second, I treated wild type mice with an autophagy inhibitor, desmethylclomipramine, and explored the goblet cell defect. I found that decrease in autophagy altered goblet cell morphology in a cell-autonomous fashion and revealed that the secretion defect is directly linked to autophagy or another membrane-related process. Most importantly, however, these experiments generated new models with which to explore the autophagy-deficient phenotype and its relation to secretion. Ultimately, we hope these and future studies will allow us to better understand CD at the cellular level and provide insight for future treatment of CD patients.
Identification of Genetic Variants in Transferrin and the Effects on Amyloid Precursor Protein Processing in Alzheimer’s Disease

Amanda Jeng

Mentor: Alison Goate

Alzheimer’s Disease (AD) is the most common neurodegenerative disorder resulting in dementia, affecting more than 5 million people in the United States alone. AD is characterized by neuronal loss and the accumulation of extracellular β-amyloid (Aβ) plaques and intracellular neurofibrillary tangles in the brain. The amyloid hypothesis suggests that changes in amyloid precursor protein (APP) and/or Aβ homeostasis results in aggregation of Aβ and deposition of Aβ into plaques. Furthermore, these events are proposed to be sufficient to initiate the cascade of pathologic abnormalities in AD. We have utilized cerebrospinal fluid (CSF) Aβ levels as a quantitative endophenotype to identify genetic variants that influence Aβ. Our group and others have previously shown that variation in transferrin (TF), an iron transport protein, is significantly associated with CSF Aβ levels and/or AD risk. In this study, we intended to detect additional variants in the TF gene that are associated with Aβ levels. The TF gene was sequenced in individuals selected based on low and high CSF Aβ42 levels. We identified single nucleotide polymorphisms (SNPs) in the promoter and intronic regions as well as two synonymous SNPs. Additionally, we identified four non-synonymous SNPs associated with low CSF-Aβ42 levels: two novel SNPs (R343W and G671E) and two known SNPs (G277S and P589S). We next sought to determine the functional impact of transferrin variants on APP metabolism using site directed mutagenesis and cell culture approaches. Levels of full-length APP were lower in cells co-transfected with APP and TF (wild-type or mutant) than in cells co-transfected with APP and a control plasmid expressing GFP. The abundance of full-length APP did not differ between wild-type TF and mutant TF co-transfections. Furthermore, APP mRNA levels were significantly lower in cells co-transfected with APP and TF-R343W than in cells co-transfected with APP and wild-type TF. This trend was also observed for TF-G277S and TF-G671E, though not at a significant level, and was not observed for TF-P589S. Together, these findings suggest that transferrin may play a role in AD pathogenesis by altering APP homeostasis.

An Investigation of the Role of Telomerase and Nucleolin in Astrocytoma Growth Rates

Neel Joshi

Mentor: Jeffrey R. Leonard

Pilocytic Astrocytoma (PA) is a type of brain tumor exclusively affecting younger patients. While PA’s slow growth rate has served as an obstacle to establishing an animal model, we believe that the expression of telomerase is important to increasing its growth and making a model possible. This has been supported by tests with a glioblastoma (GBM) cell line, showing that increasing telomerase expression increases growth rate.

Additionally, we are looking at nucleolin as another protein involved in tumor growth. Involved in ribosome synthesis, nucleolin is theorized to be involved in cell growth, due to its prevalence in rapidly dividing cells. Furthermore, research has shown that nucleolin binds telomerase, changing its localization within the cell. While nucleolin is not normally found in astrocytes, it is present in astrocytomas. Additionally, nucleolin expression increases with increasing WHO grade of brain tumor. Knockdown of nucleolin by siRNA caused a decrease in growth rate, suggesting that nucleolin is necessary for the accelerated growth in astrocytomas.
**Biology**

**Function of the N-terminal Domain of Heparin Cofactor II**

*Grace Julie Karue*

Mentor: Douglas M. Tollefsen

Heparin cofactor II (HCII) is a glycoprotein found in human blood plasma that inhibits the serine protease thrombin. Thrombin is involved in hemostasis and vascular remodeling through stimulation of platelet aggregation, clot formation, and proliferation of smooth muscle cells. HCII acts as a pseudosubstrate and covalently links to thrombin by an acyl ester bond to form a stable 1:1 complex, thus inhibiting thrombin’s proteolytic activity. Inhibition of thrombin is accelerated by more than 1000-fold when HCII is bound to certain glycosaminoglycans present in the arterial wall. Two mechanisms for this acceleration have been proposed from in vitro experiments: (1) displacement of the N-terminal domain of HCII, which is then better able to interact with thrombin; and (2) the ability of the glycosaminoglycan to serve as a template for HCII and thrombin binding. In this project, I have prepared a truncated form of HCII, which lacks the N-terminal domain, by limited proteolysis utilizing endoproteinase AspN. I have characterized the proteolytically modified HCII in terms of the site of proteolysis, the affinity for binding to heparin, and the kinetics of thrombin inhibition in the presence and absence of a glycosaminoglycan. HCII-deficient mice injected with either native or truncated HCII are being studied in an arterial thrombosis model. The results of these experiments will indicate whether or not the N-terminal domain of HCII is required for its function in vivo.

**Myeloid Cell Independent Conditional HIF-1 Induced Multistage Angiogenesis**

*Joanna R. Kovalski*

Mentors: Sunday S. Oladipupo and Jeffrey M. Arbeit

Under low oxygen conditions, activation of HIF-1 induces a strong pro-angiogenic response through upregulation of downstream pro-angiogenic targets, which stimulate mobilization, recruitment and retention of myeloid cells from the bone marrow. Pro-angiogenic myeloid cells stimulate endothelial cell proliferation, survival and sprouting, a process in cancer termed the angiogenic switch. Using a conditional model of doxycycline-regulated expression of a constitutive, and oxygen-insensitive mutant HIF-1alphaT402/564A/N803A expressed from the basal keratinocytes, I performed a time course analysis of myeloid cell infiltration by immunofluorescent cell type specific labeling on both untreated, and anti-VEGFR1 and anti-VEGFR2 immunoblockade treated conventional mouse ear cross-sections. As early as day one, there was substantial myeloid cell recruitment, reaching a maximum by day 14 with a plateau thereafter. To mechanistically probe our model, we employed receptor-blocking antibodies, which prevent ligand binding to the extracellular domain, blocking the signal through VEGFR1 or VEGFR2. Treatment against either receptor from day 0-14 resulted in sizeable decrease in infiltration of all myeloid cell types. Only blockade of VEGFR2 from day 0-14 reduced the normal level HIF-1 induced neovascularization. This suggests a critical function of local VEGF:VEGFR2 signaling for proliferation and the insufficiency of VEGFR1 directed pro-angiogenic myeloid cell recruitment for rescue. Day 14-28 blockade of VEGFR1 or R2 resulted in no abrogation of myeloid cell retention compared to a typical day 30. Moreover, there was little decrease in vessel density, implicating independence of the mature vasculature from VEGFR2 signaling. However, combination blockade of both receptors from day 14-28 decreased myeloid cell retention, but with only a slight decrement in vessel density. This suggests myeloid cells are dispensable for both vascular development and maintenance with sufficient support from local angiogenic mechanisms. Myeloid cell independent adult angiogenesis is a departure from past findings in pathological models of the tumor microenvironment, wherein these cells are crucial in initiating the tumor vasculature and evading anti-angiogenic therapies. These results suggest myeloid cells are not an absolute requirement for neovascularization, and the resolution of this discordance may lead to the identification of novel angiogenic maintenance factors and therapies.
**GABA and Glutamate Mediate Circadian Functional Connectivity in the SCN**

*Becca Krock*

The suprachiasmatic nucleus (SCN) of the mammalian hypothalamus orchestrates circadian rhythms in behavior and physiology, allowing the organism to predict and adapt to daily and seasonal environmental changes. Although the molecular basis of individual cells’ ability to keep daily time has recently been well-characterized, the rules that organize SCN cells into a working circuit remain unclear. Specifically, it is not known whether fast excitation plays a role in SCN function. Therefore, we mapped functional connectivity in the SCN to elucidate patterns of fast neurotransmission. Functional connectivity was revealed by cross-correlating spike trains of SCN neurons plated at high density on multielectrode arrays. We observed sparse positive and negative cross-correlations between firing patterns of neuron pairs that peaked within approximately 10 ms of firing and varied daily in strength and number in phase with multiunit activity. We found that an average of 80% of these negative cross-correlations and 0-50% of positive correlations were blocked by GABA<sub>A</sub> receptor antagonists. Furthermore, application of ionotropic glutamate receptor antagonists abolished 75% of positive and more than 50% of negative cross-correlations. These results indicate that fast synaptic connections mediated by GABA and, surprisingly, glutamate release within the SCN change in strength and number over the circadian day.

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**Caspase-9: A Candidate Susceptibility Factor in Murine Alkylator-induced Therapy-related Acute Myeloid Leukemia**

*Yedda Li*

Therapy-related acute myeloid leukemia (tAML) is caused by exposure to chemotherapies and radiotherapies and has a poor prognosis. To better understand the genetic factors involved in secondary leukemogenesis, we studied alkylator-induced leukemias in murine models and found differing levels of tAML susceptibility among 20 inbred strains. Genome-wide mRNA profiling of c-kit<sup>+</sup>/lineage<sup>-</sup> (KL) hematopoietic stem and progenitor cells identified a correlation between strain-dependent differences in gene expression and tAML susceptibility. Of the differentially expressed genes, Caspase-9 (Casp9) is an initiator caspase crucial for the initiation of cellular apoptosis. We studied Casp9 expression in a reference tAML-resistant murine strain, C57BL/6J, and two tAML-susceptible strains, DBA/2J and PL/J. As measured by microarray profiling and confirmed by two independent qRT-PCR assays, Casp9 expression is significantly lower in the susceptible strains. PCR amplification of Casp9 cDNA isolated a novel isoform from the susceptible strains that lacks exon 2, creating a frameshift and a premature stop codon that is predicted to trigger nonsense-mediated decay. Functionally we predicted that cells with low Casp9 expression would be more resistant to alkylator-induced apoptosis and more likely to acquire mutations necessary for leukemogenesis. Data from flow cytometric apoptosis assays suggest that KL cells from the tAML susceptible strains are more resistant to apoptosis than the reference C57BL/6J KL cells after treatment with a DNA alkylating agent. These results suggest that differences in Casp9 expression levels may influence strain-dependent tAML susceptibility, and that inherited genetic factors may explain the observed expression differences. Ultimately, our understanding of the role that genetics plays in determining susceptibility to secondary leukemias may allow us screen patients who are more susceptible and to prevent them from receiving treatments that are known to induce these cancers.
Quantification Methods and Analysis of Head Motion and rs-fcMRI Preparations in a Pharmacologic fMRI Study of Cortical Function in Tourette Syndrome

Miranda Renée Lindburg

Mentor: Kevin J. Black

Tourette Syndrome (TS) is a chronic disorder characterized by motor and vocal tics. While it is commonly accepted that dopamine antagonists can lessen severity of tics, it has also recently been shown that tic acuity can also be reduced by dopamine agonists. To examine this, we are currently performing an fMRI study on TS patients and controls matched on several dimensions. A working memory task with multiple degrees of difficulty is given, interleaved with rest blocks, under double-blinded conditions of levodopa and placebo administration on two separate scan days.

In fMRI studies, head motion within the scanner causes large amounts of image degradation and loss of fidelity, and common correction methods often cannot mitigate this. We hypothesized that the TS group would move systematically more than the other, which could confound the results and show false activation differences between the two. In addition, levodopa, as a tic reducer, could also have a confounding effect on head motion. We examined the effects of each of our independent variables, including the working memory task, on head motion. Results suggest the only significant variable is the working memory task, which means that analyses of our study are feasible. Surprisingly, both TS patients and control subjects move more during rest, which we propose may relate to restless motion due to a lack of concentration.

A 2008 study by Church et al. found that adolescents with TS have immature network connections in the brain’s control system. To expand on their study, we performed resting state-functional connectivity analysis on our data, to find an “endpoint” of control network development in TS, as compared to controls.

Quantitative Trait Loci Affecting Liver Fat Content in Mice

Olga Minkina

Mentor: James Cheverud

Dietary obesity is a complex trait influenced by the interaction of genes and the environment. Although the recent increase in the prevalence of obesity is largely driven by changes in diet and activity levels, individual variation in the response to an increasingly obesogenic environment is due in part to genetic variation between individuals. In humans, obesity is associated with non-alcoholic fatty liver disease (NAFLD), a condition in which excess fat accumulates in the liver. This disease has the potential to progress to steatosis and cirrhosis, in which the production of reactive oxygen species (ROS) and pro-inflammatory cytokines promotes hepatocyte apoptosis, eventually leading to liver failure. To study the genetic basis for variation in liver fat content in response to a high fat diet, nuclear magnetic resonance imaging (MRI) was used to determine liver fat proportion in 479 mice in 16 LG/J X SM/J recombinant inbred (RI) mouse strains fed either a high fat (42% kcal from fat) or low fat (15% kcal from fat) diet. The LG/J X SM/J intercross has previously been characterized as a good model for the study of obesity as a complex trait. An analysis of variance (ANOVA) confirmed that there is a genetic basis for variation in liver fat proportion within the population. This study revealed three new quantitative trait loci (QTLs) that contribute to liver fat proportion but not body weight or liver weight, identifying regions of the genome with effects on fat accumulation in the liver.
Components of the NCoR Co-repressor Complex Repress Lytic Replication of Gammaherpesvirus 68 in Macrophages

Jerome M. Molleston

Mentor: Herbert W. Virgin IV

Gammaherpesvirus 68 (γHV68) is a murine virus which is both genetically and biologically related to human Epstein-Barr virus and Kaposi sarcoma-associated herpesvirus, thus providing a useful system for modeling gammaherpesvirus pathogenesis. A very important feature of all herpesviruses is the establishment of a latent state, which, in contrast to lytic replication, involves no production of infectious virus and expression of only a limited subset of viral genes. It is known that γHV68 establishes latency in macrophages, B cells, and dendritic cells, but the genetic mechanisms of latency regulation are poorly understood.

One such complex that may be involved is anchored by the nuclear receptor co-repressor (NCoR). It binds to hormone receptors such as retinoic acid receptor and recruits histone deacetylases (HDACs) to promoters to mark histones for transcriptional silencing. Previous work showed that inhibition of HDAC activity led to increased lytic growth, so we explored the possibility that the NCoR complex is involved in regulating latency.

Here we show a novel connection between lytic replication in macrophages and HDAC3, HDAC4, NCoR, and retinoic acid. We show that expression of gene 50, an immediate-early viral gene associated with lytic replication, is decreased in macrophages when HDAC3 or HDAC4 are overexpressed. In addition, gene 50 expression, as well as viral growth, is increased in macrophages when NCoR protein levels are lowered by siRNA treatment. Gene 50 expression and viral growth are also increased in macrophages by treatment with retinoic acid. However, in fibroblasts, neither lytic viral protein expression nor viral growth is dependent on HDAC activity.

We thus postulate a potential role for the NCoR co-repressor complex in regulating the decision of lytic or latent fate of virus upon infecting a cell. Future directions will involve investigating any direct binding of the NCoR complex to the gene 50 promoter, as well as investigating further any differences in NCoR complex function between macrophages and fibroblasts which might explain the difference in viral growth between the two cell types.

Identifying and Characterizing Novel Components of the Arabidopsis thaliana Jasmonate Signalling Pathway Involved in Pseudomonas syringae Pathogenesis

Inez Oh

Mentor: Barbara Kunkel

The plant pathogen Pseudomonas syringae produces coronatine (COR), a molecular analogue of the plant hormone jasmonate-isoleucine (JA-Ile), which stimulates the jasmonate (JA) signalling pathway in Arabidopsis thaliana. This results in increased pathogen growth and enhanced disease symptom production in the plant. The jasmonate insensitive 1 (JIN1) gene encodes the AtMYC2 transcription factor, a component of the JA signalling pathway that defines a branch of the pathway enhancing susceptibility to P. syringae, and is essential for the plant’s ability to respond normally to JA.

The bHLH64 gene, predicted to encode a transcription factor, was previously identified in a microarray experiment to be affected by JA and P. syringae pv. tomato strain DC3000 in a COR dependent manner. I took a reverse genetics approach to studying the role of bHLH64 in the JA signalling pathway. Results of various molecular and physiological assays using bhlh64 mutants and bhlh64 jin1 double mutants indicate the involvement of bHLH64 in the JA signalling pathway as a negative regulator of P. syringae growth and symptoms. The bhlh64 mutant also displayed increased sensitivity to abscisic acid (ABA), a stress hormone that causes a delay in germination. The JA and ABA pathways are known to be interconnected, leading us to postulate that bHLH64 might be a point of cross talk.

A forward genetics approach was also used to identify other genes involved in the JA signalling pathway. A number of mutants were previously identified in a primary screen to be hypersensitive or insensitive to JA, an indication that the mutated genes were involved in the JA pathway. Secondary screens carried out on these mutants confirmed that JAE 73-23 is hypersensitive to JA. Complementation tests show that it is likely to be a new allele of the COH36 gene.
**Role of Glucocorticoid Receptors in Regulation of PER2 Rhythms in the Mouse Forebrain**  
*Chiamaka Onwuzurike*

*Mentor: Erik Herzog*

The mammalian circadian clock regulates daily processes such as metabolism, sleep/wake cycle and hormone production. Disruption of circadian rhythms is correlated with human psychiatric disorders, such as major depression and seasonal affective disorder, suggesting that normal circadian rhythms may be necessary for normal mood regulation. In addition, rhythmic expression of clock genes has been observed in several forebrain structures involved in emotion processing. For example, PERIOD2 protein (PER2) expression is circadian in the basolateral amygdala (BLA), central nucleus of the amygdala (CEA), dentate gyrus (DG), and oval nucleus of the bed nucleus stria terminalis (BNST-OV). It previously has been shown that while DG and BLA rhythms rely on unknown signals from the suprachiasmatic nucleus (SCN), CEA and BNST-OV PER2 rhythms require rhythmic release of glucocorticoids (GC) from the adrenal glands. Since glucocorticoid receptors (GR) are present throughout the forebrain, we hypothesized that GR expression in each forebrain region is required for their circadian timing. To test this hypothesis, we used a genetically engineered forebrain GR knock out mouse (FBGRKO) with GR disruption throughout the forebrain, including the BLA, DG, and BNST but normal GR expression in the CEA. We compared PER2 expression in FBGRKO and control mice sacrificed at four times of day. We found that the number of PER2-positive cells in both the CEA and BNST were rhythmic but peaked 6h earlier in the FBGRKO compared to controls. In contrast, we found no effect of the FBGRKO on PER2 rhythms in the DG or BLA. These findings suggest that GR expression in the CEA mediates circadian regulation in the CEA and BNST but not elsewhere in the brain. Furthermore, GR expression elsewhere in the forebrain, likely the BNST, is required to time the circadian peak in the BNST and CEA.

**Effect of Antioxidants on the Immune Response to Dying Tumor Cells**  
*Archana Reddy*

*Mentor: Thomas Ferguson*

Cancer chemotherapy usually kills tumors by apoptosis, a mode of cell death which generally induces immune tolerance. It would be ideal if anticancer chemotherapy, in addition to directly killing tumor cells, stimulated the immune system to combat tumor cells. The few chemotherapies that do induce immunity have been shown to be highly dependent on this immune response for an optimal therapeutic outcome, especially the release of HMGB1, a danger-signaling molecule. Studies have shown that caspase-dependent oxidation of HMGB1 is necessary for tolerance induction by apoptotic cells; this tolerance has also been converted into immunity by treating the apoptotic cells with an antioxidant, which reduced HMGB1. This study explored whether modulating the apoptotic pathway with antioxidants could alter the immune response to tumors. The hypothesis was that when apoptotic tumor cells are treated with antioxidant, they will induce a stronger immune response against a tumor. The results did not correspond with the hypothesis and in some cases showed the opposite trend, suggesting that factors other than the oxidation state of HMGB1 must be taken into account in converting the tolerance accompanying tumor cell apoptosis into immunity.

Another potential cancer treatment is therapeutic vaccination. DNA vaccines have certain advantages in treating cancer but have low immunogenicity, a problem that can be ameliorated by co-administration of an adjuvant. An auxiliary experiment was done to explore the role of HMGB1 as such an adjuvant, based on a pilot experiment suggesting that HMGB1 cDNA might inhibit tumor growth. The results, however, contradicted these findings, suggesting that HMGB1 cDNA may have unanticipated molecular repercussions. Despite the ambiguities in the specific mechanisms of tumor cell death immunogenicity, these studies as well as the literature support the idea that in order to effectively combat tumors, we must take into account the interaction of treatments with the immune system.
Biology

ROLE OF TEST STIMULUS IN THE ROD-AND-FRAME EFFECT

Fady Riad

Mentor: Dora Angelaki

The rod-and-frame effect (RFE) is a phenomenon in which the presentation of a visual stimulus causes a bias in the perceived orientation of vertical relative to the earth’s axis, referred to as the subjective visual vertical (SVV). Subjects perceive SVV as having a smaller than true angle with the vertical axis of the visual stimulus. Both of these phenomena have been studied extensively, and some studies have looked at the combined effects, leading to models of how the brain integrates multisensory information to produce percepts of spatial orientation. Such studies have shown that the brain uses prior information about the natural world when making estimations about orientation.

Studies have also shown that the magnitude of the rod-and-frame effect can be varied by manipulating how realistic or robust the presented visual stimulus is, but all studies have measured SVV through a secondary visual stimulus (test stimulus) which is assumed not to affect SVV. The current study asks the question, “What is the effect of the test stimulus on SVV?”

Our results show that a more robust test stimulus causes a more profound A-effect. This is a distinctly different phenomenon than the rod-and-frame effect because the A-effect is a fixed bias relative to the orientation of the body, rather than the orientation of the visual stimulus. This finding allows us to make further inferences about how the brain perceives orientation and gives us more precise insight as to what kind of prior information is used in estimating orientation.

Bioengineering

Synopsis

BIOENGINEERING IMPROVED PHOTOSYNTHETIC PRODUCTIVITY FOR R. SPHAEROIDES VIA SYNTHETIC REGULATION OF THE LIGHT-HARVESTING ANTENNA LH2

Jacob Rubens

Mentor: Robert Blankenship

I led a team of nine other undergraduates in designing, modeling, building and testing a synthetic regulation system to optimize photosynthetic antenna size. This work resulted in a gold medal at the International Genetically Engineered Machine Competition (iGEM) in November 2009.

We designed a synthetic regulation system to optimize the size of the Light Harvesting Complex II (LH2) in the purple photosynthetic bacterium Rhodobacter sphaeroides. R. sphaeroides was chosen because of its well-characterized photosynthetic and genetic system. The synthetic regulation system was designed to optimize the expression level of LH2 based on incident light and makes use of natural R. sphaeroides genes as well as synthetic genes from E. coli and synechocystis. It is composed of nine BioBrick parts that were assembled via gene synthesis and restriction digests. Eleven new BioBrick parts were constructed and submitted to the Registry of Standard Biological parts. Two of these new BioBricks were characterized. To test the efficacy of this regulation system, a novel experimental procedure was devised to monitor how varying light availability at different depths in a photobioreactor affects biomass accumulation. It was found that wild type cells exhibit extreme photoinhibition and shading effects, while ΔLH2 cells are capable of greater growth deeper in a photobioreactor. Future work will conduct the same experiment on the synthetic mutant R. sphaeroides. This data will be used to refine the system model and to make improvements.
Localization of Synuclein Protein in Mouse Auditory Tissue

Apollo Stacy

Mentor: Brian Faddis

Synucleins are a family of proteins comprising alpha-, beta-, and gamma-synuclein. Synucleins are widely researched because of the role they may play in neurodegenerative diseases, including Alzheimer’s and Parkinson’s. Synucleins are also important for the normal hearing sensitivity of mice. Despite research efforts, the normal cellular function of synuclein is still unknown. One means of addressing this question has been to find how synuclein localizes in synuclein-expressing tissue. The goal of this research was to investigate the localization of synuclein in auditory tissue and to thereby come closer to understanding the function of synuclein in hearing. To date, light microscopy studies have revealed that alpha-synuclein localizes to synaptic terminals at the base of inner and outer hair cells and at synaptic terminals in the dorsal cochlear nucleus; beta-synuclein localizes to spiral ganglion cells and synaptic terminals in the ventral cochlear nucleus; and gamma-synuclein localizes to the cytoplasm of Dieter’s cells.

Prediction of Finger Movement from ECoG Using Artificial Neural Networks

Marshall Channing Strother

Mentor: William Smart

This thesis presents a method for predicting finger movement from electrocortigraphic (ECoG) brain recordings of human subjects using an artificial neural network. Patients were asked to perform a simple finger-movement task while bilateral ECoG data were collected. Precise measurements were also taken of the flexion of each of the fingers of the hand. A two-layer artificial neural network was then constructed to model the relationship between these two sets of data. The first layer of this network is modified to model the delay between cognition and physical motor response, and the second is a generalized linear model. Once the network is trained, it can be analyzed to discover the relative importance of (1) the different frequencies of the recorded signal, (2) the position of the recording electrodes on the cortex, and (3) the lag between the recorded signal and the observed movement. Results are presented from training this model on a variety of artificially generated data sets as well as a subsample of the ipsilateral data collected from a single patient.
**Determining the Role of VIP Neurons in Mouse Circadian Rhythms**

*Daniel Sun*

Mentor: Erik Herzog

The mammalian suprachiasmatic nuclei (SCN), located in the anterior hypothalamus, are a master circadian pacemaker. Together, these 20,000 neurons regulate daily rhythms in physiology and behavior of the organism. Elucidating the mechanisms behind rhythm generation and synchrony between single cell oscillators in the SCN is a crucial step in the study of disorders related to circadian dysfunction, such as major depressive disorder and advanced phase sleep syndrome. Recent studies implicate the neuropeptide vasoactive intestinal polypeptide (VIP) as a candidate for generating and coordinating rhythms in the SCN.

We hypothesized that VIP-expressing neurons in the SCN are the pacemaking cells which drive and synchronize rhythms throughout the SCN and coordinate daily running wheel behavior. To test this hypothesis, we generated a transgenic mouse line that could express yellow fluorescent protein (YFP) and conditionally activate Cre recombinase in VIP neurons (VIP-YPFstop-Cre-ERT2) with the ultimate goal of selectively deleting VIP neurons in the SCN. We expect that VIP-cell-less mice will exhibit disrupted circadian locomotor activity.

We have confirmed germline transmission of the transgene in two lines of mice by PCR-based genotyping. Using immunohistochemistry, we have verified the co-expression of endogenous VIP and our VIP-YPFstop-Cre-ERT2 construct in cells of the SCN, olfactory bulb, cortex, and enteric nervous system. In addition, we have observed YFP expression in living cells of cultured SCN explants. Subsequently, we crossed these mice with floxed diptheria toxin (DTA) mice, and found that treating cultured tissue from these animals with tamoxifen decreased the number of VIP neurons compared with controls. We have also delivered tamoxifen into transgenic mice by three different protocols and found no effect on circadian behavior or the number of VIP neurons in their SCN. We conclude that our transgenic construct is faithfully expressed in VIP neurons, is present in live VIP neurons, and can be used to conditionally eliminate VIP neurons in vitro.

**Characterization of Cis-Regulatory Sequence Divergence in Yeast**

*Sandeep Venkataram*

Mentor: Justin C. Fay

The molecular evolution of cis-regulatory sequences is not well understood. Comparisons of closely related species show that cis-regulatory sequences contain a large number of sites constrained by purifying selection. In contrast, comparisons of distantly related species show that cis-regulatory sequences retain little to no sequence similarity but drive similar patterns of gene expression. Gain and loss of transcription factor binding sites is one model by which cis-regulatory sequences can diverge without a change in function. Yet, because cis-regulatory sequences are difficult to align between distantly related species it is difficult to know whether sequence divergence is just a consequence of binding site turnover. To characterize sequence divergence, we generated a database of orthologous cis-regulatory sequences across 14 yeast species. Orthologous cis-regulatory sequences were defined by syntenic relationships with conserved protein coding sequences. Both local and global alignment algorithms show that nearly all orthologous cis-regulatory sequences have no significant level of sequence similarity. Analysis of binding sites found by ChIP-chip as well as well-annotated cis-regulatory sequences show that a simple turnover model cannot explain cis-regulatory sequence divergence. Our results indicate that cis-regulatory sequences may be evolving under a complex model of compensatory changes or that many sequences have diverged in function.
**Tracer Validation of CFT as Potential Marker for Nigrostriatal Neurons**  
*Chen Xu*

**Mentor: Joel S. Perlmutter**

Parkinson disease (PD) is one of the most debilitating neurological disorders encountered. Individuals afflicted with PD experience, among other symptoms, tremor, rigidity, bradykinesia, and postural instability. These behavioral manifestations of PD can be induced in non-human primates by injection of the selective neurotoxin 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), which destroys dopamine-producing nigrostriatal neurons leading to loss of striatal dopamine, mimicking nigrostriatal neuron reduction and striatal dopamine deficiency that occur in people with PD. An objective measure of the loss of these nigrostriatal neurons is critical for testing new treatments to determine if they can slow disease progression. Several such currently available biomarkers have been proposed, but none has been proven to faithfully reflect PD severity. The purpose of this study is to validate a neuroimaging marker for the loss of nigrostriatal neurons. Using the MPTP injected non-human primate model, we investigated the potential for a synthesized radioligand, $[^{11}C]2$betacarbomethoxy-3beta-4-fluorophenyltropane (CFT), to be a marker for nigrostriatal neurons. Nine non-human primates were trained to perform various tasks pre- and post-MPTP injection. Video recordings of these tasks were given to a blinded rater who provided animal behavioral ratings on each non-human primate. Positron emission tomography (PET) scans using CFT were performed on each non-human primate throughout the duration of the study. CFT binding potential (BP), which provides a measure that reflects the number of specific binding sites, was calculated for each scan to show amount of striatal CFT binding. Significant correlations between CFT BP and animal behavioral ratings were revealed ($p < 0.01$). Upon euthanasia, tissue samples were extracted from non-human primates and striatal dopamine levels were obtained through high pressure liquid chromatography (HPLC). CFT BP showed significant strong positive correlations with striatal dopamine content ($p < 0.001$). Five separate non-human primates underwent the same training protocol. Upon euthanasia, brainstems were sliced and substantia nigral cell counts were obtained through stereology. Although the number of studies is still very small, the nigral cell counts may correlate with CFT BP. Based upon the present data, CFT has the potential to be a neuroimaging marker for nigrostriatal neurons.

**Using Fluorescent Bioparticles to Quantify Effects of Interleukin-7 and Interleukin-15 on Phagocytic Immune Cells**  
*Tony Zhou*

**Mentor: Richard S. Hotchkiss**

Sepsis is a severe blood stream-borne infection and is a significant cause of mortality in critically-ill patients. One of the most significant complications from this infection is the systemic inflammatory response and loss of immune cells, specifically monocytes, macrophages, and neutrophils which have key phagocytic function to engulf harmful pathogens. Interleukin-7, a hematopoietic growth factor, is an important cytokine that modulates activity of the immune system by stimulating the proliferation of B, T, and NK cells. In this study, we tested the ability of IL-7 to enhance phagocytic uptake of innate immune cells in sepsis. In order to quantify the effect of IL-7 on the engulfment of apoptotic cells by macrophages, we developed an assay using pHrodo succinimidyl ester, a pH sensitive fluorescent dye, and fluorescently labeled E. coli bioparticles. These bioparticles were administered to splenocyte suspensions obtained from septic mice treated with or without IL-7. The effect of IL-7 to improve the uptake of bacteria in sepsis was quantified by flow cytometry.
From ΣΙΚΕΛΙΑ to Sicilia: Administrative, Architectural, and Epigraphic Romanization in Rome’s First Province

Philip Katz

Mentor: Judith Evans Grubbs

For nearly five centuries, the island of Sicily was the foremost center of Greek civilization in the western Mediterranean. Many aspects of this Greek culture survived the Roman conquest of the First Punic War and remained strong until the end of antiquity, leading many scholars to conclude that Sicily was never Romanized. Yet despite this Hellenic identity, after 241 BCE Sicily was officially a Roman province with many of the typical Roman institutions and customs. By utilizing textual, archaeological, and epigraphic evidence, this study examines the impact of Rome on three distinct aspects of Sicilian culture. First, as a result of the turmoil created by the Punic, Servile, and Civil wars during the final two centuries of the republic, Sicily’s administrative institutions were gradually transformed, with new Roman magistracies, status distinctions, and laws establishing Sicily as the first provincia. After the reign of Augustus, many of the island’s physical structures, most notably entertainment facilities and private homes, were remodeled or rebuilt to reflect new Roman customs and preferences. Finally, throughout the principate, the Latin language and other elements of Roman epigraphy became increasingly popular in public and, to a lesser extent, private inscriptions. Contemporary with these instances of Romanization, however, were a number of countervailing trends. At least until the end of the republic, agricultural taxes continued to be collected according to the previous Greek tax code; many of the island’s archaic Doric temples and native cults retained the appearance and function during the Roman period; and Greek never disappeared from private inscriptions and, in the late empire, even reemerged in public inscriptions. These divergent trends combine to show that even though Sicily never became completely Roman, her bureaucracy, physical structures, and linguistic habits were substantially Romanized during the late republic and early empire.

Alexander the Great Literary Device: An Examination of Homer and Alexander the Great in Second Sophistic Literature

Natacha Lam

Mentor: William Bubelis

This thesis examines the roles of Homer and Alexander the Great in Second Sophistic literature, with a focus on how both these figures were utilized in Plutarch’s Life of Alexander and Arrian’s Anabasis. The Second Sophistic covers a time period of Roman political dominion in Greece, during which Greek authors exhibited great fascination with and examination of their classical past. The research for this thesis involved closely examining the two main texts in question, reading various works of secondary literature and other prominent authors during the Second Sophistic—notably, Dio Chrysostom, Philostratus, and Lucian. The thesis makes four main arguments. First, Homer serves as a foundational example of how the past interacted with the present in Second Sophistic literature as: a) a pan-Hellenic, cultural unifier in a time of weak political power; b) an opportunity for reader escapism into an idealized and romanticized time of Greek supremacy; c) a backdrop for various philosophical or moral arguments; and d) a common set of historical figures which authors of the Second Sophistic examined in a more complex and multi-faceted manner. Second, Alexander serves as a pivotal figure during this time period. He is an important historical figure due to his military prowess and symbolism of Greek power, an important cultural figure because of his reputation for spreading Greek culture and education throughout the known world, and an important literary figure because the plethora of anecdotes surrounding his character makes his identity ripe for varied philosophical argument and interpretation. Third, Plutarch utilizes Alexander as a figure of identity examination and interweaves Homeric references for the purposes of dramatizing or highlighting the transformation of Alexander’s identity. Fourth, Arrian weaves together a plethora of literary traditions surrounding Alexander, of which Alexander’s strong connection to Homer is an example.
Classics

THE METAMORPHOSES OF “CUPID AND PSYCHE”

Katherine Jane Langdon

Mentor: Catherine Keane

At the heart of Apuleius’ second century AD novel *Metamorphoses*, also known as *The Golden Ass*, is the beauty-and-beast-themed allegorical “Tale of Cupid and Psyche,” a story whose length, intricacy, and poignancy have allowed it to stand alone as a classic of ancient literature, but whose character, plot, and thematic parallels also tie it firmly into the novel. Apuleius’ honed skills of rhetoric and reference make the tale especially palatable for an ancient erudite audience. This thesis analyzes his sources and writing style to shed light on his creative process and his use and subversion of literary trends and cultural phenomena, especially as they relate to three aspects of the tale: the allegory, characters, and literary technique.

Psyche’s journey is a metaphor for the human soul in its quest for love and immortality. Apuleius, a Platonic philosopher, bases this allegory upon themes from Plato’s *Phaedrus* and *Symposium*, as well as upon conventional Greco-Roman allegorical artwork uniting the personified Love and Soul. He manipulates these into a new allegory for entertainment, not proselytizing.

Study of the characters also yields evidence for Apuleius’ craftsmanship. Psyche is a passive heroine whose interest and transformation stem from her role as the allegorical Soul. Cupid is an amalgamation of Greco-Roman religious and philosophical beliefs about the nature of love; thus every aspect of his character contradicts another. Apuleius plays with his age and cosmic role to transform him from a knavish bully into a caring husband and father. Venus is a domineering matron obsessed with maintaining her slipping position of authority; she motivates most of the plot.

As a writer during the Second Sophistic intellectual movement, Apuleius’ literary style depended on the elaborate use of allusion and rhetoric. Thus the tale reflects epic and poetry, often inverted for comic effect. The transformations of characters and source materials within the tale further connect it to the novel’s theme, metamorphoses.

Classics

THE NECESSITY OF SCIENTIFIC MEDICINE, RELIGION, AND FAITH IN HEALING: A STUDY OF THE CLASSICAL GREEK MEDICAL SYSTEM

Max S. Rosen

Mentor: William Bubelis

This study takes an in-depth look at the nature of Classical Greek medical and healing practices. The medical system, as I demonstrate, grew out of two main realms: philosophy (i.e., secular medicine), as well as religion (i.e., religious or spiritual medicine). However, the prescribed treatments in both of these spheres for those seeking health, I argue in this thesis, strove to incorporate an individual’s web of life, emphasizing aspects of the patient’s daily diet, exercise, physiology, and spiritual proceedings.

I first study the healing effects provided by the Asclepian temples in antiquity, paying close attention to the possibility of therapeutic effects of testimonies and healing dreams at these temple sites. Next, I outline the essentials of Hippocratic medicine. I draw specific links between the religious medicine practiced at the Asclepieia and the secular medicine of Hippocratic physicians. They both emphasized a person’s relationship with his environment, as witnessed by their use of dietetic regimens, which altered a person’s diet and exercise. This insistence on dietetics both by Hippocratic physicians and Asclepian priests, in turn, seemed to heal not only many physical illnesses but also many subconscious and internal maladies. This medicine, effectively, was a mind-body medicine, one that grew out of the two spheres: a philosophic resolve to view the body’s health as a microcosm of the overall universe—thereby emphasizing the connectedness, and resulting required balance, of all aspects of one’s life in relation to one’s health—as well as a religious possibility of attending to one’s mind and emotions. Ultimately, I contend that instead of being diverging and opposing medical practices, it was this coexistence of secular and religious medicine as well as a psychosomatic, mind-body-approach to medicine that proved to be so valuable.
Questioning Achilles & Patroclus: 
Contextualizing the Opinion of Aristarchus
Chase Stephen Sackett

Mentor: Ryan C. Platte

For twenty-five hundred years, scholars have debated the nature of the relationship between the epic heroes Achilles and Patroclus. Representations of Achilles and Patroclus by such ancient authors as Plato and Xenophon reveal key insights into their own efforts to position the Iliad in accordance with their own conceptions of society and the world, as well as their views on sexuality and the ancient Greek institution of pederasty, which involved both pedagogical and sexual relationships between adult males and young males nearing adulthood. Among modern scholars, the apparent attempt of Aristarchus of Samothrace to remove a potential reference in the Iliad to a sexual relationship between Achilles and Patroclus has attracted particular speculation. However, placing Aristarchus’s opinion in the context of his own commentaries and critical style, as well as the methods of his predecessors at the Alexandrian library, reveals that he is an unlikely opponent of homosexual relationship or the institution of pederasty in general. Instead, Aristarchus is more concerned with the notion of prepon, or propriety, as shown in his other works. Furthermore, it is impossible for the modern reader to fully understand why Aristarchus recommended the removal of those lines from the Iliad, or to definitively determine the nature of Achilles and Patroclus’s relationship as portrayed in Homer. As a result, my study asserts that the opinion of Aristarchus is best seen as emblematic of the tensions surrounding both interpretation of the Iliad in the ancient world as well as Alexandrian views on the institution of pederasty.

The Language of Haneen in Arab Literature of the 1990s
Vivek Gupta

Mentors: Mohamed-Salah Omri and Emma Kafalenos

Inserting foreign words in a literary text, rendering the sense of one language into another, translation, and transliteration occur frequently in Arab literature of the 1990s. I argue that language shifts express haneen, or longing for a remembered time and place. By identifying language shifts as expressions of longing, one assigns agency to writers for their use of language. From this perspective, writers deliberately invoke other languages in the literary language of a text to reconstruct memories of past times and places. These other languages may be local dialects of Arabic or Western languages. I outline parameters of language “citation” and “inflection” to discuss aspects of language shifts. Citation is a noticeable shift from one language to another, whereas inflection is often difficult to trace without knowledge of the inflected language. Inflection captures the sensibility of one language in another. The primary texts for this project are an Arabic novel Dhakirat al-jasad (1993) by Ahlam Mosteghanemi, an Arabic autobiography Ra’aytu Ramallah (1997) by Mourid al-Barghouthi, and an Anglophone novel The Map of Love (1999) by Ahdaf Soueif, from Algeria, Palestine, and Egypt, respectively. From a close reading of Palestinian poet Mahmoud Darwish’s meditation on haneen from Fi Hadhrat al-ghiyab, and adopting Svetlana Boym’s “reflective nostalgia,” Henri Bergson’s “memory,” and Jens Brockmeier’s reading of the Proustian “involuntary memory,” I construct a theory for haneen. The form of haneen Darwish conceives can be seen in works by Mosteghanemi, al-Barghouthi, and Soueif. The writer of the autobiography, the narrators of the two novels, and the characters in all three narratives use language citation and inflection to express this longing.
Comparative Literature

The Other as Negative Space: How Counternarratives and Hybrid Narratives Determine Where Monsters Stand in Relation to Humanity

Vladic Kostin

Mentors: William Layher and Emma Kafalenos

This study examines the ways in which perspectives and narrative structures can influence how we view monsters and their human antagonists. I focus specifically on two different types of narratives. The first type is a counternarrative, a retelling of an already established story through a different perspective. Grendel is a counternarrative because its protagonist refers to the same world and the same basic story as Beowulf. The second type of narrative I discuss is a hybrid narrative, one where a single story is partitioned between two different perspectives. Dr. Jekyll and Mr. Hyde is an example of a hybrid narrative because it contains within it two protagonists who share the same story.

Although counternarratives are similar enough in the events they describe that we may start treating them as the same story told twice, they are nonetheless inherently separate texts with incompatible interpretations of those events. And while hybrid narratives contain two such vastly different perspectives that we may wish to see them separated from each other, they are still combined into one text that relies on both perspectives to form a complete story. Counternarratives are forced apart while hybrid narratives are forced together, leading to a conflict between the monster protagonist and the human protagonist, between their perspectives and their versions of the narrative.

Taken together, the two sets of narratives depict monsters as either completely distinct from mankind or completely united with it, when in actuality they are both and neither at the same time. Monsters are beings trapped between the human world and the outside world, neither a part of nor separate from either one. This region cannot be defined; but like a negative space, it can be outlined by the perspectives surrounding it and by the narratives that construct those perspectives.

Comparative Literature

Yu Hua’s Allegories of Personhood: Body, Past, Person

Dylan Suher

Mentors: Robert Hegel, Lingchei Letty Chen and Emma Kafalenos

The Chinese “avant-garde” writer Yu Hua’s works are chiefly characterized by acts of senseless, graphic violence and images of defecation, copulation and consumption. This study seeks to explain the frequent appearance of these motifs through a careful examination of the images and the way they interact with different philosophical and historical frameworks. Other studies on Yu Hua have primarily sought to explain these images by treating the images of the body as symbolic of other major themes in his work, but these interpretations do not sufficiently explain the centrality of the images of the body throughout his fiction—specifically, the “grotesque body” as described by Mikhail Bakhtin. These images of the body are clearly tied within Yu Hua’s work to a concern with history, but the contradictory possible significances of the body provided by different discourses present in Chinese history make a simple historicist interpretation impossible. The bodies within Yu Hua’s work are instead linked, using Walter Benjamin’s concept of allegory, in an allegorical relationship with Yu Hua’s conception of the past: charged but ultimately hollow images of the body are linked to a conception of the past as eternal, cyclical and devoid of a final meaning. This relationship in turn mirrors a conception of the person based in unique perceptual experience and defined against the strictures of society and language. In the final analysis, the individual in Yu Hua’s work is created by the very subjective questioning of his own position, a process that is subverted and co-opted by capitalism. Yu Hua’s radical critique of the emerging Chinese capitalist system puts him in conversation with a variety of contemporary artists and writers who similarly problematize personhood within capitalist culture.
Where the Ceiling Cracks: An Analysis of the Types of Firms Females Are Selected to Run
Josh Charney

Mentor: Bruce Petersen

When a firm hires a female as its CEO, is the firm of lower quality and higher risk compared to firms who hire males? If women are being stigmatized in the labor market, then higher quality firms may be more reluctant to hire a female CEO. I examine this hypothesis by sampling the different types of firms these new female CEOs run. My results show that when compared to firms that select male CEOs, firms that select females are considerably smaller, are somewhat riskier and somewhat less profitable. The differences, however, are not statistically significant and thus my study provides suggestive, but not conclusive, evidence that firms selecting a female are of lower quality and higher risk.

Institutions of the Underground Rain: Commons Governance on the Ogallala Aquifer
Charlie Franklin

Mentor: Sebastian Galiani

Who should govern the commons? Economists traditionally address the commons dilemma under the assumption that only an external, central authority can coerce sustainable appropriation among users. However, recent evidence shows that local, self-managed institutions can effectively regulate a common-pool resource under certain circumstances. I argue that local governance institutions manage common-pool resources more effectively than do central governments. Using evidence from the Ogallala (High Plains) Aquifer in the central United States, I use two different fixed effects models to compare groundwater resource depletion between local conservation districts and state water development boards in years 1964 – 2007. Results based on nearly 200 counties in 7 states show that the presence of local institutions improves groundwater levels by 5.3%. However, a regression with withdrawal rate as the dependent variable does not yield significant results for lagged local institutional formation. I conclude that local, self-managed institutions may provide a more effective solution to the commons dilemma than a central locus of control. Further research using more precise measures of institutional impact may show stronger results. These conclusions have implications for the role of local institutions in future environmental and resource policy design.
The Impact of Tort Reforms on Health Care Expenditures

Srishti Mirchandani

System incentives push physicians to practice “defensive medicine” in avoidance of malpractice litigation, resulting in potentially excess health care services and expenditures. Tort reform is touted as one possible remedy. Using panel data from twenty-five years across the fifty states, I exploit different state experiences of tort reform to examine the impact on per capita health care expenditures. A robust model controlling for time and entity fixed effects predicts a statistically significant reduction of about 3% of state per capita health care expenditures with an active damage cap. Controlling for possibly endogenous policy increases estimates to about 13%. Credible assessment of the impact of such reforms could provide important insight for future tort reform policies.

Do Labor Market Conditions Influence the High School Enrollment Rate?
Evidence from Missouri

Alex Mistratov

This paper investigates the impact of labor market conditions and economic status on high school enrollment rates. I use a panel specification to avoid potential omitted variable problems of prior cross-sectional studies. The results suggest a positive relationship between the county unemployment rate and a school district’s enrollment rate for poor districts. Meanwhile, enrollment rates in wealthier districts are not affected by the unemployment rate. Teacher characteristics and demographics also appear to influence the enrollment rate. The paper demonstrates the importance of accounting for omitted variables and a correctly identified dependent variable.
Economics

An Increasingly Risky World: Double Probability Discounting of Gains
Josh Morris

Mentors: Leonard Green and Joel Myerson

In past studies observing probability discounting, the subjective value of a probabilistic reward has been measured by finding the indifferent point between a larger, probabilistic reward and a smaller, certain reward. The present study observed probability discounting when a common multiplier (between 0.05 and 1.0) is added to both rewards, making both options probabilistic. In two experiments, subjective values of a wide range of amounts of money were fit to the hyperbolic function: \( V = A/(1 + h(1 – p)/p)^s \). Magnitude effects showed that the rate of discounting increased as the amount of money increased. High to moderate common multipliers had no effect on the rate of discounting, however, at very low common multipliers the rate of discounting systematically decreased.

Economics

“Social Butterflies”: A Model of Social Approval as a Motivation for Charitable Giving
Grace Tsou

Mentor: Michele Boldrin

The motivations for voluntary charitable giving and the implications of these motivations are debated in the economics literature. The present study attempts to model the social approval motivation for giving where change in behavior occurs based on whether or not and to what extent an individual’s peers observe his or her giving behavior. I present a theoretical model of how an individual might maximize utility with respect to social approval and joy-of-giving. Under certain conditions, the model predicts that a group of givers who put value on social approval will, on average, give less than a group of givers who do not put weight on social approval. Using data from the Indiana University Center on Philanthropy Panel Study of Giving and Volunteering Behavior, I show empirically that this prediction is correct. The results of this analysis of social approval and giving provide insight into how behavior changes when observed versus unobserved, social psychology, and interdependent preferences.
The Descent from the Pedestal:
The Dilatory Space Between Marriage and Consummation in Three of Shakespeare’s Plays
Alissa Cooper

Mentors: Jami Ake and Joseph Loewenstein

Scholars have acknowledged that marriages play a central role in Shakespeare’s comedies, tragedies, and romances, and several have argued for a significance to what Carol Thomas Neely called “Broken Nuptials.” However, no one has yet explored in any real depth the curious gap that occurs between marriage and consummation that appears in several of Shakespeare’s dramatic texts. This essay examines this odd occurrence in three plays, The Merchant of Venice, Romeo and Juliet, and Othello, and finds that all three plays illustrate a heroine intent upon taking herself off the pedestal, although Desdemona begins the play off the pedestal and arguably spends most of the play attempting to reverse this trajectory. With varying levels of failure, Portia, Juliet, and Desdemona attempt to mitigate the pervasive anxieties surrounding female sexuality by a process of deidealization, which must occur so that they can create a mature, reciprocal sexual relationship. This anticipatory space thus primarily serves a function in which the heroines delay consummation—an act which renders them vulnerable to misogyny—until that time which their husbands can view female sexuality in a less misogynistic light.

Dostoevsky and British Modernism:
The Influence of Dostoevsky on Joseph Conrad, D. H. Lawrence, Wyndham Lewis and James Joyce
Colleen Davis

Mentors: Marina MacKay and Vincent Sherry

Western Europe saw sweeping social, scientific and political changes taking place at the turn of the twentieth century which changed the way we consider the human condition, and Modernist literature exploded with new ways of portraying this condition. Curiously, one of the common literary influences throughout Modernism is Dostoevsky; reactions to him are diverse, and he really is one of the period’s most divisive figures.

This thesis traces Dostoevsky’s presence throughout the works of Conrad, Lawrence, Lewis, and Joyce, and uses these examples to explain how and why Dostoevsky made such an impact on British Modernism. It does not contend that the similarities are directly causative; it does claim an influence, and yet a tension and hesitance to recognize Dostoevsky’s pull. The aspects of Dostoevsky’s work that stay with each author are indicative of the shifts taking place throughout Modernism. As faith in truth diminishes, so does insistence upon fidelity to it, and Conrad’s and Lawrence’s concerns with Dostoevsky’s work become superseded by an emphasis on aestheticism, and, for Lewis and Joyce, Dostoevsky’s stylistic choices begin to weigh in on contextual themes. Earlier Modernists take issue with the truths Dostoevsky preaches in his novels, while later Modernists are fascinated with Dostoevsky’s presentation of truth as subjective.

In presenting truth, each Modernist seems willing to meet Dostoevsky, but only halfway. Where Dostoevsky’s influence can be found in their works, the prose is both invigorated and frustrated by this tension. It pulls the authors backward, slows them down and reminds them of those sometimes uncomfortable tethers pulling them into the world around them and the cost of this relationship—truth, which as the Modernists are keenly aware, is necessarily sacrificed in our relationships with other people and, of course, in the telling of a story.
**Invented History:**
**Memorializing the Holocaust Through Fiction**
*Samuel Morris Guzik*

*Mentor: Rafia Zafar*

This paper examines the ways in which post-Holocaust authors have told and re-told the story of the Shoah and discusses a spectrum for evaluating those methods. Using survivor testimony as source material, authors expand on the basic history of the Holocaust to create a narrative that is both personally meaningful and continuously relevant to new generations. Initially, writing about the Holocaust follows the pattern literary critic Marianne Hirsch calls “postmemory,” using the repetition of traumatic images as a mechanism for dulling the shock of recalling the events. As postmemorial work succeeds in exposing a new audience to the collective recollection of the Holocaust, however, the need decreases for a means of aesthetic representation that deals explicitly with trauma. It is then possible to describe the Holocaust within the larger context of Jewish history. This paper will explore the way in which three contemporary authors—Art Spiegelman, Jonathan Safran Foer and Nathan Englander—manipulate shared memories and represent different stages in their relationship to the Holocaust in order to decrease the traumatic shock of the Shoah without losing its relevance to contemporary authors and audiences.

**“An Explosion of Roles”:**
**Destruction of the Home and Construction of Settler Femininity in Three Novels about Decolonization**
*Rebecca Hufstader*

*Mentor: J. Dillon Brown*

This paper explores the construction of settler femininity in *The Last September,* by Elizabeth Bowen, *Wide Sargasso Sea,* by Jean Rhys, and *July’s People,* by Nadine Gordimer. While these three novels take place in different locations at different historical moments, all three portray settler societies during the process of decolonization. I examine the ambivalent suspension of the three female protagonists between the metropolis and the indigene in order to understand their simultaneous desire for and fear of the racial or native Other. This uncanny Other creates, in the moment of decolonization, a distinct sense of the unhomely within the exclusionary domestic space, calling into question both the colonial structures which guarantee the settler woman’s authority and the patriarchal structures which keep her oppressed. I suggest that ultimately, with the destruction of these homes, the texts open up the possibility of a settler feminine identity which can empower women without relying on racist institutions. By forcing their protagonists out of the security of their homes and into an unknowable future, these novels gesture toward a feminist project which accepts rather than exploits racial and national alterity.
Estate, Empire, and the Individual: English Nationalism and the Estate Novel

Molly Jennings

Mentor: Marina MacKay

The estate novel has formed a cornerstone of English literature for centuries, reaching at least as far back as Austen’s novels. As the estate novel evolved along with changes in the English social and political fabric, however, so did the estate itself as it began to lose its value to modern England and its stabilizing power. This thesis explores the intersection between the post-colonial and the late modernist in novels written during the interwar and postwar period of decolonization by focusing on the struggles of the protagonists of three novels to find a national home: Evelyn Waugh’s Brideshead Revisited, Elizabeth Bowen’s The Last September, and Jean Rhys’s Wide Sargasso Sea. These novels play an important role in the shaping of the cultural image of empire and offer insight into the various ways in which the country house functioned as a cultural and physical garrison in the face of dispossession.

The protagonists of these novels find agency in the wake of dispossession: losing a home and the nationalism it represents, both of which they have long taken for granted, causes each to seek identity on his or her own terms. In Brideshead Revisited, this search leads to a new group with a strong collective memory: the Catholicism Ryder chooses has a long and well-known history. In The Last September, Lois’s search leads her to seek a history beyond that which she has inherited as a member of the Protestant Ascendancy. Antoinette, in Wide Sargasso Sea, remains caught between binaries that constitute English epistemology, unable to create a space for herself. Rhys’s act of writing her story gives her a home, but not one that materially changes her situation. Together, these works demonstrate both the power and the limitations of the estate and, by proxy, the nation.

Grandmothers and Stories

Elena Losey

Mentor: Kathleen Finneran

In “Grandmothers and Stories,” I examine the lives and stories of my biological grandmothers and how their experiences shaped my relationships with them. My maternal grandmother, Carmela Amabile, is the daughter of Sicilian immigrants and grew up in the Great Depression. I honor her here by retelling the stories of her girlhood that I heard from her as a child. These stories, and my memories of their tellings, have shaped my love of and respect for Gramma, and in turn have given me a great appreciation of the importance of kinship. My paternal grandmother, Barbara June Losey, died in a car accident when my father was a teenager. She was rarely mentioned in my household while I was growing up, and as a result I knew very little about her. With this essay, I chronicle my recent curiosity about this grandmother I never knew by exploring stories, relics, and my own impressions. In the end, I believe I have succeeded in fostering an intimate relationship with her, despite the fact that she is no longer living. Together, these two essays are a testament to the importance of storytelling, family, and history.
“Divided from the Sphere”:
Desire, Displacement, and Death in the
Lyric Poems of Andrew Marvell

Melanie Mohn

Mentor: Steven Zwicker

From the opening lines that urge the soul’s courage in the created world, the 1681 publication of Andrew Marvell’s *Miscellaneous Poems* depicts various attempts to navigate an often uncomfortable earthly existence. The volume begins with several religious lyrics that express different aspects of an anxiety of embodiment, the spiritual problem of the soul’s incarnation in a fallible body. In these poems, the soul longs for its eventual ascent to heaven as a release from the pressures of an earthly existence. While it waits on earth, the soul’s activity is marked by recurrence, as it repeatedly denies temptation and turns in careful circles. Marvell’s own echoing poetry reflects a similar tendency, perhaps related to his discomfort with the limitations of the body and the demands of desire.

Marvell’s pastoral dialogues and Mower poems retain, and to an extent render concrete, this anxiety of embodiment—concerned not only with the limitations of the physical form, but also its susceptibility to temptation and sin—by attending to the specific pressures of erotic love. Pastoral settings provide a retreat from the public sphere, but the retirements of these poems more importantly attempt to evade the compulsory pursuit of a feminine love object and a fallen, postlapsarian sexuality. For Marvell’s male speakers, the emergence of an adult woman in the pastoral landscape inaugurates a state of psychic displacement—often doubled by physical wounding—and causes the loss of what the speaker retrospectively imagines as an original relation between mind, body, and nature. These speakers seek various remedies: the Mower attempts to assuage his psychic pain through repetitive physical labor, recalling the soul’s own anxious circling. Others displace their desire onto a less threatening object, admiring an ambiguous “infant love” in a peaceful pastoral scene as an emblem of unadulterated innocence and the original unity that Marvell’s poems consistently crave. However, these retreats—the pastoral scene, pristine childhood—remain threatened by the inevitable emergence of desire. Despite a remarkable range of tone and content, Marvell’s lyrics ultimately circle a shared conclusion: realizing that only death can end desire, the poems finally imagine the body’s demise, the soul’s ascent, a personal apocalypse.

Completing an Edition of *Brittain’s Ida*

Channah Rubin

Mentor: Joseph Loewenstein

This senior thesis project includes a critical edition of the poem *Brittain’s Ida* with an accompanying essay on habits of attribution in early modern literary culture. *Brittain’s Ida* was first published in 1628 and attributed to Edmund Spenser, although scholars now believe it was written by Phineas Fletcher, an author of the generation following Spenser’s and one of several English poets especially indebted to him. This edition will become part of the larger Spenser Edition prepared by the Spenser Project and includes notes, gloss, an exploration of the physical bibliography of the poem, and a textual introduction placing the poem within literary and historical context. The accompanying essay on attribution traces the historical disputes over authorship of the poem and proposes comparisons between these disputes and the more modern philosophical writings of Barthes, Foucault, and Derrida.
Divided Loyalties: American Nationalism and the Pull of the Orient, 1850s-1880s
Laura Soderberg

Mentor: J. Dillon Brown

Several scholars, such as Lester Vogel, Timothy Marr, and John Davis, have demonstrated the ways that symbols of the Orient in general and the Holy Land in particular have saturated and shaped American discourse since the Puritans. Starting in the mid-nineteenth century, however, as travel to the Middle East became increasingly possible, Americans were faced with a region both physically real and deeply foreign but to which they imagined themselves closely tied. I examine the shifting approaches that authors took towards reconciling this connection to the outside with the desire to be culturally autonomous, arguing that the negotiation of this connection to the outside reflects the stability of the American national identity. I begin with a case-study of George William Curtis’ 1852 travel works, *Nile Notes from a Howadji* and *A Howadji in Syria*, arguing that Curtis represents a new willingness to place his nationality at a distance, yet also that, by giving himself over to the Orient, Curtis seems to have strayed too far for the comfort of his contemporaries. Caught between these two extremes, there seemed to be no way to allow for closeness between the US and the icons of the Orient without threatening the integrity of the American identity. I then turn to the new approach that arose with the wave of interest in Near Eastern archaeology. The ancient Orient could, symbolically at least, be reimagined into an American pre-history, giving the post Civil War nation a stabilizing sense of continuity and distancing the influence of the more politically menacing Europe. In this approach, fascination with the Orient became an almost patriotic endeavor, and visits to the Middle East took on an air of self-congratulatory nostalgia. These authors sublimated their admiration for what they once would have seen as alien into an admiration for the roots of their own culture. Finally, I examine Herman Melville’s *Clarel* (1876), as a portrait of a Holy Land once again alien. That Melville’s pilgrims are irretrievably removed from the sites they visit, however, results not in an end to their faith but a shift to Christianity disconnected from place and tied only to the individual.

Keats and Dreaming
Minha Yoon

Mentor: Guinn Batten

John Keats’s poetry engages the reader in an intense questioning of Imagination, one of the key concepts of British Romanticism. My thesis explores the ways in which the power of Imagination is actively involved in creating various points of contact between abstraction and reality in Keats’s work. In the completed romance poems of 1819, *The Eve of St. Agnes, La Belle Dame Sans Merci*, and *Lamia*, I hope to respond to the currently predominant skeptical interpretation of Keats’s poetry and to further suggest that we may reconsider what many critics have identified as the young poet’s disillusionment with the power of Imagination as a development of a more complex awareness of its intimate relationship with the mutability of an individual life. In the romance poems, Imagination manifests its influence through the various manifestation of dreaming.

Following the chronological order of the romances, the examination of dreaming as a deliberately conducted activity in *The Eve of St. Agnes* uncovers the productive potentiality of dreaming while also establishing the dreamer, Madeline, as a locus between the realm of reality and abstraction based on her conscious participation in dreaming. In *La Belle Dame Sans Merci*, application of a more theoretical reading provided by the psychoanalytic criticism of Sigmund Freud and Julia Kristeva realizes the melancholic nature of dreaming and its self-enthralling dreamer. Ambivalence of circulatory nature achieved by the knight-at-arms’ self-enthrallment invites us to consider the significance of transient beauty in relation to its effective resilience against the limiting boundary set by knowledge. Finally in *Lamia*, the dreaming activity is incorporated and dispersed through Keats’s reconstruction of the pre-existing narrative to display its ever pervasive and ever continuing capacity. Dreaming in Keats’s romance thus reveals the profundity of Romantic Imagination and enables us to view the blurred boundary between reality and dreaming as the necessary condition for imaginatively productive living.
Environmental Studies

How Aspect and Topography Affect Plant Stress

Lauren Elizabeth Barry

Mentor: Ellen Damschen

Global climate change is likely to alter local patterns in temperature, precipitation, and heat wave events. Species will react differently to these changes depending on a variety of factors, including their topographic location and its effect on the abiotic conditions of their local micro-habitat. Understanding the relationship between these factors is important when predicting individual and community response to climate change; however, few studies have quantified plant stress along these gradients in micro-habitat conditions. After noticing extreme plant wilting in the Klamath-Siskiyou mountains of southwestern Oregon during the summer of 2008, we developed an observational study to quantify the degree of wilt along gradients of elevation and aspect over two years and correlate wilting to changes in relevant abiotic factors along the same gradients. We found that variation in abiotic factors (such as temperature, light availability and soil moisture) at the micro-habitat scale was strongly correlated with topographic variables of aspect and elevation and that degree of wilting correlated with these variables. For example, although higher elevations are usually associated with cooler climatic conditions, we found that plants were more likely to wilt at higher elevations than at lower elevations. We show that this unexpected trend in wilting was correlated with decreased canopy cover and lower soil moisture at higher elevations. In addition, species traits such as Specific Leaf Area are correlated with a plant’s likelihood of wilting and may be used as broader predictors of stress. Understanding the vulnerability of different plant individuals to climatic stress due to their topographic location and species traits is crucial when considering potential impacts of increasing variability in temperatures, precipitation, and heat wave events on plant communities.

Characterizing Post-dispersal Seed Predation in the Matrix of a Connected Landscape: Spatial, Temporal and Species-specific Variation and Its Effect on Biodiversity Spillover

Michael Timothy Craig

Mentor: John L. Orrock

By improving connectivity between patches, corridors have been demonstrated to be an important conservation tool in addressing habitat fragmentation and loss, the gravest threats to biodiversity worldwide. Recent work suggests that one positive effect of corridors, increased plant species richness, can extend beyond target patches into adjacent habitats. This "spillover effect" could arise due to increased seed dispersal and deposition or decreased seed predation in non-target habitat, but the extent to which each factor contributes to biodiversity spillover remains unclear. To begin to answer this question, I investigated seed predation in the matrix of a landscape-level, highly replicated corridor system by quantifying the number of remaining seeds in seed depots. Spatial, temporal, and species-specific variation in seed predation was examined and used to explain observed patterns in biodiversity spillover. My results show that patch type did not significantly affect matrix seed removal, suggesting that increased spillover around connected patches is not driven by seed predation. However, matrix seed removal of small-seeded *Carpephorus bellidifolius* and *Anthaenantia villosis* was significantly higher than that of large-seeded *Phytolacca americana*. This species-specific removal, in conjunction with the dispersal mode (wind, unassisted, and avian, respectively) and subsequent expected deposition rates of each seed species, may determine the composition of the spillover community. Similarly, the documented temporal variation in seed removal, whereby removal in the summer was significantly greater than that in the fall, could differentially affect seed species based on time of dispersal. Matrix seed removal was also significantly higher at 50 m from the patch edge than at the patch edge, a trend that could partially explain the observed decay of biodiversity spillover. These findings have strong implications for the conservation of fragmented landscape, and serve as a foundation for further research into the determinants of biodiversity spillover.
Environmental Studies

Correlating Host Metapopulation Size and Parasite Species Richness at Multiple Spatial Scales in an Amphibian Host-Parasite System

Joseph R. Mihaljevic

Mentor: Jonathan M. Chase

With emerging evidence for the importance of parasite communities in shaping free-living biodiversity patterns and even ecosystem health, a rigorous understanding of the mechanisms driving parasite community structure is necessary. Parasite richness was historically studied as a function of host characteristics and immunity, but recent evidence suggests that landscape characteristics in which host populations are embedded can greatly influence parasite richness patterns. Because the spatial dynamics of hosts influence the movement of their parasites, host metapopulation characteristics can influence parasite species richness. In this study, I collected metamorphs of the pond-dwelling frog, *Rana clamitans*, from ponds throughout southeast Missouri, surveyed their endoparasite communities, and correlated the parasite species richness with *R. clamitans* at within-frog, within-pond, and within-site spatial scales across regions that varied in the number of ponds present (i.e., metapopulation size). I found that parasite species richness was strongly positively correlated with host metapopulation size at the within-frog and within-pond scale, and marginally so at the within-site scale. Additionally, within a subset of common parasite species, individual parasite species’ prevalence (presence/absence in a host) was also positively correlated with host metapopulation size. Through exploring the effects of host metapopulation size in this study, I show that both host- and parasite-relevant landscape dynamics are integral to explaining parasite richness patterns at multiple spatial scales.

Environmental Studies

Supporting Renewable Energy: Lessons from the Deer Island Treatment Plant

Kira M. Sargent

Mentor: Jill Pasteris

Developing renewable energy requires the creation of specific technologies, organizational structures, and financial incentives. This thesis analyzes the successes the Massachusetts Water Resource Authority (MWRA) has had installing renewable energy technologies at the Deer Island Treatment Plant (DITP). DITP, a wastewater treatment plant in Boston, Massachusetts, is an example of a large facility that has been able to generate over one fourth of its energy on-site from renewable sources.

DITP was built as the centerpiece of the Boston Harbor Project (BHP), a multi-billion dollar project designed to bring Boston Harbor into compliance with national water quality standards. Technological, political, and financial factors led to the installation of renewable energy technologies at DITP. The court-ordered restructuring of the Metropolitan District Commission into the MWRA gave the organizational freedom necessary for long-term planning and fundraising. Anaerobic Digester Gas and Hydropower technologies were integrated into the facility itself, so the Boston Harbor Project subsumed their costs. Later, solar PV and wind turbines were funded largely by state renewable energy programs. Renewable Portfolio Standards, low-interest loans, and the Renewable Energy Trust also helped overcome the unfavorable payback periods of renewable technologies. The MWRA also benefited from policies that mandated specific goals for greenhouse gas reduction, renewable energy research, and “green” jobs.

The DITP indicates several useful points for other organizations interested in promoting renewable energy. Briefly stated, these include: integrating renewable energy into existing operations and new projects, outlining the variety of benefits of renewable energy, prioritizing renewable energy goals, creating the organizational and financial flexibility for long-term planning, and building upon past successes. As the case of DITP shows, there are many opportunities to reduce fossil fuels usage, but implementing renewable energy and energy efficiency technologies takes resources, long-term planning, and innovation.
Environmental Studies

LANDS OF THE LAKOTA: POLICY, CULTURE AND LAND USE ON THE PINE RIDGE RESERVATION

Joseph Stromberg

Mentor: Clare Palmer

Land is invested with tremendous historical and cultural significance for the Oglala Lakota Nation of the Pine Ridge Indian Reservation. Widespread alienation from direct land use among tribal members also makes it a key element in exploring the roots of present-day problems—over two thirds of the reservation’s agricultural income goes to non-Natives, while the majority of households live below the poverty line. In order to understand how current patterns in land use are linked with federal policy and tribal culture, this study draws on three sources: (1) archival research on tribal history, especially in terms of territory loss, political transformation, ethnic division, economic coercion, and land use; (2) an account of contemporary issues facing the reservation, with an analysis of current land policy and use patterns; and (3) primary qualitative ethnographic research conducted on the reservation with tribal members. Findings indicate that federal land policies act to effectively block direct land use. Tribal members’ response to policy has been subject to the expression of cultural values, and the intent of policy has been undermined by a failure to fully understand the cultural context of the reservation. A discussion interprets land use through the themes of policy obstacles, forced incorporation into the world-system, and resistance via cultural sovereignty over land use decisions.

Film and Media Studies

LIVING TRUST

Robin Mabrito

Mentors: Richard Chapman and Phillip Sewell

Screenwriting for television is a process that simultaneously involves both creative and industrial factors. In this thesis, I attempt to simulate this screenwriting process from pitch to final draft. The thesis involved the writing of one pilot, two subsequent episodes, and a series bible for an original property. The pilot episode was created to demonstrate the premise of the show, and how that premise would be perpetuated, to a television network. The subsequent two episodes were crafted as if a television network had “picked up” the show and ordered more episodes to be created. The series bible, a sort of “master document” for the show, was created as both a sales tool and a guiding force for the screenwriter.

The premise of the thesis is centered on three trust fund-dependent siblings who are forced to live together when they discover their parents have robbed them blind. The thesis works to explore certain thematic issues such as amorality, family conflict, and the effects of a financial disaster. It is designed as a single-camera, half-hour situation comedy, aimed for either network or cable television. Overall, the thesis worked successfully as a synthesis between the theoretical media studies and practical screenwriting experiences I have had previously in the classroom.
Unlike most directors, Wim Wenders, a member of the New German Cinema movement of the 1960s and 1970s, did not want to be a storyteller. Rather, he sought to make films that capture reality and the passage of time, both of which stand at odds with a fabricated narrative. However, this cinematic goal proved impossible: movies need stories for structure, coherence, and entertainment value. In the mid-1970s, Wenders reconciled the narrative/anti-narrative opposition in his Road Movie Trilogy. These films, which include Alice in den Städten, Falsche Bewegung, and Im Lauf der Zeit, feature weak plotlines, undefined characters, and stark, dramatic imagery. Here, I argue that Alice in den Städten is a model for a cinematic approach that attempts to challenge narrative while representing reality on celluloid. Through Alice in den Städten’s episodic structure, use of the long take, and closing scene, Wenders’ images retain a certain degree of autonomy yet still manage to satisfy the viewer’s need for narrative form and a sense closure.

My thesis comparatively studies the admissions policies and how they changed in the 1960s at Yale and Princeton and Oxford and Cambridge. First, I offer a historiography of admissions to elite universities in the U.S. and the U.K., within the larger context of the social class structures and events in both countries. Second, I examine changing admissions policies at Yale University and Princeton University during the 1960s. Third, I explore attempts to reform admissions policies at Oxford University and Cambridge University during the 1960s. Fourth, I offer a comparative analysis of admissions policies and their effects on elite universities in both the U.S. and U.K. during the 1960s. The conclusion analyzes and presents wider implications based on the historical research.

An examination of admissions to elite institutions in the U.S. and U.K. during the 1960s reveals three key findings. First, the U.S. saw transformative change in admissions at Yale and Princeton through bottom-up pressure such as student protests and the civil rights movement, which caused top-down reforms at these elite institutions. Once the Ivy League reformed admissions procedures in an effort to recruit a more diverse undergraduate student body, the secondary-level prep schools soon followed suit. On the other hand, demand for reform in admissions in the U.K. came largely from the middle-class and public media, mainly newspapers such as The Guardian and The London Times. Second, the ways institutional leaders acted on admissions reform profoundly affected both the extent of change and the depth of institutional commitment to change. The fact that British universities were divided into autonomous colleges limited the ability of any single leader to effect change throughout the university. In contrast, administrators in the U.S. held tremendous influence thanks to the centralized governing structure of U.S. higher education institutions. Lastly, the way “merit” was defined was critical at each institution. Significant differences between the U.K. and U.S. in how merit was interpreted fundamentally shaped the ways these institutions approached and carried out admissions changes. Conceptions of merit came from institutional leaders, but also from groups who were putting pressure on each institution to reform, including the press, the public, and those within the universities themselves.
Enemies in Our Midst: The American Wartime State, German and Italian Internment, and the St. Louis Experience of the Second World War

Eric Houtman

Mentor: Margaret Garb

This work will examine the three levels of American society during the Second World War and expose the intersection of the expansion of state power and domestic mobilization upon social, racial, and political understandings. Beginning with an examination of the continuum of the American Executive from the late eighteenth century, I will paint a portrait of war as a medium through which the authority of Washington was continually expanded in an attempt to provide for the security of the nation. As the focus of the study, the lead-up and prosecution of the Second World War will be the backdrop to the discussion. In addition to an understanding of state power, this study will examine the domestic internment policies of the Roosevelt Administration and how their introduction resulted in a rapid process of German and Italian alien assimilation, as well as a construction of a popular understanding of the American home front. Through a utilization of St. Louis area newspapers and archival information, this work will uncover the local notions of the responsibilities of the home front upon the civilian and alien population, and further the underlying social, economic, and racial tensions which were not abolished by national mobilization.

The Fight for Minds and Souls: A Comparative Study of the Catholic Church’s Role in Nineteenth-Century French and American Education

Matthew A. King

Mentor: Steven Hause

My thesis examines and compares the role of the Catholic Church in nineteenth-century French and American education. Education was used as a tool to instill the desired values and instruction of the state in an effort to produce a collective understanding of ideals, morals, and rights for a diverse population. In both countries, education reformers sought to make public education free from sectarian influence so all children could receive public education without learning lessons contrary to their faith. Such reform was opposed by the Church. Catholic leaders believed that Catholic instruction was necessary to develop a proper morality in children and that a non-sectarian moral education was unacceptable.

I argue that the Church was able to remain a strong influence in education despite each country’s anti-Catholicism and educational reform of the day. I focus on the Ferry Laws, often championed as the first laws that began the secularization of French society, demonstrating how their effect was actually moderate, with the Church maintaining a strong grip on education. For the United States, I focus on the Church’s battles with Protestant-influenced public schools over taxation, using three cities as key examples. I show how, despite these battles, the Church was able to provide Catholic instruction for Catholic children and remain a key alternative to public schooling in American cities. Finally, this thesis compares the two countries, touching on each country’s approach towards the relationship between freedom and religion, where France emphasizes freedom from religion while the United States emphasizes freedom of religion.
“That I May Proclaim Your Holiness Clearly and Consciously and Manifest to All”:
Rhineland Jews, Christians, and the First Crusade
Ian Meyers

Mentor: Mark Pegg

This thesis examines life in the Rhineland before, during, and after the First Crusade in order to chart the effect of anti-Jewish violence on Jewish-Christian relations. While life for Jews in the Rhineland before 1096 was not ideal, they were able to relate to their Christian neighbors and rulers, developing favorable economic arrangements and enjoying friendly relations. I explain how the ideological development of holy violence (using Fulcher of Chartres and other accounts of Pope Urban II’s speech at Clermont) sidelined the Jewish minority and inspired martial pilgrims to attack the Jews of the Rhineland instead of Muslims in Jerusalem. To understand the expression of anti-Jewish violence, I primarily use three Hebrew-language accounts of the Rhineland massacres, which also represent an early form of Jewish memorialization. My thesis draws from a wide range of sources, including Passover prayers and a conversion account written by a former Jew, in order to demonstrate the changes that swept the Jewish community in the aftermath of the First Crusade. The attacks left Jews in the Rhineland distrustful of their Christian neighbors and caused them to turn inward to protect themselves and try to understand their suffering. Jews and Christians in the Rhineland, once integrated and intimately connected, began to draw back from one another.

Selling the Wars:
American and British Propaganda in World War I and World War II
Eric S. Reif

Mentor: Elizabeth Borgwardt

My thesis examines American and British domestic propaganda from World War I and World War II, focusing on the origins and activities of four national propaganda agencies: the Committee on Public Information and Office of War Information in the United States and the Parliamentary Recruiting Committee and World War II-era Ministry of Information in the United Kingdom. I argue that the domestic propaganda campaigns of the United States and Great Britain demonstrate not only their war aims but also the value that each nation placed on promoting its public image. The differences in the ways in which they developed national propaganda organs and the messages which they produced reflect different cultural attitudes towards propaganda as well as varying official viewpoints on the two wars. After primarily examining the American public speakers programs—the Four Minute Men in World War I and the Victory Speakers in World War II—and the British military and national service recruiting campaigns, I conclude that, while both the United States and United Kingdom relied on propaganda to motivate its citizens to support both World War I and World War II, in both wars the American government placed a much higher value on the role of a centralized, bureaucratized national propaganda agency to inculcate support for American war efforts.
Both a Healing and Destroying Witch: Female Practitioners in Colonial Massachusetts and Surrounding Areas During the Witchcraft Trials of 1648-1692

Ashley Salter

Mentor: David Konig

This thesis examines the relationship between midwives and witchcraft in Puritan New England from 1648 to 1692. Looking closely at the witchcraft trials which occurred in Massachusetts and its surrounding areas, this thesis argues that taking on the role of midwife created an ideal environment for witchcraft accusations. Performing the role of healer and midwife brought women outside of their own nuclear family into the community at large and allowed them personal access to the private world of other families. Midwives also embodied the physical and personality traits common to witches, which were necessary for the execution of their healing skills. Both midwives and suspects of witchcraft were commonly female, in middle age, and demonstrated an assertive personality, an interest in children, and proficiency in magic. Midwives also found themselves at risk when they intersected with religious leaders and male medical practitioners, who utilized witchcraft trials to reaffirm their superior position in the Puritan world. Midwives encountered these risk factors when they utilized their skills in the community, placing them in a uniquely vulnerable position when inexplicable events occurred and the community began to suspect that witches were at work.

First Fired, Last Hired: The Urban League of St. Louis During the Great Depression

Andrew Senter

Mentor: Margaret Garb

My thesis examines the work of the Urban League of St. Louis during the Great Depression. The Urban League was one of the few organizations in St. Louis that fought for the rights of African Americans during the 1930s. Even though most historical commentators have categorized the Urban League as a conservative organization, my research led to some new insights about the League. In particular, through examining the Urban League of St. Louis archives, I discovered that the St. Louis chapter was a much more liberal and radical group than the national organization. The reason for this shift in tactics was grassroots pressure from Black St. Louisans who demanded an ideological change in the Urban League. This was especially true with regards to the work the League did to improve Black opportunities on New Deal programs and in Organized Labor. The work of the St. Louis Urban League demonstrated how in order to have a greater understanding of the Urban League movement it is necessary to conduct in-depth studies of local branches. It also showed how studying local and grassroots African American organizations allows us to have a greater understanding of the Civil Rights movement.
“This Is the Lord’s Doing; It Is Marvelous in Our Eyes”: Sacred Themes in Crusader Narratives
Anna Studstill

Mentor: Mark Pegg

My thesis examines the sacred nature of the First Crusade by closely analyzing themes in narratives of the First Crusade. I focus my examination on the chronicle by Fulcher of Chartres. The first theme I focus on is the idea of a martial pilgrimage to Jerusalem. Pilgrimage shaped the sacred nature of the First Crusade. The second theme I examine is penance during the First Crusade. Pope Urban II preached the crusade as a way to gain forgiveness for sins and earn entrance into heaven, which was an important idea for Fulcher of Chartres and the crusaders. Visions were predominant in narrative accounts of the First Crusade. Visions were a way for the martial pilgrims to communicate with God and merge the earthly world with the heavenly. Another theme in the narrative accounts, images of the cross, connected the martial pilgrims with Christ. Finally, the First Crusade was the beginning of the development of the Imitatio Christi or the imitation of Christ. This thesis is a synchronic study of various topics and themes related to the chronicle of the First Crusade by Fulcher of Chartres.

The Case of Moll and Portia: Cross-Dressing and Desire in Early Modern City Comedy
Shelby Carpenter

Mentor: Jami Ake

The topic of the thesis is William Shakespeare’s The Merchant of Venice and Thomas Middleton and Thomas Dekker’s The Roaring Girl. More specifically, the focus of the project is on two cross-dressing female characters, Portia and Moll, and how they use their cross-dressing activities to modulate their respective relationships to the system of marriage. The central conclusions of the paper are that Portia uses cross-dressing to place herself inside the system of marriage, while at the same time rewriting her relationship with her husband as one in which she has greater power, while Moll places herself outside marriage while shoring up the martial system for other characters.
German Society and Football:
An Analysis of This Dynamic Relationship
Nicholas Alexander

Mentor: Stephan Schindler

In Europe, football/soccer has been a platform for Europeans to engage with members of their own nation and with citizens of other European countries. Football plays a critical role in the formation of national identities and thus has been a way for European citizens to define themselves. Germany is a country marked by a shadow due to its dark history, particularly because of the human rights atrocities committed by the National Socialists in the 1930s and 1940s, and it has struggled to establish and express national identity despite its guilt and shame. My dissertation seeks to understand ways in which Germany has used football to positively identify with its culture, traditions and those patriotic sentiments that are so common to other nations, and ways that Germany can express national pride without guilt. Through an exploration of certain football matches and their reception in German society and by using an interdisciplinary method which includes elements of sports studies and community theory, it is clear football affords Germans the opportunity to regain a sense of normalcy with respect to their sense of pride and patriotism regarding their country.

Crossing the River Jordan:
Exploring Individual Perceptions of National Identity in Jordan
Emily Becker

Mentor: Nancy Reynolds

The uniqueness of Jordan as a state, as a nation, and as a nation-state is challenged along almost all conceivable lines. Demographically speaking, a majority or near majority of Jordanian citizens have Palestinian origins. Ideologically speaking, many frame Jordan as a smaller part of a Greater Syrian, Arab, and/or Islamic nation or as larger collection of separate familial or tribal groupings. Territorially speaking, Jordan only relinquished its claims to the West Bank twenty years ago. Politically speaking, Hashemite monarchs—who some consider to be foreigners—have ruled Jordan since its inception as a nation-state. Despite these challenges, Jordanian nationalism remains a powerful ideological force.

In this paper, I look at how Jordanians—both Jordanian-Jordanian and Palestinian-Jordanian—understand their national identity on an individual level. Using twenty-two in-depth interviews with Jordanian residents that I conducted in the fall of 2008 to support my claims, I analyze three specific topics: how Jordanians imagine their past, present, and future, how national identity is expressed through language, and how Jordanians understand the relationship between national identity and natural resources. Ultimately, I find that there is no single sense of Jordanian-ness, but rather a fractured imagination of national identity that varies widely from person to person. I argue that it is important to understand the nuanced nature of national identity at the individual level so that we are better able to tackle resource scarcity, land conflict, and other environmental challenges in the current century and beyond.
The Holocaust in Brazilian Life: A Comparative Analysis with the Way It Is Perceived and Handled in America

Fernando Cutz

Mentor: James Wertsch

My research explores the different ways in which the Holocaust is remembered, perceived and handled in the United States as compared to Brazil. It analyzes the way that memory of the Holocaust developed and was shaped over the course of the past six decades in the United States and how different tendencies and interests have shaped it in a drastically different way in Brazil. Despite the vastly different paths to the creation of national memories of the Holocaust, it is noted that both countries now seem to have similar memories, and the paper analyzes why and how this convergence may have occurred, ultimately concluding that the issue is one of humanity which transcends more political or national considerations.

From Bombs to Sunflowers: The Denuclearization of Ukraine

Hana Damore

Mentor: James Wertsch

Ukraine was born nuclear. With the break-up of the Soviet Union in 1991, Ukraine inherited approximately 5,000 nuclear weapons, making it the owner of the third largest nuclear weapons arsenal in the world. Shortly after statehood, threats from Russia and a poor economy ignited a nuclear debate in Ukraine. Yet, in 1994, Ukraine became a non-nuclear state. In 1996, five years after it inherited the weapons, the defense secretaries of Russia, Ukraine and the United States watched as sunflowers were planted where a Ukrainian nuclear facility once stood.

This paper provides a comprehensive look at the denuclearization process and its effects. It aims to demonstrate that the United States played a critical role throughout and that, without its excellent foreign policy, the denuclearization might not have taken place. It seeks to demonstrate that without Ukraine’s decision to denuclearize, the world might not be the same today. In 1991, there were 30,000 Soviet nuclear weapons, 52 countries had not signed the Nuclear Non-Proliferation Treaty (NPT), and there were five nuclear free zones throughout the world. Today, there are approximately 23,000 nuclear weapons in the entire world, nine nuclear free zones and only four countries that have not signed the NPT. This progress can be attributed to leaders such as Obama, Reagan and Gorbachev, but also to smaller players like the Ukraine.
Grounded in historical and religious specificities, my thesis explores the emerging expressions of Islamic feminist thought in Morocco and illustrates how feminism has been applied productively in society. Islamic feminism differs greatly from western conceptions of feminism as it focuses on improving women’s place in society using religious justifications, through a rereading and reinterpretation of the religious texts as vehicles for an egalitarian and emancipatory message. I argue that this ideology presents the future of the women’s movement in Morocco. The historical political structure and the pivotal role played by religion in maintaining the power of the monarchy paired with the Sufi expression of popular religion, which historically allowed for the participation of women in religious practice, have established the groundwork for the growth of Islamic feminism in Morocco. I assert that the loose construction of the ideology and its preservation of Islamic identity bridges the socio-economic divides in Morocco and attracts adherents from diverse backgrounds, creating a new broad-based ideology whose expressions are beginning to flourish in Moroccan media, scholarship, and everyday life.
Consider: the Parthenon Marbles, Picasso’s Guernica, and the Sarajevo Haggadah. It is almost impossible to imagine what brings together an enormous sculptural ensemble made in Athens in about 450 BC, a heroic oil painting created in Paris in 1937, and a delicate illuminated manuscript likely crafted in Aragon in about 1350. In addition to their places and dates of origin, these objects differ in their materials, formal and thematic complexity, scale, function, and condition. Yet all are considered cultural treasures and are housed in national museums. All three objects, whether or not their museum plaques tell their complete stories, are marked by repatriation.

The return of cultural treasures to their rightful owners is an enormously complicated issue, particularly in Southern Europe, where there is a need to reconcile traditional and contemporary understandings of culture. Through a multifaceted prism of anthropology, sociology, art history, aesthetics, politics, law, and ethics, this study explores many of the theoretical and practical arguments for and against the return of cultural treasures to national museums in Greece, Spain, and Bosnia and Herzegovina. It also considers the evolution of such museums within changing meanings of nationalism and regionalism as well as peoplehood.

While realizing that repatriation issues can never be completely resolved and that national museums are themselves cultural treasures, a set of criteria for evaluating claims is proposed. These include historical, legal, and moral considerations. Ultimately, however, one nation must determine if it can spiritually possess the essence of another.

In Ecuador, Afro-descendent populations have been historically marginalized economically, socially, and politically since the colonial era. Their overall subalternity in Ecuador has resulted in exclusion from contemporary citizenship both formally and informally. Through examining the historical foundations of citizenship in the late colonial and early republican periods through current day, I focus on how omission and contradictions in Ecuadorian history leave out Afro-descendants and impact their subalternity. Their exclusion extends to national identity from which blackness and Afro-Ecuadorian culture are absent. I contend that this historical invisibility and isolation have resulted in the contemporary subalternity of Afro-Ecuadorians. Through an examination of the Afro-descendent population in the Chota-Mira Valley in the Northern highlands of Ecuador, I explain social and economic factors demonstrating the marginality of black citizens. However, recent political developments and the expansion of federal programs aimed at resolving some of the inequalities that Afro-Ecuadorians face demonstrate the strongest steps ever taken by the government to ensure the constitutional rights of Afro-Ecuadorians. Nonetheless, Afro-Ecuadorians still face informal discrimination in their country. In this thesis, I discuss several examples of contemporary obstacles that Afro-Ecuadorians have encountered in their present efforts to expand the idea of citizenship to include Afro-descendant populations. I will conclude by discussing the current challenges of reimagining the idea of Ecuador as a plurinational state in which the dominant paradigm shifts to break apart the historically hegemonic idea of the country as a nation-state with a singular nationality.
Illegal Surveillance in Colombia: The Role of Political Ideology in Public Response to the Security vs. Liberty Debate
Millicent Moon

Mentor: Guillermo Rosas

During “times of threat,” such as war or a threat of terrorism, democratic governments have historically implemented security policies that violate individuals’ liberties. Such policies often provoke a national debate over security versus liberty, and political ideology has proven to be a crucial factor in the public’s response to this debate. In Colombia, the public was forced to reconsider its security vs. liberty debate in 2009, when governmental investigations revealed that the national security agency (Departamento Administrativo de Seguridad, “DAS”) had been illegally spying on human rights defenders, Supreme Court judges, trade unionists, journalists, and other public figures since at least 2003. During the investigations into the DAS, Colombia was suffering from a “heightened level of threat” due to its internal armed conflict between insurgent, counterinsurgent, and governmental forces. In addition, the conservative and liberal sectors of society had become viciously polarized since President Álvaro Uribe’s election in 2002.

In my research, I analyze the role of political ideology in the public’s response to the 2009 DAS investigations in order to gauge Colombians’ attitudes towards principles of their democracy during a “time of threat,” and political hostility. To evaluate the role of political ideology, I examine editorials published by three Colombian newspapers throughout 2009. My analysis of the editorials and of research conducted by the Latin American Public Opinion Project explores plausible explanations for the unanimous condemnation of the DAS’s illegal surveillance in Colombia.

Making Sense of China’s National Narrative: The Reaction to the Chinese Embassy Bombing in Belgrade
Christine Orchard

Mentor: James Wertsch

The NATO bombing of the Chinese embassy in Belgrade, Yugoslavia, on May 8, 1999, provides a case study for understanding how the Chinese nation interpreted and responded to information of national importance. After the embassy bombing, Chinese were filled with emotion and anger towards the U.S., while Americans perceived this as a regrettable military accident to be quickly forgotten. Based on the same set of “facts,” the differences in national perspectives are stark. Collective memory and the stories that define national identity help to explain these national responses. Using Chinese newspapers as primary sources, this thesis explores the underlying interpretive framework particular to China, explains the manifestation of the framework regarding the 1999 incident, and discusses the importance of considering these deeply-rooted national narratives in society today.
On February 15, 2009, the Venezuelan people passed a referendum to end presidential term limits, thereby making it possible for current Venezuelan President Hugo Chávez to run for re-election indefinitely. Inspired by this event that embodies the turning point in the growing leftist movement in Latin America, the purpose of this study is to explore the controversy that revolves around Chávez’s political persona in hopes of understanding this enigma. The study begins by exploring Chávez’s emergence into power and goes on to investigate his development as a political leader. As the study navigates through the various events that have shaped Chávez’s political career and identity, it also examines his struggles to remain in power in response to the constant threats of his opposition. Through the transition from his youthful idealism towards a more pragmatic “leftist” position, the study illustrates Chávez’s political development as it examines his efforts to realize his goals of eliminating Venezuelan inequality. As the study explores the successes of Chávez’s revolutionary policies and radical social missions, his influential impact on the rest of Latin America becomes apparent. Offering an alternative solution to the neo-liberal policies that have plagued Latin America, Chávez and his “twenty-first century socialism” are at the forefront of a wave of “leftist” leaders in Latin America. Ultimately, while the future of Chávez’s presidency in Venezuela is uncertain, this study emphasizes the fact that the passing of the February 15, 2009, re-election referendum was the turning point in the rise of Chávez’s twenty-first century socialism in Latin America.

This thesis explores, in political and cultural realms, the impact of World War II on the Euro-American fashion industry. It focuses mainly on the issue of French couture under German Occupation in the larger context of American, British, and German fashion. Given the historical and patriotic importance of couture in France, couturiers such as Lucien Lelong did collaborate with the Germans but for the cause of Parisian Haute Couture. Couture also served as an intellectual form of rebellion against the occupiers, which increased the livelihood of Frenchmen. However, the consequences of the war on fashion, particularly the influence of Nazi Germany on France, did not come without ramifications. Collaborators faced shame and humiliation during the Épuration (Purging) with the liberation of Paris, and the stigmatization of collaboration still remains contentious today. Despite the retrospective criticism that they have received, I argue that French couturiers had reason to keep their fashion design houses in operation.
ISI—SECRET’S UNVEILED: PAKISTAN’S INTER-SERVICES INTELLIGENCE AGENCY

Bennett Seftel

Mentor: Robert Canfield

Since its establishment in 1948, Pakistan’s Inter-Services Intelligence (ISI) organization has played a pivotal role in shaping Pakistan’s political agenda. Initially, the ISI was created to monitor India’s activities and to provide military intelligence to Pakistan’s army, but, over the course of the last sixty years, the function of the ISI has evolved and extended far beyond its original purpose. The ISI gained American favor by aiding U.S.-funded Afghan rebels during the Soviet Union’s invasion of Afghanistan. However, following the Soviets’ defeat, the ISI turned a new page and allocated a number of its American and Saudi Arabian sponsored resources to supporting the Taliban and its anti-Western philosophy. Through ISI efforts, the Taliban was able to transform itself from a rebel group into a dominating political and military force. Today, as the U.S. continues to devote immense resources to the “War on Terror,” the ISI appears as both ally and enemy to the American war effort. This paper examines the evolution of the ISI from an intelligence organization focused on providing information to the Pakistani military to a more politically minded group that attempts to appeal simultaneously to both the United States and the Taliban. In playing a double game, the ISI’s main objective is to prevent India’s government from building a positive relationship with Afghanistan’s government and creating a political alliance that could sandwich Pakistan between two potentially hostile countries. Understanding the ideology, motives, and aims of the ISI will assist the United States’ plan of action in the “War on Terror,” and may eventually assist in the global effort to bring peace to the international community.

“THERE IS AN INCREDIBLE MALAISE”: YOUTH EXCLUSION IN MOROCCO AS A CONSEQUENCE OF CONTEMPORARY GLOBALIZATION

Annie Seibert

Mentor: Sunita Parikh

Recent globalization trends mean that individuals around the world can connect with each other faster, more extensively, and for a lower cost than previously imaginable. On the other hand, globalization has created a system in which not all citizens equally reap the benefits of international integration. For youth especially, globalization may be contradictorily just as much about global connectedness as it is about local isolation. By analyzing in-depth interviews and a survey I conducted in the spring of 2009, economic indicators, and other qualitative and quantitative data, this study seeks to address how globalization has differentially impacted youth and their socialization processes specifically in Morocco.

Global market integration in Morocco—particularly following the structural adjustment reforms of the 1980s—has lead to a reduction in the size of the public sector, increased competition in the labor market, and more access to internet and communication technologies and consumer goods from abroad. Among other trends, these changes have fostered feelings of frustration among youth vis-à-vis their domestic opportunities and their place as a young citizen in a developing nation. As adolescence is a transitional period and one of identity formation, I argue that globalization has played a part both in disrupting the growth process from childhood to adulthood and in aggravating feelings of youth social exclusion in Morocco. Given demographic commonalities among the rest of North Africa and the Middle East, youth exclusion in Morocco may have larger implications for understanding youth growth processes and the impact of globalization elsewhere.
Eating Disorders in Buenos Aires: A Public Health Perspective
Sonia Sequeira
Mentor: Carolyn Sargent

This thesis will examine the general context of eating disorders in Buenos Aires, Argentina, and the public health and government response to the problem. It will specifically investigate La Ley de Talles (clothes law) that mandates all retail and designer clothing stores in Buenos Aires to carry a full range of sizes, from 36 to 48 (U.S. XXS to XL). I will review the public and professional reaction to the intervention and evaluate its potential effectiveness based on current eating disorder literature. I argue that while the law is a commendable effort, its efficiency is severely hindered by the lack of public and industry support and the continuation of a culture of slenderess. I then recommend stronger prevention methods for eating disorders as well as ways that La Ley de Talles can be incorporated into these methods.

Bolivian Immigration in Argentina: Migrant Social Networks and Buenos Aires’s Garment Industry
Elizabeth Slater
Mentor: Bret Gustafson

One of the many impacts of globalization and capitalism is an increase in migration between countries and a corresponding growth in migrant laborers working in the informal sector of the economy. While this phenomenon is common world-wide, it is clearly seen among migrant workers from Bolivia and other neighboring countries, who have found an economic niche in the garment industry. They provide cheap labor for many garment sweatshop owners and for many well-known clothing manufacturers and have also taken advantage of the flexibility and informality of the industry to start their own small clothing factories, called talleres.

By analyzing the personal narratives of a group Bolivian immigrants, this study seeks to understand why these immigrants decided to leave their home country and what steps they went through to find work in Buenos Aires’s garment industry. It highlights the crucial role social networks play in connecting immigrant laborers with employment opportunities. It finds that while these networks help in finding employment opportunities, they also tend to restrict workers to the informal sector of the economy. Social networks, therefore, help to form the foundation of migratory movements, but they do not necessarily have the power to confront larger socioeconomic problems, such as a lack of regulation within the garment industry and an absence of labor rights for Bolivian workers.
CONSIDERING THE BEST INTERESTS OF U.S. CITIZEN CHILDREN IN THE DEPORTATION HEARINGS OF THEIR UNDOCUMENTED PARENTS

Grace Van Voorhis

Mentor: Claire Solomon

According to the Current Population Survey conducted in March 2008, there are now approximately 4 million United States-born children living in families in which one or both parents are undocumented, up from 2.7 million in 2003. Following the September 11, 2001, terrorist attacks, the U.S. Immigration and Customs Enforcement developed a comprehensive strategy for “removing all removable aliens by 2012,” referred to as Operation Endgame. It has since poured billions of dollars into worksite enforcement operations and home raids in order to identify and deport undocumented persons. However, Operation Endgame has serious implications for the millions of children who were born in this country to undocumented parents and possess certain rights and privileges associated with citizenship. The Urban Institute estimates that for every two undocumented immigrants that Immigration and Customs Enforcement apprehends, one U.S. citizen child is implicated. The thousands of U.S. citizen children whose undocumented parents are deported each year must either accompany their parents to a foreign country or experience family separation; in essence, they must forgo either their right to reside in the U.S. or their right to a family life. Under current immigration law, however, federal judges have very little power to evaluate the potential impact of deportation on implicated citizen children when issuing a verdict. In fact, immigration law is the only area of law involving children in which the “Best Interests of the Child” are not a primary consideration in the judge’s decision-making process. This thesis argues that the U.S.’ handling of deportation cases causes children to sufferunnecessarily and stands in violation of both national and international legal and moral principles. It concludes that federal judges must be given the discretionary power to consider the best interests of the child when deciding whether to deport undocumented parents.

UNITED STATES DRUG POLICY IN COLOMBIA: A HISTORY OF CONTINUITY

David Weisshaar

Mentor: Ignacio Sánchez Prado

For the last three decades, United States policymakers have tried persistently to stem the flow of cocaine from Colombia to the United States. Such efforts reached a new level when Congress passed the $1.3 billion Plan Colombia legislation in 2001. Analysts have frequently portrayed Plan Colombia as a constructive, innovative approach in the so-called “war on drugs.”

While many observers have viewed Plan Colombia as a step forward in U.S. drug policy to root out the Colombian cocaine trade, closer examination of the historical record reveals the Plan’s resemblance to past policies. Throughout the last thirty years, critical features of U.S. drug policy in Colombia have remained fixed. First, the focus of the policy has always been on rooting out supply in the source country, not on depressing U.S. demand. Second, U.S. drug policy has consistently relied on military solutions rather than development strategies. Finally, all U.S. attempts to curb drug trafficking in Colombia have failed to significantly decrease the amount of cocaine flowing into the United States or to curb domestic cocaine usage.

This research project traces these continuities in U.S. drug policy from the presidency of Ronald Reagan to the present day, examining primary documents such as national security directives and legislative actions. The paper considers alternative strategies for fighting the war on cocaine, including investing greater resources in domestic drug treatment and usage prevention programs and funding economic development projects in the Andean region. However, the research project concludes that the core focus of United States drug policy is unlikely to change regardless of the ideological bent of any one president because of the entrenched nature of the current supply-side, militarized policy.
**International and Area Studies**

**Indigenous Mobilization: A Case for International Law**

*Marley Williams*

*Mentor: Bret Gustafson*

On September 13, 2007, the United Nations Declaration on the Rights of Indigenous Peoples was adopted by the United Nations General Assembly. Indigenous peoples see the United Nations Declaration as the culmination of centuries of activism and protest on behalf of indigenous peoples’ rights under international law. Indigenous activists tout the Declaration as a significant step towards addressing many of the social, economic and political issues that have been of primary concern and importance to indigenous peoples around the world. This thesis addresses several fundamental questions raised by the recent adoption of the United Nations Declaration on the Rights of Indigenous Peoples by the UN General Assembly. First and foremost, as an international law document, what sort of binding force does the Declaration have on member states of the United Nations? Second, what impact has the Declaration had on indigenous communities and governments with large indigenous populations? I will approach these questions through case studies of Peru and Bolivia, two Latin American nations that both voted for adoption of the Declaration. In this thesis I will attempt to explore the role that the Declaration has played within the political systems of these two nations as an international legal instrument adopted by the United Nations and as an impetus for indigenous mobilization.

**Jewish, Islamic and Near Eastern Studies**

**Never Mind the Extremes, What’s in the Middle?: Education and the Middle Class in Two Middle Eastern Countries**

*Naomi Burstein*

*Mentor: Itai Sened*

This paper detractions attention from the usual media obsession with extremism in the Middle East to pay overdue attention to more fundamental attributes of societies in the region. In particular, I explore the middle class as an important determinant of economic growth and political development and the role of in the sustainable growth of the middle class. In order to do so, I use most different cases comparison between the educational systems of Egypt and the educational system of Israel. I have chosen these two countries because they are both Middle Eastern countries, yet Israel is considered to be more western and uphold more western ideals. I hope to show that education is an important determinant in our analysis of the middle class and that higher education leads to a country’s growth, development and overall prosperity. I further hope to lend a new way of thinking of the Middle East conflict and aid our understanding of issues that currently plague society there.
Linguistics

Statistical Evaluation of Language Relatedness Using Phonetic Comparison Algorithms

Sarah Brooks

Mentor: Brett Kessler

Historical linguists have employed various techniques to test the historical connections and similarity between languages. However, all methods have fallen short due to their inability to specify how much similarity is sufficient to declare with any certainty that two languages are related. I used statistical significance tests to overcome this flaw and implemented phonetic comparison algorithms (PCAs) to determine language similarity. If semantically matched words in two languages are significantly more phonetically similar than the background level of phonetic similarity expected by chance, then the languages can be deemed related. I developed a computer program to test the effectiveness of several PCAs on classifying the relatedness among 15 languages: 11 languages from the Indo-European language family and 4 from the Uralic family. Sounds (phones) were represented as 16 binary features (i.e., +/-voice, +/-continuant, etc.). The first PCA I implemented rated the similarity of two sounds by the number of features on which they differed (the Hamming distance). A second algorithm said sounds were the same if they agreed in voicing. A third declared sounds as equal if they shared the same place of articulation. The final PCA passed phones through a decision tree to determine similarity. I judged the success of each PCA based on whether it classified languages in the same family as being related and languages not in the same family as unrelated. PCAs that considered only a subset of features performed reasonably well (62% accurate for voicing and 81% for place), but those that looked at all 16 features performed the best (86% for the decision tree, 90% for the Hamming distance). My research demonstrates the utility of representing phones using multiple features when studying language relatedness using PCAs and statistical significance testing.

Jewish, Islamic and Near Eastern Studies

Holocaust Education in Israel: The Effects of Holocaust Commemoration and Education on Israeli Identity

Yael Friedman

Mentor: Nancy Berg

The Holocaust has increasingly become an important identity marker for Jewish Israelis since the establishment of the State of Israel in 1948. This paper explores the evolution of Holocaust education as a reflection of social, political and cultural shifts in Israeli society as well as a contributor to changing attitudes. The Israeli government has played a significant role in incorporating this period of Jewish history into the collective national identity, primarily through Holocaust education. I divided the history of Holocaust education and commemoration into three periods: the establishment of Israel through 1960, the Eichmann Trial (1961) through the early 1980s, and the mid-1980s through the present. In the early years of the state, recognition of the Holocaust was limited to the public commemoration of Holocaust Martyrs’ and Heroes’ Remembrance Day; there were no curricula on the subject, and, to a large extent, any discussion of the topic was taboo. It was not until the Eichmann trial that the silence surrounding the Holocaust was broken. Survivors were encouraged to share their experiences with the public. By the 1970s, Holocaust study was an established fact in universities. With the threats posed by the Six Day War and the Yom Kippur War, Israelis further internalized the messages of the Holocaust within the context of Jewish history. Since 1979, the Holocaust has officially been incorporated into Israeli high school curricula for 11th and 12th grade students. Educational efforts soon extended beyond the classroom. In the late 1980s, the Israeli government encouraged students to go on trips to Poland to visit sites of death and destruction. These trips have increased students’ sense of national pride and the importance of Israel’s existence. As time passes, and the number of Holocaust survivors dwindles, the subject has become a more popular topic in schools, suggesting the strong connection between the Holocaust and national identity.
An Elementary Proof of a Generalization of Brun’s Theorem
Matthew L. Herman

Mentor: Brian Blank

Twin primes are pairs of positive integers p and p+2, both of which are prime. The twin prime conjecture, which states that there are infinitely many twin prime pairs, stands as a famous open problem in number theory. The sum on an infinite sequence of numbers is called an infinite series. Such a series may or may not converge to a finite value. Euler was able to show that the series of the reciprocals of the primes, not just the twin primes, 1/2+1/3+1/5+…, is not finite. In 1915, Brun demonstrated that the series of reciprocals of the twin primes, (1/3+1/5)+(1/5+1/7)+…, is finite regardless of whether or not there are infinitely many twin prime pairs. Had Brun’s proof shown that the opposite was true, he would have proved the twin prime conjecture in the affirmative. Usually, to show that the sum of the reciprocals of certain primes is finite or infinite requires more complicated techniques, such as sieve methods. In his proof, Brun used sieve methods but restricted himself to the twin primes. The cousin primes are pairs of primes that differ not by two, as the twin primes do, but by four. In this work, using an elementary sieve method developed by Brun, and as expanded on by Landau, an attempt was made to show that the sum of the reciprocals of the cousin primes is finite. Even more generally, we were able to show that the sum of the reciprocals of the primes p and p+k, where k is a positive power of 2, is finite.

Explorations of a Generalization of the Descent Statistic
Andrew Wilson

Mentor: John Shareshian

In his recent PhD thesis, Denis Chebikin defined a number of variations on the standard notions of descents and inversions from the theory of permutations. One of these variations is a generalization of the descent statistic. Traditionally, a permutation, which is a reordering of the first n integers, is said to have a descent at position i if its value at position i is greater than its value at position i+1. In the generalized form proposed by Chebikin, a permutation is said to have a k-descent at position i if the substring of length k beginning at position i has an odd relative ordering. In our paper, we explore two properties of this generalization that have not yet been addressed by Chebikin. First, we aim to calculate exactly how many permutations have a certain descent set. Second, we attempt to understand how the Solomon descent algebra functions in relations to the new concept of descents. When n=k-1, we are able to calculate the number of permutations in any descent set. Furthermore, if we assume the descent algebra exists when n=k-1, we see that its structure is quite interesting. We also briefly investigate the same issues when k=n-2, answering the first question successfully but discovering that, in this situation, the descent algebra does not exist.
Performing Arts

To Nowhere Decided: A Senior Thesis in Dance
Corinn Williams

Mentor: David Marchant

To Nowhere Decided is an evening-length modern dance performance which combines dance for camera and live performance. The show was developed through a collaborative process with my cast of seven dancers, stage manager, lighting designer, and cinematographer. Each of the three sections of dance for camera was filmed in a different location on or surrounding Washington University’s campus. These locations included Snow Way Parking Garage, Schnuck’s Grocery Store, and the cast’s apartments and dorm rooms. The site-specific sections were choreographed with the intention of bringing dance to spaces that are not typically considered performance sites. Far too often, people rush through their lives without stopping to notice the world around them. The site-specific works were designed to give the audience the opportunity to look at these average and fairly utilitarian spaces in a new light. I attempted to highlight the often overlooked beauty of each place by bringing an art form with established aesthetic value into it. The three sections of live performance, “Three is the Loneliest Number,” “Chapter Fermer,” and “CityScape,” are also rooted in the everyday. While the dances for camera allowed me to transport my audience to locations that people inhabit or move through on a daily basis, the sections of live performance were inspired by relationships, interactions, and experiences that most people experience at some point in their lives. I created To Nowhere Decided with the intention of challenging the way that people experience the world around them and the people in it.

Philosophy

Expediency Over the Ideal: The Right Not to Be Punished
Grace Fox

Mentor: Christopher Wellman

Douglas Husak distinguishes his work in Overcriminalization from other legal philosophy by concentrating on the substance of the criminal law. Husak chooses to address the problem that the United States has too much law and too much punishment. Husak’s solution is to develop a set of principles designed to constrain the law and the state’s inclination to punish indiscriminately. He bases many of these principles around his conception of a right not to be punished. However, he stops short of classifying this right as a fundamental right, one which is subject to the highest level of protection. Instead, he argues the right not to be punished merits an intermediate level of scrutiny, affording it neither the strict scrutiny of fundamental rights nor the lesser standard of the rational basis test, which nonfundamental rights must undergo. In this paper, I offer a critique of Husak’s conception of the right not to be punished. I argue that Husak’s categorizing the right not to be punished as meriting intermediate protection is a hasty dismissal that counters his earlier assertion of the importance of this right, a right which is vital to his theory of criminalization. Also, I argue that his concession of classifying this right as neither fundamental nor nonfundamental contradicts his principles of communication, proportionality, and justice that he holds essential to a functional criminal justice system. Husak offers a way out, stating that, in order to criticize his relegating this right to intermediate protection, one must give an example of an overextensive or bad law (by his definition) and show that it would pass this less stringent level of scrutiny. I include a discussion of the current treatment of sex offenders and the legal establishment of residency restrictions and sex registries as examples of overcriminalization that would pass his intermediate level of scrutiny.
Correlation of Post Traumatic Stress Symptomatology with Performance on Event Segmentation, Memory and Attention Tasks

Michelle Eisenberg

Mentor: Jeffrey Zachs

People have an astounding ability to make sense of the continuous stream of incoming sensory information entering the brain. People do this through the process of event segmentation, by which people break incoming information about the world into discrete segments. Performing event segmentation requires attentional resources and influences memory encoding. Previous studies indicate that event segmentation may involve a region of the brain called the anterior cingulate cortex; however further evidence is necessary. Studying a population that has less activation of this brain region compared to controls provides one method of determining whether this region is necessary for event segmentation tasks. People with post traumatic stress disorder provide a promising model for studying event segmentation, as people with this disorder display less activation of the anterior cingulate cortex than controls. Furthermore, people with post traumatic stress disorder often exhibit deficits on tasks testing memory and attention. This study therefore investigated whether severity of post traumatic stress disorder symptomatology correlated with deficits on tasks involving event segmentation, memory, and attention. Higher levels of post traumatic stress disorder symptomatology were found to be significantly correlated with greater variability in placement of event boundaries. A non-significant trend also suggested the possibility of an association between higher levels of post traumatic stress disorder symptomatology and faster time to completion of a test requiring attention. However, post traumatic stress disorder severity was not significantly correlated with performance on tests of memory.

Bilingualism and Costs to the L1: Models of Bilingual Production

Stacey Lynn Goebel

Mentors: Mitchell Sommers and Brett Hyde

A common question in applied linguistics asks how a bilingual can produce speech in one language without experiencing detrimental intrusions from the unused language. Many techniques have been used to investigate this phenomenon, including naming tasks. Research in language switching and blocked naming tasks has shown significant effects of bilingualism on first language naming. Using this effect, many researchers have come closer to understanding models of bilingual production. Some have suggested that the model of production a bilingual uses changes during development of the second language. This study replicated blocked naming and language switching tasks to further study developmental effects of bilingualism on the first language and, in turn, bilingual production. Results, although not conclusive, support the hypotheses that as bilinguals become more fluent in their second language, they switch from using an inhibitory model to the use of a language specific selection model.
Age Differences in Memory for Face-Name Associations: The Effects of Spaced Retrieval on Learning

Mitra Hashemi Haeri

Mentors: David Balota and José Luis Bermúdez

Although past research has demonstrated the benefits of spaced retrieval on long-term memory performance in both young and older adults, no studies have addressed how these two age groups naturally apply spaced retrieval. In the current study, young and older adult participants learned name-face associations and were instructed to test themselves using a self-selected strategy, equal spaced intervals, or expanded intervals across three experimental blocks. Participants also completed a questionnaire on strategy use. Results indicated that both age groups naturally spaced their retrieval using expanding intervals, utilizing an early retrieval attempt in order to strengthen encoding. Also, both younger and older adults were able to apply equal and expanded retrieval schedules after a brief explanation of each technique. Additionally, results suggest that there is no significant difference in final recall performance between the equal and expanded spacing strategies. Findings on corrective feedback versus no feedback and objective versus subjective timing manipulations are discussed, along with metacognitive findings.

The Effects of Aging and Working Memory on Delay Discounting of Monetary and Juice Rewards

Julia Keighley

Mentor: Todd Braver

The current study examined how older adults make decisions about immediate versus delayed rewards using the tools of neuroeconomics as a means of testing theories regarding age-related changes in cognitive control. Neuroeconomics integrates findings from psychology, economics and neuroscience to examine the decisions people make. The experiment extended current behavioral and functional MRI (fMRI) studies on-going in the Braver lab by utilizing primary liquid rewards to test for preferences between smaller amounts consumed immediately and larger amounts received after a directly experienced delay. The research to date has been carried out in younger adults, showing that delayed liquid rewards decline in subjective value over a time course of seconds compared to immediately experienced ones. In this study, decision-making behavior over two sessions in adults ages 60 and older was examined to determine whether such effects are impacted differentially by advancing age but stable within individuals. In each behavioral session, discounting trials with real liquid rewards were randomly alternated with discounting trials involving hypothetical money, as well as trials probing working memory function. In addition, individual differences in personality and working memory capacity were also assessed with both self-report questionnaires (i.e., indexing impulsivity and reward-sensitivity) and on-line measures (Automated Operation Span Task). A key hypothesis being tested was that older adults might show steeper discounting of liquid rewards than young adults, relative to performance on money trials, with such impulsivity associated with a reduced capacity for cognitive control (as indexed by working memory span). The observed results were partially consistent with this hypothesis, but also indicated that older adults' decision-making behavior was less stable and internally consistent than younger adults. The current results are discussed in relation to preliminary findings from an fMRI study carried out in younger adults to provide interpretations in terms of the neural mechanisms underlying the decision-making process.
Effect of Cognitive Deliberation on Self-Judgments of Personality
Jordan Livingston

Mentor: Simine Vazire

For centuries, people have wondered how they can best come to know themselves. Traditionally, many philosophers have encouraged the use of introspection in the search for self-knowledge. However, the recent psychology literature challenges this idea and suggests that gut reaction may be a better technique for accessing self-knowledge. The current study asked whether self-knowledge is best accessed by introspection or gut reaction. To answer this question, we investigated the effects of cognitive deliberation on self-judgments of personality. Specifically, subjects were placed in one of three conditions when reporting their self-perceptions: (1) a control condition in which subjects were instructed to respond at their own pace, (2) a deliberate condition in which subjects were instructed to think long and hard about each item, and (3) a gut reaction condition in which subjects were instructed to respond as quickly as possible to each item. After reporting their self-perceptions, participants engaged in a variety of tasks (e.g., Wonderlic Intelligence Test, Brick Creativity Test) that served as criterion measures for the self-perceptions. We hypothesized one of two results. First, in the Introspection Hypothesis, we hypothesized that deliberated self-reports of personality would lead to an increase in accuracy of self-perception. Second, in the Gut Reaction Hypothesis, we hypothesized that fast self-reports would lead to an increase in accuracy of self-perception. In an analysis of three traits—intelligence, attractiveness, and creativity—we found different trends favoring both hypotheses. Future studies will need to explain why self-knowledge for different traits is best accessed by using different cognitive strategies. We suggest that the saliency of a trait in one’s self-concept might determine which traits are best accessed by cognitive deliberation or gut reaction.

Mechanisms for Top-Down Control of Visuospatial Attention in Humans
Joshua Sarfaty Siegel

Mentor: Steven Petersen

The study of attentional systems of the brain lies at a critical intersection of cognitive, neuronal, and behavioral functions. The remarkable ability of humans to fluidly shift attention from one task to another is subsumed by specific task-control regions of the brain. “Top-down control of visuospatial attention” is the process by which visual perception is altered by signals from attentional control regions in response to varying task demands or stimuli. A recent model suggests that task-control regions are organized into two distinct neural networks and that attentional control regions might be a subset of the regions in these two task-control networks. The first, the cingulo-opercular network, includes hubs in the dACC (dorsal anterior cingulated cortex) and aI/fO (anterior insula/frontal operculum) and it is implicated in stable task-set control over an extended timescale. The second, the fronto-parietal network, includes hubs in the dLPFC (dorsal lateral prefrontal cortex) and the IPs (intraparietal sulcus) and is implicated in trial-by-trial control of adaptive task performance. This experiment explores the ways in which the two networks differently exert top-down control on visuospatial attention. In this experiment, human subjects perform a visual discrimination task (Posner task). Arrows are used to cue subjects’ attention to a spatial location for either 1) single trials, or 2) periods of multiple trials (blocks). The task was conducted by subjects undergoing fMRI scans to look at temporal variation in activity in the two task-control networks within trials and throughout task blocks. We hypothesize that the two networks use two distinct mechanisms to exert top-down control on visual regions over an extended versus a trial-by-trial time scales. Behavioral results show that attention, resulting from cueing, improves response time equally under both conditions. Imaging data shows activity in fronto-parietal regions implicated in top-down control of attention, however data collection is not yet complete.
Hearing children of deaf adults (CODAs) often serve as liaisons between the deaf and hearing worlds because of their natural relationship to the deaf population. For the deaf, CODAs can serve as advocates or interpreters, while for the hearing, they can serve as teachers of the deaf experience. There is one flaw, however, in using CODAs to learn about deafness: these individuals are not deaf themselves. The concept of qualia suggests that there is a difference between knowing and understanding some phenomenal property; we cannot *know* something until we experience it. While CODAs cannot know what it is like to be deaf, they can extract information from their experiences with their parents and other deaf individuals in an attempt to understand deafness. This thesis is a review of some of the current CODA and deaf studies literature. Using these works, we explore three factors which contribute to the perception a CODA may have of deafness: participation in the Deaf community, communication style of deaf parents, and the CODA role as an interpreter. Through exploring CODA narratives, we found their perceptions to be diverse as a result of their unique experiences with deafness. This finding suggests that some CODAs may be better resources on deafness, and it may be inappropriate and misinforming for those in the hearing community to generalize the experiences of one CODA with their deaf parents to the entirety of the CODA and deaf populations.
Hydrostatic Pressure Dependence of Magnetic Order in Rare Earth Intermetallics RTMg (R = Eu, Gd and T = Au, Ag)

Hunter Banks

Mentor: James Schilling

The magnetic transition temperatures for ferromagnets EuAgMg, EuAuMg and GdAgMg, as well as the antiferromagnet GdAuMg were measured at several hydrostatic pressures as high as 0.8 GPa and using helium as the pressure medium. These materials were chosen because thermal expansion and specific heat measurements suggest that their magnetic ordering might be suppressed at only a few GPa. The transition in GdAgMg shows a strong negative pressure dependence, while the transition in GdAuMg has almost zero pressure dependence. The transitions in the Eu compounds show small, positive dependences.

Microanalytical Studies of Carbonaceous Stardust

Emily Lebsack

Mentor: Thomas J. Bernatowicz

Presolar grain research is an exciting new field in which stardust, formed in ancient stellar outflows of red giants and supernova ejecta and recovered from primitive meteorites, is studied in the laboratory. These precious grains give us unprecedented information regarding the evolution and age of our galaxy, nucleosynthesis, supernova mixing processes, the composition of the stellar atmospheres in which the grains were formed, and the processes operating on the meteoritic parent bodies of the grains and in the interstellar medium. In this investigation we discuss the methods of finding and preparing these rare dust particles for study. In particular we discuss the preparation of supernova graphites from the meteorite Orgueil and rare AB-type silicon carbide (SiC) grains for TEM study after ultramicrotome sectioning. We also focus on the importance and methods of finding "pristine" presolar SiC grains—those that have not been exposed to corrosive chemicals commonly used to isolate the grains.
A Natural Basis of SU(2) Invariant Operators Acting on Spin 1/2 Degrees of Freedom
Jackson Pitts

Mentor: Alexander Seidel

Spin liquids are phases of matter which are noteworthy for the fact that they do not spontaneously break symmetry at zero temperature. In a sense they are “more quantum” since the zero point energy successfully removes long-range ordering. This property of spin liquids may provide the key to high-temperature superconductivity and be deeply related to the “topological quantum order” which may have applications in quantum computing. One Hamiltonian was recently identified that describes a spin liquid phase on a 2D kagome lattice, and whose ground state is exactly known. Unfortunately the Hamiltonian is currently defined very implicitly. To understand the Hamiltonian better, it is desirable to express it in a basis of so-called “ring-exchange operators.” These operators act on a cell of the lattice by permuting the spins. Unfortunately there is no unique way to realize such an expansion since general ring-exchange operators are vastly over-complete. The aim of this project is to find a natural and simple subset of these ring-exchange operators and to expand the Hamiltonian in this basis. The expanded Hamiltonian may allow aid to anticipate any real materials which might have these properties.

Calculation of Stop Squark Production in Proton-Proton Collisions
Andrea Linville

Mentors: Michael Ogilvie; JoAnne Hewett and Thomas Rizzo, SLAC National Accelerator Laboratory

Though the Standard Model of particle physics is an elegant theory which has been studied extensively for decades, it leaves many fundamental questions unanswered and is thus widely believed to be incomplete. Possible extensions to the Standard Model (SM) have been postulated and are in the process of being investigated experimentally. The most promising extension is the Minimal Supersymmetric Model (MSSM), which relates every SM particle to a superpartner, or sparticle, that differs by ½ unit of spin, but otherwise carries identical quantum numbers.

Supersymmetry (SUSY), however, is not a perfect symmetry. If it were exact, each SM particle would have the same mass as its superpartner. Since no superpartners have yet been observed, this implies that if SUSY exists, it must be a broken symmetry in order to allow the sparticles to be relatively heavy, and thus unstable. The precise masses of the sparticles are highly dependent upon the specific model of SUSY breaking, which is presently unknown. Experimental input will be necessary before it will be possible to determine the SUSY breaking model.

It has been predicted that the lightest supersymmetric quark will be the superpartner of the top quark—the stop squark. The search for this sparticle is an important experimental task, as it is among the superpartners most likely to be within the range of the LHC. In this analysis, we use parton-model methods to predict the stop production cross section in proton-proton collisions for stop masses ranging from 200 GeV to 2 TeV.
**Political Science**

**Persuaded by the Echoes of Their Own Voices: How Cognitive Biases Crucially Influenced the Bush Administration’s Decision to Go to War with Iraq**

*Gregory Charles Allen*

*Mentor: Gary J. Miller*

This study argues that the conventional wisdom of a broad failure of the U.S. intelligence community prior the 2003 War in Iraq mistakenly ignores the oversized influence of the Pentagon’s Office of Special Plans, whose repeated and colossal errors in judgment were the direct cause of mistaken beliefs about the existence of Iraqi weapons of mass destruction and ties to terrorist organizations. This paper details six crucial erroneous judgments of the Bush Administration’s intelligence analysts and evaluates the connection of those policies to the predictably irrational effects of cognitive bias. The cognitive biases approach ultimately offers a compelling explanation for why top administration officials not only made serious errors in judgment but also ignored consistent and compelling evidence that contradicted their faulty assessments. The paper concludes that the errors made by intelligence analysts and the consumers of that intelligence neatly align with the predictions of a bounded rationality model that takes into account the effects of cognitive bias.

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**Political Science**

**The Effects of the Nonpartisan Blanket Primary on Electoral Change in Louisiana, 1964-2003**

*Mark R. Dudley*

*Mentor: Gary J. Miller*

Do the institutional differences of state election laws help to explain the uneven process of electoral change in the Deep South during the last quarter of the 20th Century? Previous research on Southern electoral change has studied the effects of numerous variables within an assumed context of similar electoral institutions. This paper examines the unique institution of Louisiana’s nonpartisan blanket primary through a comparative study of Deep South state legislative elections between 1964 (the first election following the passage of the Civil Rights Act) and 2003 (the last election before Hurricane Katrina in 2005). Employing statistical and spatial analysis, regression, and elite interviews, this paper finds three initial effects of the nonpartisan blanket primary on electoral change that have faded with the increase in two-party competition: impact on candidate number, impact on party performance, and an impact as a direct result of the set of unique electoral situations created, such as single party run-off elections and candidate election through a single electoral primary.
“One Man Acting Alone”:
The Consolidation of the Empowered Executive in War and Foreign Affairs, 1945-1963
Benjamin Haber Fifield

Mentor: Randall Calvert

This paper holds that the early Cold War period, beginning in 1945 and ending in 1963, marked the consolidation of an interpretation of the Executive Branch that vested in it substantial authority in the realm of war and foreign affairs at the expense of the Legislative Branch. Although the controversial formation of that power put forth by the Truman Administration encountered considerable resistance in Congress and amongst the wider public, a mildly chastened version of the Truman Administration’s arguments were quietly advanced by President Eisenhower and his Cabinet during the mid-1950s. Subsequent Congressional acquiescence to this interpretation laid the groundwork for the arguments about Executive authority in wartime that would be put to wider use in the Vietnam War. This shift in expectations plagued not just Congress but the wider public as well, as displayed in the shift in rhetoric and arguments made by the leading opinion makers of the era in response to instances of strong Executive action in the realm of foreign affairs and war.

Exploring Causality:
What Is the Relationship Between Intellectual Property Rights and Foreign Direct Investment in Developed Economies?
Vidhyarth Hariharan

Mentor: Nathan Jensen

Do strengthened intellectual property rights policies drive foreign direct investment (FDI) inflows in developed economies? Canada and Japan increased intellectual property protection (IPP) in the late 1980s. These policy changes were followed by increases in FDI in research and development (R&D) in Canada and Japan, respectively. This paper examines the assumptions necessary to infer causality from this correlation. Policymakers have long sought to design institutions that stimulate economic growth. In this paper, I explore the role of intellectual property protection in affecting FDI inflows in developed economies. Using two empirical case studies assessing Canada’s 1987 patent reforms and those in Japan in 1988, I evaluate whether the heightened level of protections encouraged greater FDI inflows. Particularly, I use data on patent protection and R&D investment by foreign firms. My research shows that FDI inflows to each country’s R&D sectors rose significantly in the years post-reform. This unambiguous increase in R&D expenditures suggests a strong positive association between the implementation of intellectual property rights protection and foreign investment.
YouT ube and Campaign Advertisements:  
THE EFFECT OF WEB-BASED VIDEO ON THE  
CONTENT OF CAMPAIGN ADVERTISEMENTS  
Jake Laperruque  
Mentor: Steven Smith

This paper is a study of the impact of online video in presidential campaigns, specifically on the nature of campaign advertisements. Using the 2008 presidential election, I conduct a comparative study of the broadcast and online advertisements from the Obama and McCain campaigns, seeking to evaluate if there are differences in content between broadcast and online advertisements. The campaigns’ YouTube profiles were used as a data source; 998 campaign advertisements were viewed, totaling in over 53 hours of video. The collection of data was based upon predicted differences in content that would arise due to the inherent differences between broadcast and online advertisements: broadcast advertisements are passive and involuntary while online advertisements are active and voluntary. The prevalence of vote requests, volunteer requests, donation requests, issue stances, personal attacks, and mention of campaign events were all studied to evaluate the hypothesized differences between broadcast and online advertisements. The data yields a variety of findings, reflecting a significant divergence in content between broadcast and online advertisements in several areas. The study also demonstrates potential for change and development in political advertisements and campaigns as a whole as a result of the prevalent use of YouTube and online video.

Portrayal of the Home in the Race for the House:  
HOW CONGRESSIONAL CANDIDATES PRESENT THEIR PERSONAL LIVES TO VOTERS  
Ruth Elizabeth Mandelbaum  
Mentor: Mona Lena Krook

While male candidates have traditionally portrayed themselves as “family men” during their campaigns, female candidates, especially those with young children, must decide whether emphasizing their family lives will show that they are “family women” or will signal to the electorate that they may not have enough time to perform public duties. Previous literature has examined gender differences in the campaign strategy of Congressional candidates and has also studied the personal lives of Congressional candidates. This study is the first to focus solely on the combination of these two areas by examining the ways in which Congressional candidates portray their family lives during their campaigns using candidates from the 2004, 2006, and 2008 Congressional election cycles. Three methods were used: (1) content analysis of campaign commercials of 40 candidates; (2) content analysis of campaign websites of 63 candidates; and (3) questionnaires sent to all female candidates in the three election cycles studied. In campaign commercials, women, especially Republican women, were far less likely to show or discuss their families than male candidates. On campaign websites, men and women tended to mention their families at the same rate, but women were more likely to mention their children, and men were more likely to mention their spouses. Male and female Democrats were alike in the ways in which they portrayed their families on their websites, while male and female Republicans diverged greatly. These findings have practical implications for the ways in which campaigns are run as well as theoretical implications involving the continued prevalence of gender stereotypes.
Is It Enough?:
The Two Political Channels to Solving Domestic Violence in India
Tess Elizabeth Mattingly

Mentors: Sunita Parikh and Jami Ake

The political response to domestic violence in India can be defined through two channels, the formal policies of the government and the grassroots-level efforts of non-governmental organizations (NGOs). This essay investigates the connections between the state and NGOs through government-generated statistics, surveys of female empowerment NGOs, and qualitative analysis of current Indian newspaper articles to determine where their agendas align and diverge to empower women from domestic violence. Through this multi-tiered data analysis, I conclude that it is the interaction of the two channels that enables women to resist violence: when state and NGO efforts are aligned both achieve their ultimate goals.

Determinants of Energy Policymaking:
Renewable Portfolio Standards and the Politics of Climate Change in the American States
Jeremy Rogoff

Mentor: William R. Lowry

While widespread attention has been paid to the federal government’s effort to adopt a nationwide climate-change policy, relatively little coverage has been given to the bodies that have already produced substantial global warming legislation: state governments. This paper examines Renewable Portfolio Standards (RPS), the primary policy tool over the past decade utilized by U.S. state actors. Several studies on the determinants of RPS adoption have been completed in the past two years. Rather than replicate the results yielded from those investigations, this study seeks to build on those findings and determine what political, economic, social, and environmental factors cause states to adopt stringent and effective RPS policies. Over the course of the study, I first provide a brief overview of the policy, including its origins and the debate surrounding its effectiveness. After a brief review of the relevant theoretical and empirical literature, I present the qualitative experience of four states that span the timeline of state adopters over the last 11 years, since the first mandatory RPS was produced. Next, I present my findings from quantitative analysis done to assess the effect of certain factors on the stringency and effectiveness of a states’ portfolio standard. Finally, I conclude with policy implications of the research findings and offer directions for future investigation.
**A Failed Fairy Tale: Collective Action, Nationalism, and Democracy**

Viktoryia Schnose

Mentor: Margit Tavits

What explains the divergence of outcomes in post-communist transitions? Why has Belarus failed to democratize despite similar institutional and historic legacies to other Central Eastern European countries? I argue that the failure to democratize in the post-communist context can be partially explained by the inability of political elites to overcome the collective action problem of getting enough citizens to participate in mass mobilization that aims at challenging the political status quo in favor of democratic reforms. Political elites that used nationalism as a mechanism to solve the collective action problem successfully transitioned to democracy (for example, the Czech Republic, Slovakia, Hungary, Poland and the Baltic States). When nationalism was not employed, post-communist transitions did not result in democracy as in Belarus.

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**Beyond Roll Call Voting: Descriptive Representation's Substantive Impact**

Adam Michael Susser

Mentor: Michael Minta

What constitutes representation? Is voting the “right way” all that is required of members of the United States Congress? Representation in Congress is about more than roll call voting, and the overwhelming focus of scholarly inquiry on voting misses critical aspects of representation. While there is limited scholarship on forms of representation beyond roll call voting, limited research exists on bill sponsorship and virtually no studies have systematically studied the impact of race and ethnicity on sponsorship of bills that focus on Latino interests and African-American interests.

I argue that race and ethnicity are extremely important factors in determining whether legislators will introduce legislation that explicitly concerns racial issues. My research indicates that the race of an individual legislator has the greatest effect on the predicted number of African American-interest and Latino-interest legislation. Additionally, my research challenges the concept of “influence districts” for African Americans and provides limited support for these districts for Latinos. Regression analysis combined with case studies and correlation tests suggest that even when significant African American and Latino voting age populations exist, they may not be the best indicator of proper representation.

Finally, my examination of bill sponsorships from the 110th Congress indicates that African American legislators are more likely to sponsor legislation explicitly pertaining to African American racial issues than other representatives and that there is no significant difference between Latinos and White representatives’ bill introductions when controlling for party and voting age populations. The reverse holds true for Latino issues, in that Latino legislators sponsor more Latino-interest bills, and there is no significant difference between African American and White legislators’ sponsorship of Latino interest bills. This outcome demonstrates that descriptive representation is critical to giving minority-interest legislation a chance to be considered.
The Welfare State and Multicultural Policies: Exploring Interacting Effects of Recognition and Redress

Amy Xu

Mentor: Ryan T. Moore

State-level policies occur in strange packages. Previous literature and intuition suggests that policies with similar ideological intent occur together, but, with regard to policies that focus upon minorities and the welfare state, this is often not the case. I redress per capita welfare spending in the American states against measures of multicultural policies (MCPs), which include affirmative action, bilingual education, gay marriage, and official English legislation. MCPs can be further categorized by the intent of policy, whether it is through recognition of rights or redress of previous social ills to minority groups. I analyze the data with three methods: studying MCPs as an overarching category, observing indices of recognition and redress policies, and using counterfactuals to predict the individual effect of a particular MCP in an American state. Results suggest potential validation of the theory, implying that there is indeed a negative relationship between MCPs and the welfare state—a result which may be attributed to the interacting effects of public opinion backlash and state fiscal constraints.

Marital Attitudes among Adults: The Effects of Familial Influence and Religion

Stephanie K. Brewer

Mentor: Michael J. Strube

Based on the findings of a variety of previous studies concerned with the related issues of the intergenerational transmission of divorce, marital attitudes, attitudes toward divorce, religiosity, and future family formation, the present study aimed to answer several questions regarding these issues. Forty participants completed surveys and scales designed to assess influential factors involved in their family of origin and religiosity as well as their attitudes toward marriage and divorce and the quality of their current romantic relationships, if applicable. As hypothesized, effects of the intergenerational transmission of divorce appeared along with several predicted correlates of religiosity. The preliminary findings did not support hypotheses regarding participants’ ideal pace of future family formation, but this may be due to parental relationship quality, which will be assessed in further analyses. While several hypotheses were supported by these results, continued data collection and analysis are likely to further illuminate crucial aspects of this study.
Individual Difference in Autobiographical Memory: Illusions of Change or Stability
Ileana Claudia Culcea

Mentor: Michael J. Strube

Personal assessments of the self rely on comparisons of the current self to selves from the past. The perceived temporal distance of an event, whether suggested or internally driven, can be as important as objective measures of the time passage when judging the amount of personal change. Previous research has found that individual differences (e.g., self-esteem) affect the amount of perceived change an individual reports. The current study attempted to identify additional individual differences that predict the amount of perceived change over time. Washington University students participated in a two-session experiment with the second session occurring two weeks after the first. During both the initial and final session, participants were asked to provide current assessments of their performance in several life domains (e.g., academics, friendships, extra-curricular activities, etc.), recalled performance for two weeks prior, and to predict their performance for two weeks in the future. Baseline measures on a battery of personality questionnaires were collected at the first session. An experimental manipulation of suggested temporal distance was introduced during the last session when participants were asked to recall their previous performance ratings. Some participants were induced to view the two-week period as lengthy and so were likely to report change, whereas others were induced to view the two-week period as brief and so were unlikely to report much personal change. Results indicated that extroversion, openness to experience, latitudes of self-description, and personal theories of self-change were found to affect the magnitude and direction of reported change in performance.

Costs of the Keyword Method: Cognitive Impairment Due to Confusing Semantic Links in Second Language Vocabulary Learning
Katherine Kerschen

Mentors: Mitchell Sommers and Joe Barcroft

The current research is central to the debate over the effectiveness of using the keyword mnemonic as a second language vocabulary learning strategy. In the keyword mnemonic a word in the native language that is orthographically similar to the target foreign word is used to link the target word and its translation via an interactive image. The hypothesis for the current experiment is that use of the keyword method might impair future lexical acquisition because of the confusing, artificial semantic associations that it creates. To test this theory we designed an experiment in which participants learned a set of German words using either the keyword method or rote rehearsal. All participants learned the first set of words to 100% accuracy and then received a second set to learn. Words in the second set were categorized as either novel or non-novel. Novel items had never been seen before by either group while non-novel items had been seen only by the keyword group because these items had been used as keyword links for target items in the first phase. We predicted that, for non-novel target items, recall accuracy would be lower and recognition latency higher for the keyword group. The data did not fully bear out these predictions: there was not a statistically significant interaction between learning condition and word novelty; however, a paired samples test revealed that reaction times within the keyword group were slower for non-novel words. In addition, there was a clear trend in all the data in the direction predicted by the hypotheses, and many of the statistical analyses approached significance. Therefore, modifications to the current experiment are discussed extensively. This study suggests that, due to the trending in the data, future research in this area is warranted and could contribute to psycholinguistic theory regarding lexical acquisition.
Psychology

The Evolutionary Basis of Specific Fears in 3- to 5-Year-old Children

Lynn Wilkie

Mentor: Pascal Boyer

Our project aims to differentiate evolved fears, which automatically develop under normal circumstances, and learned fears, which develop through direct teaching or life experiences. We worked with children between the ages of three and five in order to access a young age group that has been previously difficult to test. We developed a new method that tests memory for a fear-inducing versus neutral story, the assumption being that fear will manifest as a significant difference in recall of the details of the story between the two conditions. We looked at fears of animals and social exclusion. There were no differences between the conditions for recall of the entire story, but for the predator story there were significant differences for “key details” relating especially to the description of the animal. Our hypothesis that this fear would decrease as the children aged was correct, suggesting that fear for animals is innate but declines with lack of experience. Additionally, we found no gender difference in fear towards the animal, which is in contrast with most previous studies and suggests bias in self- and parent-report methods. On the other hand, the results for the social exclusion story were inconclusive. More research should be conducted in the future to determine whether the trend for the animal story continues as children get even older.

Psychology

Associations Between Shape Concern, Self-Control, and Locus of Control and Disordered Eating in College-aged Women

Allison Winik

Mentors: Meghan Sinton and Denise Wilfley

Despite the prominence of risk and maintenance factor research within the field of disordered eating, studies have yet to reach a consensus with regard to the associations between such factors as self-control, locus of control, and shape concern and the onset and maintenance of eating pathology. The goal of the current study was to address these uncertainties and to build upon past research on locus of control, shape concern, self-control, and disordered eating attitudes and behaviors, specifically by distinguishing between positive and negative life events in conjunction with an examination of locus of control. One hundred three college-aged female participants provided self-report data on 1) disordered eating attitudes and behaviors, including shape concern, as assessed by the Eating Disorders Examination Questionnaire (EDE-Q), 2) locus of control for positive and negative life events, as measured by the Attributional Style Questionnaire (ASQ), and 3) self-control, as assessed by the Self-Control Scale. Pearson correlations indicated significant, positive correlations between shape concern and disordered eating, as well as between self-control, an internal locus of control for negative life events, and an external locus of control for positive life events. Further, T-test results revealed significant differences between participants low and high on Global eating pathology and low and high on Shape Concern on the measures of locus of control for negative life events and self-control. Participants high on Global eating pathology (n=60) and high on Shape Concern (n=56) reported significantly more internal loci of control for negative life events and significantly higher levels of self-control than did participants low on Global eating pathology (n=43) and low on Shape Concern (n=47). These findings suggest that examining the two constructs of self-control and locus of control, with separate attention to positive and negative life events, provides a broader illustration of the factors associated with disordered eating and shape concern than previously has been reported. In addition to providing important implications for future research, the significant, positive associations found among an internal attributional style for negative life events, self-control, shape concern, and disordered eating also suggest potential targets for intervention and prevention programs for college-aged eating pathology.
“Hiding the World in the World”:
Environmental Ethics and the Zhuangzi

Julia Jay

Mentor: Pauline Lee

Some environmentalists see the adoption of a less anthropocentric approach to nature as a crucial step toward a healthier environmental future, and Daoism has been regarded as a possible source of such an alternative worldview. By focusing on ideas in the Zhuangzi, this thesis questions the ways in which Daoist texts have been used to support various environmental philosophies, looking specifically at deep ecology. The main focus is on understanding the way in which the Zhuangzi treats nature and its relationship to humankind. Once this understanding is reached, it is compared with current environmental philosophies to determine whether the Zhuangzi is truly compatible with current environmental goals.

Central to the Zhuangzi is the concept of enlightenment, which can be understood as a state of unity with nature in which the individual is forgotten but not lost. Having once successfully reached this state through self-perfection and thereby having redefined the self as nature, the enlightened sage is obliged to undergo the same process of self-perfection again, only this time with regards to the new self (i.e., nature). This implies that enlightened beings can contribute in a positive way to nature—they can, in a sense, improve it. Interpreted in this way, the Zhuangzi does contain what can be called a “nature-friendly” ethic, but it is in some cases irrelevant to and in others at odds with the goals that environmentalists hope to accomplish by transplanting it into the American consciousness.

Divided by a Common Religion:
Secularization in the United Kingdom and the United States

Iain Prendergast

Mentors: Daniel Bornstein and Frank Flinn

The United Kingdom and United States share a common language, similar cultures, and similar governments. In terms of religion, however, they differ greatly. The U.K., despite a history replete with examples of the importance of Christianity, is now determinedly secular, even post-Christian. The United States, on the other hand, has a legal framework that separates government from religion, and a history empty of people like St. George and Henry VIII. Yet the United States is still very religious in both personal and public faith.

In this thesis I first looked at the works of David Hume and Voltaire, two Enlightenment thinkers whose writings have long been viewed as precursors to modern secularism. I then compared their works to those of today’s “New Atheists.” The similarity in the work of both groups of thinkers, and statistical data about the U.K., led me to conclude that secularization in the West did not occur because of the dissemination of anti-religious writing.

The secularization of the U.K. occurred primarily in the 1950s and 1960s, decades and even centuries after many thinkers previously believed it to have happened. A process as complex as secularization has many causes. In the case of Britain, the inability of the Church to respond to the problems of modern life at the time and the concept of femininity divorced from traditional religion were prominent among the reasons that the U.K. secularized so quickly.

The United States underwent similar upheavals at the same time. However, because of a history of revivalism and a common religion strengthened by the immigrant experience, religion in the U.S. continued. The future of religion in the U.S. therefore appears more vibrant, although the speed and strength with which the U.K. underwent secularization shows that with religion, a society’s future is anything but clear.
Religious Studies

The Battle in the Soul: Demons, the Logos and the Purpose of Justin Martyr’s Apologies
Travis W. Proctor

Mentor: Roshan Abraham

Scholars have long recognized the important role that demons play within the Apologies of Justin Martyr but frequently limit their studies to exclusive examination of his demonology. In contrast, this thesis examines Justin’s demonology in relation to his Logos theology and posits that Justin views demons as the evil counterpart to the benevolent Logos in a dichotomized cosmology. The demons and the Logos persistently struggle to convince man to do their bidding. Interestingly, throughout his discussion of demons and their war against the Logos, Justin portrays those who submit to demonic coercion as irrational, while emphasizing good reason as the method by which man could resist demonic advances. Conversely, Justin presents the Christian Logos as the epitome of reason and those who follow the Logos as men guided by rationality. Through this rational/irrational dichotomy, Justin’s Apologies reveal a dualistic worldview where the Christian Logos, representing rationality, struggles against demons, symbolizing irrationality. When understood within Platonic psychological discourse, I propose that Justin is actually using this cosmological battle as an allegory for the battle within the soul between reason and irrationality. Platonic psychology provides a proper context through which to understand Justin’s Apologies, as it is a major part of the Ancient philosophical curriculum in which he was instructed and with which he would likely have instructed his own students. With this allegorical reading in mind, I argue that Justin’s Apologies may have been intended for a role in addition to apologetic. More specifically, Justin aimed to use the Apologies as a pedagogical text to instruct his audience in the ways of Platonic rationalized psychology.

Religious Studies

The Kosher Meat Riots of 1902: A Moment of Democratic Transformation for American Jewry and Urban Political Culture
Jonathan Salzinger

Mentor: Iver Bernstein

The Kosher Meat Riots of 1902 mark an important episode in American Jewish history. Much as bonfires of kerosene-doused meat lit up the streets of New York City, so too did the events of that spring illuminate the hopes, anxieties and fears of New York’s competing social, political, economic and religious interests. The riots were front-page news in New York’s major daily newspapers for over two weeks and achieved similar status in other major cities. The events were the culmination of unrest regarding an overnight fifty percent increase in the price of kosher meat and marked the political debut of Eastern European Jews in America, as they challenged the status of the German Jewish elite and disrupted the broader political culture in the nation’s largest city. Although the Kosher Meat Riots of 1902 seized national and international attention while they were occurring, they have been largely forgotten in the decades that followed. In this thesis I set the stage for the riots with an appraisal of the hopes, anxieties and fears of American Jewry and the dominant political culture against which the riots were set, exploring the construction of justice, access and standing for Jews in America at the turn of the 20th century. A day-by-day retelling of the riots with an ongoing discussion of the concerns that underlay the different groups’ actions and understandings during them is followed by an analysis of the aftermath of the riots in their provocation of a new modus vivendi for the Jewish community and dominant political culture. I trace the trajectory of political innovation that emerged from the Kosher Meat Riots of 1902 and its transformative impact on American Jews and urban politics. In conclusion, I provide an analysis of the enduring legacy of the Kosher Meat Riots and discuss why events of such great significance have faded from the national collective memory and that of American Jewry.
Religious Studies

ONE FLESH: THE DEVELOPMENT OF A CHRISTIAN SEXUAL ETHIC IN 1 CORINTHIANS
Jessica Spencer

Mentor: Roshan Abraham

There has been a great deal of discussion on Christian sexuality in modern society, largely centering around the question of "sexual immorality" and what exactly that entails. This thesis examines the message that Paul of Tarsus intended to convey to his audience in 1 Corinthians by examining the socio-political context in which the letter was written. It begins by considering Greco-Roman sexual mores, focusing primarily on Augustus’s Lex Julia, to find that sexual ethics in the Roman world varied greatly based on social status and were designed to ensure the continuation of the Roman nobility. It then examines Jewish conceptions of sexual morality in the first century and finds that by this time period adherence to the traditional ritual purity laws, including those regarding sexuality, was primarily a means of expressing cultural unity and identity in a world dominated by other cultures. Paul draws on both of these influences to establish the Christian church as the bride of Christ, and therefore he holds every Christian to the same sexual standards: those of the aristocratic Roman bride. Paul was, however, more concerned with the general problems of division within the church than with sexual practices specifically. Sexuality had long been a tool of division in both Greco-Roman and Jewish culture, and Paul uses this same tool to break down the barriers within the community and establish all Christians as equally valued in the eyes of the church.

Romance Languages and Literatures

IMITATION IS THE SINCEREST FORM OF PLAGIARISM: THE LOVE QUESTS OF LOUISE LABÉ AND GABRIELLE DE COIGNARD
Fidel A. Desir

Mentor: Colette Winn

In an era where song remixes and movie remakes abound, today’s musicians, writers, and artists, seeking to be “unique,” strive to innovate rather than duplicate, to create rather than recreate. This focus on individualizing one’s work highly contrasts with the attitudes of the literary world of sixteenth-century France, where the word “original” had negative connotations. Credited for helping shape the French language into its modern state, the poetic giant Joachim du Bellay (1522-1560), for example, mimicked Petrarch’s and Ariosto’s sonnets, as well as promoted literary imitation in his influential book Défense et illustration de la langue française (1549). A close inspection of Gabrielle de Coignard’s (1550?-1586) work would suggest that she followed this imitative trend. Several of her spiritual sonnets share striking similarities with those of the more famous Louise Labé (1524-1566), as evidenced by her nearly identical use of poetic motifs and techniques characteristic of Labé’s poems, such as structural patterns, interjections, and metonymies. In fact, some critics regard Coignard as Labé’s "literary heiress." Although not attempting to prove Labé’s direct influence, the present study explores how these similarities in reality distinguish Coignard’s sonnets from Labé’s. The first section of the study elucidates the linear movement of Coignard’s sonnets and opposes it to the circular movement favored by her counterpart. The second section investigates how their use of the first-person pronoun “I” reveals a dissolution and a reconstitution of the self in the two writers’ poems, respectively. By analyzing these two opposing movements and the development of female subjectivity, it becomes clear that Coignard, in her quest to achieve union with the divine, may have gone against the tendencies of her time and innovated a new poetic voice through the imitation of Labé’s work.
Birth is an experience that unites mankind. Even as societies change throughout time, we are linked to the past through our common human experiences. The sixteenth and seventeenth centuries were a time of great scientific innovation and advances in medicine that contrasted sharply with previous beliefs about birth drawn from religious ideologies and misunderstandings of the body. We look to this thesis as a way to elucidate the different conceptions of birth in the sixteenth and seventeenth centuries, in particular through the examination of contemporary art, poetry, literature, and the anecdotal accounts of a midwife from the period.

In examining the artistic trends of the time as well as contemporary poetry, we find that the only birth worth describing or narrating is that of Jesus, son of God. In a time when many paintings are religious, a great number of artists’ works often focus on the arrival on earth of Jesus. In poetry as well, the Virgin birth is the only actual delivery worthy of mention (and according to Christian texts, occurs without pain or suffering for the Virgin). The standard treatment of birth in these forms of expression, then, treated birth as a sacred event and one which was surrounded in mystery. We then turned to the writings of Louise Boursier, a contemporary midwife who not only had a thriving personal practice but eventually became the midwife to the Queen of France, Marie de Médicis. Her Récit véritable de la naissance de messeigneurs et dames les enfans de France and Instruction à ma fille give us the perspective of someone who has seen births of both the highest and lowest order. Finally, in examining Gargantua and Pantagruel of François Rabelais, a physician-writer, we find the grotesque realities of birth weighed side by side with a mockery of the common people’s ignorance of their bodies.

In writing this thesis, we found that the diverse perspectives of birth in the sixteenth and seventeenth centuries each became a thread that, when woven together, form a rich tapestry of ideas and conceptions about the life, the body, and its functions.
Romance Languages and Literatures

Le patient malgré lui:
A Study of the Doctor-Patient Relationship in the Sixteenth Century
Ronald Andrew Slipman

Mentor: Colette Winn

In a time when healthcare rests at the forefront of public discourse and when average individuals benefit from a certain understanding of medicine that informs them of various maladies and treatments, it is easy to forget the former practices and considerations that characterized medicine at its start. Attitudes regarding medicine in the sixteenth century, a time of veritable infatuation for the sciences, varied considerably, from uncertain mistrust to pure rejection. Though history provides a general understanding of the state of medicine at this time, to better comprehend the mentalities of doctors and patients, one must appeal to the literature of the period. In particular, one must consider the significant works of Michel de Montaigne (1533-1592), an educated yet exemplary sick man and humanist who criticized medicine, and of Laurent Joubert (1529-1582), a physician and well-respected medical professor who analyzed both the medical practice and the attitudes toward medicine and physicians in his time. The present study notes complementary ideas expressed in Montaigne’s Essais and Journal de voyage and in Joubert’s La médecine et le régime de santé, enabling a holistic comprehension of the state of medicine in this period of both scientific renewal and stoicism.

This study reveals the state of flux that characterized the doctor-patient relationship itself. Medicine was neither a trustworthy nor constant science, and patients were torn between sentiments of fear or pain associated with sickness and of uncertainty associated with medicine. They mistrusted their physicians and did not always take their advice to heart; however, they depended on doctors when they fell gravely ill, and the infirm unwittingly became patients, as is seen with Montaigne. Similarly, physicians were forced to treat ailments despite the relatively low value society ascribed to their work. Doctors were thus subject to the caprices of the sick, whereas patients were at the mercy of uncertain practitioners, and it was therefore natural that their rapport should be dynamic, complex, and paradoxical. Facing the medical institution that sought to cure humanity according to its own rules, the patient was without choice, despite his mistrust of medical science. Yet as medicine ultimately proved to be his only saving grace to restore health, the sick individual was forced to become a patient despite himself.

Vices, Scapegoats and Evil Forces:
Magic in the Works of Miguel de Cervantes y Saavedra, Juan Ruiz de Alarcón, and María de Zayas y Sotomayor
Neha Yakhmi

Mentor: Nina Davis

During the Golden Age of Spanish literature (the sixteenth and seventeenth centuries), both popular beliefs in magic and religion coexisted in a paradoxical world. At the time of the Spanish Inquisition, the Catholic Church imposed censorship upon all published works; authors strategized and shaped the content of their works rhetorically in order to see them in print. In this thesis, I examine one of the Novelas ejemplares of Miguel de Cervantes y Saavedra, “El coloquio de los perros;” two plays by Juan Ruiz de Alarcón, Quien mal anda en mal acaba and La prueba de las promesas; and two novellas by María de Zayas and Sotomayor, “La inocencia castigada” and “El jardín engañoso.” All contain elements of magic—talking dogs, witches, pacts with the devil, and magicians—but each of the authors treats magic in a different manner, both due to censorship and their personal ideologies about magic.

I focus on the treatment of several groups who are affected by or use magic. Some people use magic to exploit women; magicians use magic for good rather than evil, Moors and other men use magic themselves or make pacts with the devil, and witches consort with the black arts as well. Not only do I examine the treatment of these characters in the works, but I also attempt to decipher the intents of the authors and to examine how censorship influenced strategies of representation in their writing. Cervantes uses magic as a way to share personal opinions in a context that may or may not be taken literally. Alarcón marginalizes Moors and women while exalting the potential good of magic in the hands of a caring father. Finally, Zayas demonstrates feminism that denounces men’s dependence on magic to control women and applauds the triumph of the virtuous women against such forces.
In the past three decades, the U.S. has resettled more refugees from around the world than all other developed nations combined. Yet following the U.S.-led war on Iraq in 2003, only minimal numbers of Iraqi refugees have been allowed into the U.S. despite the displacement of over 4 million as a direct result of the war. The U.S.’ response to the crisis has proved to be inadequate compared to that directed toward previous refugee crises in which the U.S. has been primarily responsible for events that led to displacements. Why has the U.S. failed to react steadfastly and meaningfully to the Iraqi refugee crisis?

In order to analyze the U.S. response, this thesis explores two research questions. First, in terms of admissions, how have U.S. foreign policy interests affected the U.S. response to the Iraqi refugee crisis? Second, how has the United States Refugee Admission Program (USRAP) met the needs of Iraqis who have been admitted to the U.S. during the integration process, particularly in urban areas? Methodology draws upon both quantitative and qualitative data analysis. The quantitative data is taken from government sources, including the U.S. Department of State and the Office of Refugee Resettlement, as well as from the United Nations High Commissioner for Refugees. Qualitative data derives from a policy analysis of the USRAP and various pertinent public laws, and sources including government reports and publications, scholarly research, policy reports and proposals, and newspaper articles.

The argument of this thesis is that the U.S. has not responded fully to the crisis because it has not been in its foreign policy advantage to do so. The U.S. has had an interest in legitimizing Iraq and its government and, therefore, has not addressed the crisis through special resettlement programs and sufficient aid because doing so would otherwise illuminate Iraq’s instability and thus de-legitimize the U.S. mission there. Beyond U.S. strategy, the fragmented nature of the international community’s approach to refugee policy and the inadequacies of the USRAP have also been responsible for the cumulative failed response to the Iraqi refugee crisis, particularly the USRAP’s inconsistent and inflexible design which has resulted in dire rates of unemployment and homelessness for resettled Iraqi refugees.

This paper addresses the use of education vouchers in the city of Cleveland, Ohio, and their role in the city’s revitalization. Education vouchers are funds given to parents so that they can take their children out of under-performing public schools and send them to private schools. The amount of the voucher is equal to the amount that the government would have allocated to the student in the public school system. This thesis establishes that the condition of a city is intimately tied to the condition of its schools. Therefore, the improvement of the city’s failing municipal schools will help foster revival of the city, and, conversely, revival of the city will lead to improvements in the city’s schools.

The author contends that the key to urban renewal is making the city an attractive place in which the middle class will desire to live. However, one of the primary reasons why the middle class fled Cleveland for the suburbs was because parents wanted their children to receive the higher quality education offered by the suburban public schools. This middle-class flight resulted in the erosion of the city’s tax base and the decline in its property values, which sent the schools into a downward spiral. Thus, the middle class’ movement back into the city will improve the city’s schools through the capital—financial and otherwise—that the middle class provides, but the middle class will not do so until they feel that there are good educational opportunities in the city for their children. For this reason, the author concludes that education vouchers are a viable policy solution to entice middle-class families to move into the city. Vouchers are an important intermediate step to bringing capital into the city and consequently to its schools.
The Involvement of Men in Service Provision for Survivors of Sexual Assault and Domestic Violence: A Survey of Contemporary Thought

Robert Harvey

Mentor: Jami Ake

Since the battered women’s movement of the 1970s first brought a wide range of services to survivors of sexual assault and domestic violence across the country, women have been the main service providers. Men were excluded for a variety of ideological and practical reasons, and this exclusion has largely continued to this day. This research set out to investigate contemporary thought on the subject of male involvement in the field in order to explore why men are excluded and whether or not it would be appropriate to include them. Additionally, this research attempted to identify relationships between an individual’s views on male involvement, her life experiences and her definition of feminism. The study comprised of interviews with fourteen women and men who are involved in this field in a variety of capacities, from youth educators to counselors. These interviews covered a variety of topics relating to how the participant defined feminism, how the participant became involved in the field, what work the individual has done with relation to sexual assault or domestic violence, and how the individual felt about men being involved. Men were also asked about their personal experiences working in the field. The research revealed a general agreement that men must be more involved in the field, but the study participants were not in agreement with regards to the extent of male involvement. There was also no clear link between any one part of the female subjects’ identity and their opinions on male involvement. It is clear that there are many factors informing a woman’s opinion of men working in the field. It is also clear that there needs to be further discussion between individuals in the field about how men should be involved, because the subject is not often broached at this point in time. This study is a starting point for more extensive research on the place of men in this field.

Public Peace: An Analysis of the Feminist Anti-War Movement in Serbia and Its Use of Public Performances

Emily Levitt

Mentor: Linda Nicholson

The Socialist Federal Republic of Yugoslavia started to collapse with the rise of nationalism, increasing economic instability, political manipulation, and a constellation of other factors. A series of wars and conflicts that lasted from 1991 until 1999 divided the once unified country on basis of nationality, religion, and ethnicity. Throughout the conflict Serbia acted as an aggressor under the political and military leadership of Slobodan Milosevic. Many Serbs supported Milosevic and his objective of creating a “greater Serbia”; however, a small-but-determined collective established an oppositional movement engaged in anti-war and anti-Milosevic actions. Various feminist groups constituted the major force behind the anti-war movement in Serbia during the 1990s. This research examines why and how feminists quickly sprung to action and established the core of the anti-war movement. Feminists responded to the patriarchal nature of conflict, the use of rape as a weapon of war, the macho-warrior persona adopted during times of conflict by men, and the patriarchal and sexist attitudes propagated on behalf of Serbian nationalism. Feminism provided a cultural alternative to the nationalism that supported the Milosevic regime and allowed a minority population of individuals to establish a community capable of taking collective action in opposition to the totalitarian Milosevic regime. Feminist anti-war activists chose to show their opposition by intervening in public spaces through the production of public street performances, plays, vigils, and other creative means for protests. The use of public spaces and performance emerged out of a contextual necessity but was also informed by a feminist intellectual framework that attempted to break down public-private barriers, give voice to the oppressed, and inspire cultural, not just political, change. Ultimately, the feminist anti-war movement in Serbia serves as a case study of feminist beliefs in action and the importance of cultural change in addition to political change.
Cross-cultural Conversation: Support Systems for Survivors of Intimate Partner Violence in Nicaragua and in Latino Immigrant Communities in the United States

Marion Pope

Mentor: Jami Ake

Intimate partner violence (IPV) is a serious and pervasive issue in the United States. We have some systems in place for survivors, battered women's shelters being the most common. However, these services are generally designed with a white, middle-class, English-speaking survivor in mind. Those survivors that do not fit this description (for example, Latina immigrants) are left out of the survivor support system and often have no place to go. Furthermore, while many services have moved toward woman-centered advocacy (i.e., employing a response based upon the needs of the individual survivor), it can be very hard to access these services unless a survivor chooses to leave her or his batterer, something which may not be feasible or safe.

Looking at systems in countries like Nicaragua will help us learn how to create culturally appropriate and individually tailored services. Nicaragua has developed extensive services for survivors of IPV despite poor economic conditions and significant social barriers. Many of these services are able to employ greater women-centered advocacy than those available in the United States. In addition, most organizations in Nicaragua will adapt their response according to the needs of the survivor, ensuring she or he receives appropriate care. Studying and adapting some of these Nicaraguan services for use in the United States would improve support for those survivors in the margins but, more notably, survivors with all different backgrounds and experiences. Opening up the lines of communication among violence against women advocates in developing and developed countries would benefit survivors from all areas.
This thesis examines the problem of dating violence on college campuses and, building on existing prevalence data, sets out a policy proposal to address dating violence among Washington University undergraduates. Although estimates of such abuse vary widely, academic and health promotion surveys indicate that hundreds of students are emotionally abused each year at Washington University alone, with sexual and physical abuse less common but still problematic. Despite the large numbers of students affected, no judicial policy or campus programming explicitly targets dating violence on campus. Through a literature review of dating violence prevalence, sexual assault prevention programs, and interviews with campus faculty and staff, I developed policy and programming recommendations for Washington University that could be implemented to support survivors of abuse, hold abusive students accountable, and prevent such incidents in the future. I recommend creating a coordinated community response that involves the judicial administrator, Residential Life staff, Washington University Police Department, Student Health Services, and other concerned campus groups, such as Greek Life. In addition, I recommend the installation of a campus life staff member to specifically focus on sexual and relationship violence at Washington University; that staff person would act as an advocate and support person for abused students, oversee campus programming and policy changes, and conduct research on prevalence rates and effective intervention techniques at Washington University.
Dunkanomics: Salary Valuation and Determination in the National Basketball Association

Ken Borkan

Mentor: Dirk Nitzsche, Cass Business School, City University London

Billions of dollars are spent every year on the salaries of players in the National Basketball Association. This paper examines the current and optimal salary structures of the league by deriving models to predict salary based on past performance and to value a given player’s contribution to team revenue, respectively. Tests for discrimination based on race and ethnicity are also included. The evidence suggests that the league pays about the optimal amount to its players, but that the money is not efficiently allocated. Furthermore, it indicates that players are currently paid based on their most visible attributes and not those which most lead to winning games. There is also evidence of positive discrimination towards foreign-born shooting guards.

Regulating Franchise Relationships: Empirical Efficacy and Recommendations for Reform

Jeremy Fancher

Mentor: Nicholas Argyres

This paper constitutes an overarching risk assessment of the franchise industry, with a particular focus on the regulatory environment and franchise contracts. This paper examines the risk exposure of both franchisee and franchisor as seen in existing franchise contracts. Franchisees are exposed to a number of risks, including parent company non-compliance or bankruptcy, excessive ongoing fees, and overly demanding contractual terms. Exposure to these risks can inhibit the profitability, sustainability, and competitiveness of a franchisee.

Franchisors are also exposed to significant risks when drawing up franchise agreements. These risks include the possibility of non-compliance by the franchisee, poor business practices (for example, food poisoning from undercooked meat at Jack in the Box), market cannibalization, and bankruptcy or abrupt closure of the franchisee’s business. The consequences are significant. The franchisor can suffer from brand dilution, negative public relations, lawsuits, and spillover loss of business or demand at other franchise locations. All of this is in addition to the initial financial risk incurred by both the franchisee and franchisor.

The paper fleshes out a variety of risks to which franchisees and franchisors are exposed and prioritizes them based on their significance. It involves aggregated reporting on empirical contracting but also examines contracts and provides recommendations for regulatory reform to balance risk between franchisee and franchisor, minimize total risk exposure, and improve the sustainability and efficiency of franchising.
The Effect of Increasing Demand for Ethanol on Distiller’s Profits
Steven Lee Marco and Eric Gendal

Mentor: Glenn MacDonald

In this paper, we analyze the recent changes in the ethanol industry, specifically focusing on the cellulose ethanol industry, the corn market, and their subsequent impact on corn ethanol producers’ profits and operations. We analyzed the impact of many factors including various potential government programs and legislation, recent progressions in technology within the industry, changes in price for gasoline, changes in government mandated ethanol production levels, as well as other significant variables. Using quantitative analysis to derive demand and supply we were able to estimate future price and quantity levels. Our paper contends that ethanol is a powerful alternative to gasoline. Furthermore, that demand for ethanol and production levels will continue to rise in the near future and impact distiller’s profits and margins.

Economic Freedom and International Investment Allocation
Alex Rosenberg, Eric Cappelli, and Nolan Walsh

Mentor: Radhakrishnan Gopalan

Do investors respond to changes in levels of economic freedom? Recent widespread government intervention in financial markets sheds light on the ongoing debate over how important market-friendliness is to attracting foreign investment. In theory, return-seeking international investors will shift capital allocations in response to country-level changes in economic freedom. Controlling for exogenous country factors, we evaluate how country-specific economic freedom, as measured by the Heritage Foundation’s Index of Economic Freedom, affects levels and volatilities of Foreign Direct Investment, levels and volatilities of U.S. Foreign Portfolio Investment, and returns and volatilities of foreign equity indices. Utilizing country panel data from 1990 to 2008, we attempt to quantify to what extent investors react to levels of and changes in economic freedom.
Cost and Performance: Towards the Sustainable Optimization of Residential Building Envelope

Kara Sharpe

Mentor: Jenny Lovell

Founded on an interdisciplinary dialogue between business and architecture, and based on linear program optimization of cost in relation to performance, this research focuses on residential exterior wall assemblies typical to the Midwest to explore the performance potential of current building practices. Today in the United States, buildings account for almost 50 percent of total energy consumption and over 75 percent of total electricity consumption. Building envelopes present one of the greatest opportunities to address this consumption.

While building technologies are rapidly advancing, practice in the construction industry often faces a learning curve and time lag when adopting new technologies; consequently, our current building methods will likely be in place for many years to come. For this reason, it is pertinent that we examine the current methods and the potential to increase the performance and quality of new buildings within existing frameworks while in parallel exploring new perspectives provided by the innovative analysis methods.

These new perspectives are provided by evaluating the relationship between cost and performance which is defined as the correlation between initial capital cost and lifetime cost savings. By investing additional initial capital in higher thermal performance wall materials, lifetime cost savings, in the form of reduced energy costs, can be recognized which can overcome the additional initial cost.

This research aims to display the value of sustainable building, primarily through reduced cost, but also through increased quality of space in the form of construction quality and user comfort.

Economically Feasible Investment Strategies in the U.K. Stock Market: Momentum

Timothy Windhorst

Mentor: Nicholas Hugh

This paper investigates the statistical and economic significance of momentum strategies in the U.K. stock market during the market collapse and subsequent market recovery in the early to mid-late 2000s. Using relative strength portfolios of a large-cap dominated FTSE 100 index, I test the profitability of momentum strategies before and after transaction costs are taken into account. Six trading strategies over different two-, four-, six- and eight-year investment horizons from 2001 to the third quarter end 2008 comprise this study. After transaction costs are taken into account, momentum trading strategies prove to generate returns statistically no different from zero with a chance of generating statistically negative values. Because this period of research takes place during a massive bear market and market reversal, one cannot disregard momentum profitability completely; therefore, a look into the profitability of momentum strategies in a bull market is examined. My findings show that momentum strategies appear to be economically significant in bull markets; therefore, I conclude that momentum is not a general characteristic of the U.K. stock market.
Climbing trees, exploring creeks, and swimming in lakes throughout childhood led me to understand beauty through landscapes. I remain delighted by the natural world, so I use my perception of the inherent personalities of plants and animals to kindle the subject matter for my paintings. I incorporate flora and fauna into a constructed world of patterns and hybrid organisms, working primarily with watercolors and inks.

Plants, animals, and patterns coexist and often morph together in my paintings in a way that suggests my belief in a connectedness between the living things and their surroundings. The patterning also brings a domestic atmosphere to the outside world in a dual celebration of nature and the home. For further investigation, I choose to erode the boundary that divides human interiors from the outside world of plants by using domestic patterns and objects that incorporate botanical forms.

Due to strong family roots, I regard the home as the epicenter for personal growth. This mindset instills my use of patterns and household objects with a sense of nostalgia. Such a belief also contributes to my interest in gardens, which are also constructed containers for the cultivation of growth. As a result, my paintings often employ specific boundaries within which patterns or imagery reside.
Once Upon the Leaves
Alana Miller

Mentor: Jennifer Schmidt

For my thesis project I have been creating images that talk about the construction of nature as a mythical place, a natural utopia that by definition does not exist. I attempt to grapple with ideas surrounding the human desire to be a part of an idea that is no longer available to us. Nature, as we think of it, has been humanized as a cultural construct, a place of idealized beauty and happiness.

More specifically, I have explored the ways in which the body, with a focus on the female body, relates and interacts with nature. The female body is often represented as a natural entity, part of the landscape, a constructed ideal similar to that of nature itself. I attempt to criticize this ideal while also celebrating the beauty of nature and the female form.

Because our concept of nature is just that, a concept, I have chosen to portray the relationship between the body and its environment as a surreal and magical space. Forms are abstracted, colors seem a bit too saturated to be real, bodies float, hang, and are positioned in ways that often do not makes sense. The body becomes suggestive of the environment and the line between what is real and what is not real becomes a construction in itself.

My Body, My Pod
Alana Miller
Layers Left, and Worn Away
Christy Nigh

Mentors: Michael Byron, Lauren Adams, and John Sarra

In lives of activity and constant motion, points of quiet reflection punctuate a hurried reality. Such points of punctuation serve as subtle reminders of existence outside oneself. The interaction of a human and their surroundings told through its traces, the history of a patch in the pavement, a brick worn daily, or seldom, by feet. The lifetime of an object told through the transformation of its surface, the cracking of concrete as the earth beneath it shifts, the struggle between a plant and a chain-link fence. These are small bits, which in the scheme of the world seem miniscule, and yet they are written upon by the same language as all things affected by the passage of time. This language of cracks and creases, wrinkles and folds, or places worn smooth, when read with imagination, holds the key to understanding something outside the present through objects that tell a tale in a time before my existence in their space. Taking a moment to explore, and perhaps understand, an object’s unique, or common, history is a place to begin understanding a larger world.

A hand-made object intrinsically contains within itself a record of its existence. Its experience of touch and mark give it an identity that is inherently linked to that of the object and space it depicts. Both have subtle yet valuable histories relating to the mode of their creation and the forces they have interacted with. Through the combination of paint, print, and drawing a visual hierarchy is created that forms a stage which displays and magnifies the object and allows it to tell its own history.
Coming from a family of self-proclaimed dog people, I have always loved dogs. Animation and illustration are also two strong passions of mine that go hand-in-hand. I wanted to produce a body of work for my senior thesis that exemplified my joy in creating all three. This resulted in what I’d like to call a moving illustration, or an animatic about working dogs. This is a subject that a lot of people would find silly but that I have genuine interest in. A lot of human civilization and settlement could not have been achieved without the help of working dogs. For example, sled dogs helped Inuit settlement in the far North, where harsh environments would have made it incredibly difficult for humans on their own. I threw myself into the research and even found out there is an American Kennel Club Museum of the Dog right here in St. Louis! I also enjoyed the stretch and challenge of drawing animals. Making a large amount of paintings in a short time span was also great practice for the fields of illustration and animation, where tight deadlines not only exist, they are expected.
The landscape is a given space we inhabit. One’s surroundings, understood via the senses, significantly define his or her reality. The terrain most Americans are familiar with is composed of not only natural forms but also the manufactured forms and colors of signs, posts, lettering, and architecture. These constructions hint at an alternative reality parallel to our own. I imagine another world that reinvents the natural, as if one could walk into the glowing green of a Tropicana sign and find a landscape like our own but strangely different. I am compelled to merge these realities: one given, another imagined and strange. My work is like fragments or debris picked up from another world, like the evidence of UFOs left in the New Mexico desert.

To this end, I work intuitively with paint, saturated colors, material fragments, and natural imagery to produce layered experiences that point to other worlds. By organizing and re-organizing these ingredients into different compositions I am exploring what else could be. My process is one in which anything has the potential to become valid. Stemming from the belief that other possibilities exist within our experienced reality, my studio practice is a process of searching, seeking moments when two pieces will come together under a combination of chance and choreography to provide the entranceway into an alternate realm. In one piece a lopsided pentagon with a marbled surface floats atop a flattened depiction of gold foil and both are submerged in a pink, blue, and white haze. The three components are anonymous and voiceless each but in unison begin to suggest the distinct domain that they are born from.
Denominationalism in religion and partisanship in politics are manifestations of the human instinct to form a community based upon a point of disagreement. A preoccupation with the aesthetic significance of the act of breaking as both a formative and destructive act has led me to explore it within the context of covenant. My work specifically concerns the United States’ involvement in the Israeli-Palestinian conflict and the ties of this issue to covenants. My handling of these ideas is more akin to poetry than protest. I am not working towards a dogmatic solution. I sort through histories and balance delicate contradictions of theology and ideology to gain understanding and grasp fragments of truth in the midst of uncertainty.

I am working with these concepts in an ongoing, collaborative project, Fresh Bread. I invite people to write down a promise they made in the past or that someone made to them, regardless of whether it has been kept or broken. I also choose sections of covenants, treaties, and agreements that have been a part of the history over the land of Israel, such as passages from the Bible, U.N. agreements, and the Covenant of Hamas. After gathering various promises and covenants, I silkscreen them with edible ink onto a Middle Eastern flat bread called laffa, which is given away, to be divided up and consumed by participants. The making of the bread and the printing is all done at a table in a public setting. The conversation and community facilitated during this process is not based on any one political stance held by myself or by anyone else involved. Instead, we all share the same surface—that of the bread—on which every human promise, commitment, and covenant has the potential to be broken.
Simultaneously appealing and appalling, my work investigates the moral gray areas of activities both productive and destructive: surgery, medicine, and torture. These paintings take the form of familiar media imagery recontextualized in a saccharine candy-coated aesthetic of gloss, frosting, and confetti. The pre-iconic read of the paintings is one of simple visual hedonism: a nostalgia for cupcakes and comic books. This is contradicted by the images themselves, depicting scenes of atrocity and despair. The two disparate elements, one formal the other conceptual, culminate into an irresolvably tense amalgam of self-consuming dualism lying at the very core of ambivalence.
The goal of this project is the development of a closed-loop system to estimate the location of an odor source, using a chemical sensor mounted on a robotic platform capable of moving in 2D. We model our electronic nose sensor’s response to different concentrations of ethyl alcohol and apply the gradient descent method to iteratively converge on the location of the odor. We tested our chemical source location approach for different scenarios using numerical examples in MATLAB. The end goal is implementing our model on an actual robot, by programming a microcontroller and interfacing it with the robot’s sensors. When the sensors are exposed to an odor, the program will estimate the concentration, and the gradient descent algorithm will guide the robot toward the source.

Autophagy is an evolutionarily conserved catabolic process involving the degradation of macromolecules and organelles through lysosomal machinery. Phosphoinositide 3-kinase (PI3K) signaling initiates the formation of a double-membrane vesicle called the autophagosome which sequesters proteins and organelles for degradation. The autophagosome fuses with the lysosomal membrane to form the autophagolysosome where the contents are degraded and made available for reuse in the cell. The cardiomyocyte is a post-mitotic cell, so autophagy occurs at basal levels in the heart. However, autophagy is known to be upregulated in failing myocardium caused by conditions such as dilated cardiomyopathy, ischemic heart disease, and myocardial hypertrophy. Transcription factor EB (TFEB) has been shown to regulate a complex network of genes that are involved in lysosomal biogenesis and function. We are in the process of generating a transgenic mouse with cardiac-specific overexpression of TFEB in order to characterize the role of TFEB and autophagy in cardiac pathophysiology. The transgene construct contains the TFEB coding sequence fused downstream of the alpha-myosin heavy chain (MHC) promoter. The MHC promoter drives cardiomyocyte-specific gene expression and will permit the study of TFEB in cardiac physiology in the absence of confounding extra-cardiac factors. The construct is epitope-tagged with myc at the C-terminus for specific pull-down of overexpressed versus endogenous TFEB protein. The transgene has been synthesized, sequenced, and is currently being injected in the male pronuclei of one-cell mouse embryos. We hypothesize that TFEB overexpression will lead to reduced aging, increased tolerance to starvation, and reduced cardiac hypertrophy in response to stress.
An understanding of normal motor behavior is important for the measurement of these processes in motor disorders and the early detection of disease. Current dogma in motor control theory states that individual neuronal tuning functions control fixed subsets of spatial resolution. However, recent experimental data suggests that these neuronal tuning functions may adapt in spatial resolution based on the complexity of environmental opposing forces. LWPR is a MATLAB library which is capable of modeling multidimensional nonlinear functions using a series of local models (termed receptive fields) which each control subsets of the input. These local models actively adapt input resolution based on local complexity. To test if an LWPR model could approximate the plasticity of neuronal tuning functions, computational simulations were designed in MATLAB which emulated the nominal motor control experiments. First, sparseness and randomness of the input were varied. Sparser training data resulted in less receptive fields and a worse fit, suggesting that complex functions must have a substantial number of training points. More random training data resulted in a worse fit and the same number of receptive fields, suggesting that LWPR did not mistake randomness for complexity. To test the effects of input complexity, three-dimensional training data was inputted simulating a minimum-jerk trajectory which fit a sinusoid of variable frequency. Receptive fields narrowed in the center of movement, where local complexity was highest. A model-specific parameter, initD, was pertinent. As initD was increased, more complex input data could be better accommodated by the LWPR model. Finally, a sensitivity parameter was coded which quantified the degree of model adaptation to a previous (“sensed”) movement. The sensitivity function narrowed with respect to angular separation when the complexity of the training data increased. These computational simulations, combined with future motor control experiments, provide a foundation for better understanding neuronal tuning functions.

In this project we expand our previous work entitled “Design of a Robotic Platform and Algorithms for Adaptive Control of Sensing Parameters.” We have shown that the performance of our algorithm for acoustic source location in 2D can be improved by adaptively controlling the microphone array geometry. To this end, we built a robotic microphone array with capability of autonomous control of array geometry constrained to movement in 1D. We increased the degrees of freedom of our robotic platform and designed a new controlling algorithm in order to further improve performance. In particular, the robots move in 2D, and the pair of microphones can also rotate independently of the robot orientation. A heuristic approach for the control of robot locations is presented and validated with real experiments. LabVIEW and MATLAB are used for the implementation of the system.
3D Source Localization Using Acoustic Vector-Sensor Arrays

Evan Nixon

Mentor: Arye Nehorai

In this project, we use an array of two acoustic vector sensors (AVSs) for 3D localization of a single sound source. For each AVS we first use Capon beamforming, a spatial filtering process, to determine the 3D source direction. Then, we apply a triangulation method to combine the directions, estimated by the array of AVSs, to estimate the location of the source. An AVS is composed of one pressure sensor and three orthogonally positioned velocity sensors. Combining these four measurements, a single AVS can uniquely determine the direction of a source in three-dimensional (3D) space. This is a significant advantage compared with a single pressure-sensor, which cannot estimate 3D source direction.

The Effects of Vibration and Lotus Coating on Solar Cell Dust Retention

Matthew Watkins

Mentor: Guy Genin

The adverse effects of lunar dust on solar panels could potentially be very detrimental for extended-stay missions on the Moon. The lunar dust could block light to the solar panels, thereby decreasing the power output of the solar cells. Decreased power could result in reduced mission objectives, and it could adversely affect the safety of the flight crew. Even during the short-duration Apollo sorties in the 1960s, lunar dust contamination was evident, thus a method of removing lunar dust from solar panels would be extremely beneficial. Existing research has focused on using electrostatic charges to remove dust, but we explored other possible solutions during our simulated lunar gravity test flight. The objective of the lunar gravity test flight was to determine the effects of vibrating lunar dust-coated solar panels at prescribed tilt angles. Multiple vibration intensities were tested as a removal technique, as well as the effectiveness of lotus coating as a preventative measure.
Ultrasonic Source Localization

Andrew Wiens

Mentors: Ed Richter and Sandeep Gogineni

An important component of robot navigation is location awareness. In order to navigate through its surroundings, a robot must be aware of nearby obstacles. When multiple robots must operate in the same area it is especially important for each robot to be cognizant of the location of the other robots. There are many different techniques that can be employed to enable robots to locate each other. Here ultrasonic transducers are used to accomplish this task. On one robot we mounted an ultrasonic transmitter, and on another robot we mounted two ultrasonic sensors with narrow beams onto a rotating servo motor. The two receiving sensors form our receiver array. We placed the two ultrasonic receivers close to each other so that they are present at the same phase center. Also, we fixed them at a thirty-degree angle relative to each other. As a result of this configuration, the signals picked up by these two receivers are in phase but differ in amplitude. We use the difference in the amplitudes of these two signals to infer about the direction of arrival of the signal coming from the robot with the ultrasonic transmitter. Finally, we rotate the servo motor to align the axis of the receiver array with the location of the ultrasonic transmitter. In this manner the angular position of the ultrasonic transmitter is tracked in real-time.