WUSHTA, the Washington University Senior Honors Thesis Abstracts, is published by the Office of Undergraduate Research.

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The Office of Undergraduate Research is funded by the College of Arts & Sciences.

The logo for the Office of Undergraduate Research, on the front cover of this publication, consists of an “impossible triangle” within a starburst. To some, the triangle evokes the challenge of puzzles to be solved or the eternal research question, “How does that work?” To others, the triangle represents the Greek letter Δ, the mathematical symbol for change.
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Since 2009 the Office of Undergraduate Research has published Washington University Senior Honors Thesis Abstracts (WUSHTA), an annual compendium presenting the work of our most talented and dedicated graduates. Each year our student contributors are recognized for rigorous and in-depth research projects which serve as capstones for their undergraduate years. These students have advanced beyond the scope of their coursework—exploring their topics to a degree usually expected of the graduate level—and earned the distinction of honors in their departments and schools. While these students receive their accolades individually, we would be remiss not to acknowledge the support of their mentors, whose careful guidance has inspired these students to contribute their own original conclusions to growing bodies of academic research.

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

We are honored to present the work of the Class of 2012. Congratulations!
In a sense, every play, whether it be romantic, tragic, naturalistic, existentialistic or absurd, is an expression of our human existence. Genres are simply the different aesthetics we use to convey different truths. Theatre is a reflection of life. However, pre-colonial African “theatre” was not just a reflection of life—it was life. My thesis seeks to explore the ways in which the pre- and postcolonial government affected theatre in Kenya. When the colonists arrived they viewed these dramatic expressions as works of the devil. Armed with strong Christian values and an ethnocentric ideology, anything unknown to them was up for replacement. Kenya’s independence in 1963 ushered in an era of Africanization of Kenyan ministries, agencies and institutions. Nevertheless, the hold that the British Colonial Government and then the British expatriate community had on the cultural identity of Kenyan theatre did not begin to fade until the 1970s. Another challenge for theatre in Kenya, despite the lack of playwrights, is a lack of willing and talented individuals in the field. There is lack of support among the common Kenyan for those choosing to pursue a career in the arts. It is mostly through participant-observation and personal interviews that the period of theatre under its three presidents has been examined. It was the people who have lived through it who have shared their experiences and stories with me. I have shown how even today the theatre of Kenya is closely tied to its politics. Kenyans are political beings, and as such their art form is all the more crucial to their existence and voices being heard. This thesis has examined the current state of Kenyan theatre, and having done so this thesis has examined a large part of the current Kenyan.
Black Rebel in Union Garb: An Archetypal Tale of Loyalty and Identity

Brandon R. Wilson

Mentor: Iver Bernstein

Born into slavery as the biological son of his legal owner, John Lyle Wilson lived a life of seeming peculiarity. While enslaved, he served as “his master’s right hand.” During the Civil War, he fought under both Confederate and Union flags. And during his 45 years of life succeeding the war, he acquired a 125-acre estate, fathered eleven children, “gave liberally of his means” to the Falmouth Colored Baptist Church, and was among “the best known and wealthiest colored citizens” in Northern Kentucky. From slave to Confederate servant to prosperous citizen, this piece will trace John’s ever-changing loyalties and identities as he adapted to ever-changing conditions. He was a diplomatic individual, shifting from the beloved slave of a prominent white Virginian to a beloved leader of a thriving post-bellum black community. As this piece will illustrate, 19th-century Americans maintained highly complex inter- and intra-racial loyalties. The narrative of real enslaved people like John Lyle Wilson superseded the oversimplified narratives of the proverbial Nat Turners and Uncle Toms. At his very core, John Lyle Wilson was a determined survivor of America’s cruelest institution. He internalized the social realities of the world around him, utilizing the ethos of the era for the benefit of himself and his kin. Though his circumstances seem uncommon, I will show John Lyle Wilson as a representative—an archetype, if you will—of the intrinsic and variable human relationships and loyalties that influenced the 19th-century Southern experience.
My President is Black: Hip-Hop Constructs a Political Role in 2008
Christopher Carter McLamb

Mentors: Heidi Kolk, Peter Kastor, Patrick Burke

Joining millions of other first-time voters in 2008, hip-hop musicians Young Jeezy, Nas, Soulja Boy, Ludacris, and T.I. went to the polls on November 4, 2008, to help elect Barack Obama President of the United States of America. Their participation came as part of a broader shift in hip-hop culture. After decades of opposition to politicians and government, many of hip-hop’s most popular musicians rallied behind Barack Obama’s campaign in 2008. This thesis explores the ways hip-hop culture operated as a political social movement in 2008 by examining hip-hop music, blogs, magazines, and performances over the course of the campaign. Furthermore, this thesis places the events of 2008 within a broader history of hip-hop’s role in national politics. Beginning in the early 2000s, several hip-hop musicians and moguls sought to turn hip-hop’s cultural influence into a political force representing the beliefs of post-civil rights black Americans. At the same time, hip-hop’s aesthetic culture transitioned away from the gangsta image that dominated the 1990s, reducing the controversy surrounding the genre’s musicians. In response to these developments, the Obama campaign organized an unprecedented outreach effort that established mutual respect with hip-hop culture, and appealed specifically to hip-hop’s social criticisms. Dozens of hip-hop musicians responded by promoting Obama through their music, appearances, and performances as both informal and formal Obama surrogates. In arguing for hip-hop’s political influence during the 2008 election, this thesis not only shows how hip-hop culture became a part of the coalition that led to Obama’s victory, but also offers a new way to understand how hip-hop’s aesthetic culture is intimately tied to its ability to influence electoral politics.
This paper describes the paleoethnobotanical assemblage from a Caddo ceremonial center in southwest Arkansas, the Tom Jones site (3HE40). The presence of members of the Eastern Agricultural Complex as well as likely domesticated amaranth at this site is unexpected in this region and creates new questions about subsistence practices in this area. The make-up of the assemblage from the Area 7 cookhouse context suggests that Eastern Agricultural Complex crops had ceremonial importance at the Tom Jones site. This site also presents an opportunity to define a plant assemblage from a Caddo cookhouse, a structure type that is not well understood.
Health, Healing and Religiosity in the Ritual Practice of Bikram Yoga

Elan Elyachar-Stahl

Mentor: Rebecca Lester

This paper uses a both and approach in order to deconstruct health, healing and religiosity in the ritual practice of Bikram Yoga. Just as Weber distinguishes between gemeinschaft (community) and gesellschaft (society), I consider Bikram Yoga in the contexts of both community and society. By recognizing that community and society, though interrelated, are separate entities, this paper analyzes Bikram Yoga as both a religious practice for many individuals (community), and as a temporal and historical product of yoga in the United States of America (society). I will develop a thick description of how Bikram Yoga is adapted as a religion, employing Foucault’s notion of technologies of self as the mechanism through which Bikram yoganis lead a supremely moral life. I will then prove that Bikram Yoga is a product of the modern capitalist ethos, which will culminate in a discussion that links yoga, immortality and capitalism.
Humans exhibit a strong species-wide preference for right-handedness that may be related to hemispheric specialization of the brain. This specialization allows for language and other advanced cognitive abilities thought to be unique to the human species. How such handedness developed is a topic of debate, and many studies on ancient humans have aimed to determine how such a shared preference fits into our evolution. Aside from the hominin lineage, our closest living relatives, the great apes, are often a focus of research on handedness. Researchers have studied behaviors ranging from simple reaching to complex tool-use in order to determine if hand preferences exist in hominoids as they do in humans. This study uses data from three species of captive apes and one population of wild chimpanzees. I recorded hand use during instances of feed-forage and object manipulation behaviors performed by chimpanzees, gorillas, and orangutans housed at the Saint Louis Zoo. Additionally, hand and foot use was recorded from video footage of seven different tool-use tasks performed by chimpanzees in the Goualougo Triangle, Republic of Congo. A relatively weak individual-level lateralization was displayed for the simple tasks performed by the zoo apes, while a strong individual-level lateralization was displayed for the complex tasks performed by the Goualougo chimpanzees. My results support suggestions that lateralization increases with task complexity and that population-level hand preferences exist among the great apes. However, these preferences do not approach the species-level right-hand preference documented in humans. Lateralization in hand use is present throughout a wide range of primates, but how it became so prevalent in modern-day humans is a question that can only be answered with further research.
The Implications of Kinship, Religion, and Economy for Navajo Reproductive Health

Emily Nicolle Heller

Mentor: Carolyn Sargent

Unfortunately, Navajo women continue to possess poorer maternal health indicators than women in the United States population overall. Navajo births usually occur in a hospital setting under biomedical supervision. Thus, a lack of biomedical care during birth cannot explain the maternal health disparity between the Navajo and the United States population as a whole. Other factors, such as inadequate prenatal care or nutrition, stress, and poverty are all possible causes of Navajo women’s relatively poor maternal health outcomes. In this project, I conducted archival research, using past ethnographies of the Navajo and statistical data, in order to examine various aspects of Navajo culture and life, including kinship, religion, and economy. I then analyzed my data to determine these variables’ influences on maternal health status. While traditional reproductive, kinship, religious, and economic beliefs and practices grant women status and resources, the Navajo’s location as a marginalized group within the larger national economy leads to poverty and the associated health consequences. Future efforts to improve the maternal health status of Navajo women should focus on removing economic barriers to optimal health and reproductive outcomes.
Food deserts, areas where barriers prevent residents from accessing fresh, affordable, and nutritious food, have become popular political and academic explanations for the high levels of obesity among individuals living in low-income neighborhoods. Most definitions of food deserts revolve around physical barriers to access, namely a lack of food retailers. However, many residents of food deserts exhibit other characteristics that influence their purchasing and consumption habits. A neighborhood’s physical infrastructure determines potential access, or what foods individuals can buy, but other factors shape realized access, or what foods individuals actually buy. In this project, I argue that focusing on physical access is necessary but not sufficient for facilitating the consumption of a healthful diet, because such a limited scope ignores the intertwining social and economic factors at play within food deserts.

My research on urban American food deserts began with a review of scholarly articles and texts to determine the sociohistorical roots of food desertification. Next, an examination of national and local anti-food desert initiatives gave insight into the range of solutions directed at food deserts. Finally, a food basket analysis of the Old North Saint Louis food environment, and consumer and staff interviews at the Old North Grocery Co-op provided a detailed investigation into the results of a specific attempt to ameliorate food desert conditions. My analysis suggests that, despite their important role in determining diet and health, barriers to realized access are understressed because of difficulties garnering funding and support.

Understanding and targeting the sociocultural determinants of realized access holds promise to pose new questions and solutions about diet, nutrition, and obesity in and beyond urban America. Potential access receives more resources because of its relative simplicity, yet focusing on the determinants of realized access will draw attention to many fundamental inequalities and injustices.
Invisibility and Responsibility: Access to Healthy Food in St. Louis, Missouri

Michaela Kupfer

Mentor: Carolyn Sargent

My research explores the economic, political, and social roots to the disparities in rates of obesity and diet-related health conditions between privileged and disadvantaged populations in the United States. Rates of obesity and its associated chronic illnesses such as diabetes, heart disease, and high blood pressure have increased dramatically over the past thirty years. The popular rhetoric surrounding the obesity epidemic frames the recent increases as a failure of personal responsibility, an argument that has deep roots in American traditions of individualism. I seek to problematize this understanding by revealing the ways in which unjust and oftentimes invisible systems of power structure the nutritional choices that disadvantaged individuals have available to them. In particular, I focus on how the food industry’s accumulation of economic and political power has led to the superabundance of obesity-promoting foods. This then interacts with systems of social power to determine which populations have access to nutritional well-being. I use the example of St. Louis, Missouri, and of the O’Fallon Park neighborhood in North St. Louis City, in particular, to elucidate how these forces have shaped the contemporary landscape of accessibility to food and health.
This research involved a study of alternative farming, primarily in Washington State. The farms I studied varied in size, philosophy, practice, produce, and phenomenological approach to farming. The primary research method was participant observation. At each farm, I gathered information—stories, personal perspectives, and data—by interacting, working, and eating with the farm workers and owners. Looking at the relation of power and values, the thesis weaves stories of the farmers with a perspectival history of food. Within this study I see the alternative food movement as a values-based movement that encourages different relations to the production and/or consumption of food. I see alternative farming practices of varying kinds as practiced or supported by people within this movement. The thesis’s main argument is what I consider the true paradox of alternative farming—the movement is built on values, but alternative farming practices only become mainstream over the long-run if they encourage greater production (power) and not as a result of the values held by those in the movement that originally supported the practices. This makes the practice of alternative farming a struggle for those in the movement, for the values that motivate them at the outset prove to be fundamentally opposed to the workings of the modern world. From this the thesis and research is really about two things: the beauty of people “following a dream and trying to see it through,” and the conflict, hopelessness, and frequent futility of the movement and its associated lifestyles given these farmers’ relationship to power.
The purpose of this paper is to provide a narrative of the moral principles that govern Western biomedical practices. An all-encompassing, historical perspective of Western biomedical ethics provides insight into how contemporary policies govern the issues that arise today. The paper is organized into three chapters, the first of which evaluates the origins and evolution of Western biomedical thought. Beginning with an examination of the Hippocratic Oath, the first chapter moves sequentially through history, highlighting the time periods that most heavily impacted the evolving moral principles of biomedicine. The narrative evaluates the influences of Christianity in 4th-century Greece, Thomas Percival’s work in 18th-century England, and the founding of the American Medical Association and its 1947 code of ethics. The second chapter provides an evaluation of the changing practices of Western biomedicine in the 20th century, specifically the new emphasis on research with human subjects. A number of events in recent history, including Nazi medical experimentation brought to light at the Nuremberg Doctors’ Trial and the Tuskegee syphilis study, resulted in the maltreatment of human subjects in research. These human rights violations highlighted a need for reform by Western biomedicine; this chapter additionally evaluates the policies that emerged in the wake of unethical human experimentation. The third and final chapter narrows its focus, honing in on one contemporary debate in the field of biomedical ethics: the ownership of biological material. A number of recent controversies, including the story of Henrietta Lacks, Moore v. Regents of the University of California (1990), and Washington University v. W.J. Catalona et al (2007), are addressed. Existing policies protect the patient in clinical practice and in research; however, the actual issues that arise are multi-faceted and cannot be cleanly negotiated by policy. No matter how extensive the governing bioethics policies, their application to real people in real situations presents difficulty.
Anthropology

Behavioral Shifts Associated with Changes in the Reproductive Status of Female Chimpanzees at the Saint Louis Zoo

Mariam Mathai

Mentor: Crickette Sanz

Chimpanzees are highly gregarious animals, and a large part of their sociality is centered around reproduction. For this reason, regulation of reproduction via birth control in captive populations may have a significant impact on the social interactions in this species. This project followed a group of ten chimpanzees at the Saint Louis Zoo. Their behaviors were monitored following the removal of two females off of birth control, with the objective of determining if this change in reproductive status led to changes in social patterns and a shift in female dominance hierarchy within the group. A total of 170 hours of behavioral data were collected from May to August 2011 looking at the social interactions between seven focal females and the three males in the group. Grooming interactions, proximity, approaches and responses, and opportunistic sexual advances were recorded as indicators of sociosexual change in the group. Additionally, the estrous cycles of the two females were carefully monitored via changes in sexual skin swelling. The data identified a linear dominance hierarchy among the females of the group and revealed a significant relationship between reproductive status and group associations. Shifts in individual behavior and variation in the type and frequency of social interactions were observed based on the changing estrous states of the two sexually receptive females. These results provide us with a better understanding of the complex relationship between chimpanzee sociality and reproduction, and ultimately provide insights into the evolutionary relationship between sex and group affiliation within our own species.
Cancer: A Global Anthropological Profile

Priya Parikh

Mentor: Peter Benson

As the burden of illness in developing countries becomes more chronic in nature, cancer incidence and mortality are increasing dramatically. To better understand the trajectories of cancer globally, it is vital to explore scholarship that addresses various aspects of cancer anthropology: risk factors and prevention, metaphor and conceptions, stigma and coping, gender related issues, complementary therapies, and epidemiology and distribution. By doing this, I aim to create a profile of where cancer is in the world and the cultural issues that are involved in its current burden. With this approach, we can add an anthropological view to the current medical perspectives on cancer, so that we can be better informed on how to make a positive applied impact on cancer control.
Rural Americans face unique barriers to accessing adequate health care and constitute one of the most medically-underserved groups in the United States. Increasing the number of primary care physicians in rural areas is a key method to decreasing rural health care disparities. In an effort to increase this workforce, government and private organizations offer substantial financial incentives, including loan-forgiveness programs, to physicians in exchange for a rural service commitment. However, physician recruitment and retention remain enduring challenges. Factors influencing retention remain poorly understood and are of intense interest for lessening rural health care access disparities. The majority of literature on retention-related factors focuses on negative dynamics that cause physicians to leave underserved, rural communities.

This project explores factors reinforcing the retention of established rural physicians through a dual approach: 1) an etic literature-based analysis examines and contrasts the themes of the larger culture of American medicine and the values held by its physician members with the values and themes unique to rural American medical culture; 2) emic perspectives of rural medicine are presented and discussed from a series of qualitative interviews with longtime rural Kansas physicians.

Results indicate that several factors based in anthropology encourage rural physician retention. These factors are intrinsically linked to the cultures of both rural medicine and rural communities, and strongly resonate with many of the cultural ideals of American physicians. This project dispels common negative myths and associations of rural medicine and includes two key highlights: 1) a new understanding of the relationship between rural medical realities and the ideals of professional medical culture; 2) the value of developing an emic understanding of rural medical culture. Together, these ideas can be valuable in the future development of policies and interventions aimed decreasing rural health disparities by increasing rural physician retention.
Anthropology

Community and Healing: Black Hospitals and Racial Politics in the Jim Crow South

Ezelle Sanford III

Mentor: Peter Benson

African Americans have a long and tortured relationship with medicine and science. Use of black bodies as subjects for medical education and scientific experimentation necessitated the creation of parallel healing infrastructures created by African Americans for the use of the African-American community. Such a parallel healing infrastructure valued the importance of the black community. This sentiment has continued into the 20th century with the establishment of black hospitals as facilities to treat African-American patients with dignity and respect. In the Jim Crow era when facilities were all but “separate-but-equal,” black hospitals not only treated their communities, but also served as beacons of racial pride and mechanisms for social uplift. Lincoln Hospital of Durham, NC, a historically black hospital, is used as a case study to understand the importance of community in black health. In light of hospital integration in 1963, black hospitals succumbed to a complex interplay of exacerbating factors. Yet, fifty years after African Americans were granted access to all health facilities, the racial health gap is widening. This paper seeks to understand the historical importance of community in the health of the African-American community, in effort to understand its place in ameliorating growing contemporary racial health disparities.
How Effective Are Campus Tobacco Bans?
The History and Effects of Tobacco Control Legislation

Dana Sherman

Mentor: Peter Benson

This thesis shows the efficacy of campus tobacco bans. Tobacco bans are hypothesized to decrease freshmen exposure to tobacco products. These freshmen, therefore, are less likely to initiate smoking than students not influenced by tobacco bans. This is shown through an examination of the influence social norms and tobacco control legislation have on smoking behavior, risk factors for initiating smoking, and a study of students at a recently tobacco-free university. Results from the study reveal underclassmen who entered the university after the tobacco ban was implemented reported less exposure to tobacco products than upperclassmen who entered the university before the tobacco ban was implemented. More stringent tobacco control measures cause smoking behaviors to be viewed more negatively. Tobacco bans increase negative perceptions of smoking and decrease freshmen exposure to tobacco products, thereby decreasing their likelihood of initiating smoking.
This thesis is an ethnographic case study of refugee and immigrant microloan takers, their lending institution, and the microfinance sector. Using anthropological studies of the relationships between knowledge, power, and resistance, I argue that the microloan clients resist the subject-regulating technologies of microfinance designed to shape them into ideal neoliberal citizens. They do so by pursuing social rather than financial endeavors through their microenterprises. The lending institution participates in this resistance as well. At the same time, leaders of the dominant microfinance paradigm, who have a vested interest in structuring microfinance as a profitable asset class rather than a tool for social development and community empowerment, purposefully render this transcript of socially oriented refugee enterprises illegible.

However, due to recent humanitarian crises caused by unregulated and unscrupulous microfinance practices, the entire sector has entered a phase of self-evaluation with the purpose of returning the focus to the clients. We must recognize that clients’ goals do not equal funders’ goals, and that we cannot conflate the two. Instead, we can learn from the International Institute and its microenterprise clients that success comes in many forms, and trust that community development, rather than individually focused improvement, is a valuable endeavor.
Santa Chiara Dossal (ca. 1283)
Tempera on panel
Basilica of Santa Chiara, Assisi
The Model of Female Franciscanism: The Evolution of the Image of St. Clare of Assisi

Mary Julia Bressman

Mentor: William Wallace

The Order of the Poor Clares is the female second order of the Franciscans, a religious order known for its active mendicancy. Founded by Clare of Assisi in 1212, the Clares desired closeness with Franciscan tradition, yet their strict enclosure interfered with their ability to lead truly Franciscan life. Throughout my study of the Poor Clares I wished to rectify the dissonance between the Clares’ Franciscan identity, of which mendicancy is a central part, and their life in cloister. I discuss this discrepancy through an analysis of the evolution of the image of St. Clare. In doing so, my thesis addresses a gap in art historical discourse. While Franciscan art of early modern Italy has received a great deal of attention, the Poor Clares’ artistic commissions and depictions of their founder have not been discussed in such detail.

My research outlines a clear trajectory of the evolution of Clare’s image from her first representation through the fifteenth century, at which point her image is solidified. The first image of Clare, the Santa Chiara Dossal, commissioned by the Poor Clares in 1283, highlights Clare’s Franciscanism by representing Clare as the as leader of the second order. Soon after, the Franciscan brothers also included images of Clare in their visual repertoire. The Franciscans, though, depicted Clare as a virgin saint and later as the female counterpart to Francis. She holds a lily as a symbol of her virginity, and while depicted in relationship to Francis, their figures are always separated. With deference to their male counterparts, the Poor Clares adopt the Franciscans’ representation of their saint.

By adopting the Franciscan version of St. Clare, the Poor Clares’ retain a Franciscan identity through a path that is socially acceptable for medieval monastic women. While remaining in cloister, their Franciscanism is solidified by their deference to the friars.
Tristemente Célebre [Regrettably Known], 1979
Eugenio Dittborn (born 1943)
Photosilkscreen on grey cardboard
Edition of 1
Image courtesy Alexander and Bonin, New York
Art History and Archaeology

Art Actions and Airmail Paintings: Art During the Pinochet Regime in Chile, 1973-1989

Molly Moog

Mentor: Angela Miller

The repressive military dictatorship of Augusto Pinochet in Chile, from 1973 to 1989, is not remembered for its artistic sponsorship, but rather for its egregious violation of human rights. However, artistic production did exist during the seventies and eighties in Chile, exemplified by artists Eugenio Dittborn and the members of CADA (The Art Actions Collective), who employed conceptual and performance art in a critical deconstruction of the Pinochet regime’s official discourse. This thesis examines the dictatorial period through an analysis of the collaborative art actions that CADA executed throughout Santiago and the collage-like compositions of Eugenio Dittborn, which were displayed within Chile and sent to museums abroad through airmail. Chapter one examines the official discourse of the military regime; its efforts to erase the history of the previous government, headed by Socialist president Salvador Allende; and the dictatorship’s effect on the Chilean artistic, cultural, and intellectual scene. Chapter two focuses on CADA’s “art actions”: participatory urban interventions that deconstructed the regime’s use of rhetoric and censorship and opened a counter-dictatorial discourse. Chapter three examines the prints and Airmail Paintings of Eugenio Dittborn, which incorporated photographs of marginalized Chileans in a commentary on the mediation of photographic images and the power of photography to capture disappearance. Chapter four addresses post-dictatorial debates on how to remember the Pinochet regime and the manner in which critical discourses on the artistic production of the dictatorial period have entered into these debates. Chapter four also challenges the notion of an extant, coherent artistic avant-garde in Chile during the dictatorial period. This analysis of art, politics, and memory during and after the Pinochet dictatorship engages with current debates over the lasting legacy of the dictatorial period in Chile.
Unraveling Mechanisms of Recruitment Limitation in Temperate Forest Seedling Communities

Amal Al-Lozi

Mentor: Jonathan A. Myers

A central goal of community ecology is to identify mechanisms that shape community diversity and dynamics. Ecological mechanisms may be viewed through the lens of three fundamental processes: dispersal, ecological drift, and niche selection. These processes may have an especially strong influence on recruitment limitation of seedling communities, where spatial patterns created by dispersal may be modified by niche selection and drift along abiotic or biotic gradients. Here, I examine the interplay between seed arrival and niche selection imposed by a dominant herbivore, white-tailed deer, during the assembly of temperate forest seedling communities. In an oak-hickory forest near St. Louis, Missouri, I censused all woody oak stems trees ≥ 10 cm diameter in seven 0.5-ha sites, measured dispersal using seed traps, and censused the density and composition of woody seedlings. To examine effects of deer, each site was divided into a paired deer-exclosure and unfenced control treatment. I am testing two main hypotheses: (1) seed arrival constrains local seedling diversity and increases variation in species composition among sites; (2) deer impose a biotic selection pressure on seedling diversity and composition. The results suggest that dispersal limitation may have a stronger influence than deer on seedling diversity and composition. Seeds of all species occurred in fewer than 30% of the seed traps, and the majority of traps captured only one or two of eight species, suggesting low seed arrival rates. Moreover, while deer had no influence on local seedling richness or community similarity, they negatively affected large-scale seedling richness. However, this latter effect was modest. As our study continues, I will examine the potential role of deer as a niche selection pressure, including their effects on density dependent mortality of common and rare species. This large-scale experiment will help identify dominant sources of recruitment limitation in temperate forests.
The intestinal epithelium is a critical barrier against pathogens, toxins, and commensal bacteria. Its homeostasis is maintained in part by constant turnover of epithelial cells. Stem cells at the base of the intestinal crypts generate new enterocytes, which migrate upward to take the place of older cells shed into the lumen, but the mechanisms regulating the rate of migration are not completely understood. Our lab previously demonstrated that mice deficient in Irgm1, an immunity-related GTPase, have increased cellular proliferation in their intestines, as measured by number of mitotic figures and depth of intestinal crypts. These mice also have constitutively higher serum levels of Type I interferons (IFNs). From this data, we hypothesized that the elevated Type I IFNs in Irgm1 knockout mice led to increased turnover of their intestinal epithelium, and that this phenotype would be reversed in mice deficient in both Irgm1 and Ifnar, the IFN alpha/beta receptor. To measure intestinal epithelial cell turnover, we first optimized a protocol for sequentially labeling proliferating cells with two different thymidine analogs. By examining the relative migration distances of the labeled cells we were able to determine the rates of cellular migration in both the knockout and the wild-type mice. Our results show that the intestinal epithelial cells of Irgm1 knockout mice migrate more quickly than do those of wild-type mice, indicating a higher turnover rate, and that the turnover rate returns to wild-type levels in Irgm1 x Ifnar double-knockout mice. These findings are interesting, given that Type I IFNs in wild-type mice are normally elevated during viral infection. A higher rate of intestinal epithelial turnover during viral infection could be beneficial to the host, as it could help eliminate infected epithelial cells.
Auditory Intensity Effects on Audiovestibular Integration in Normal Young Adults

Angela M. Chen

Mentor: Timothy Hullar

Falls are a major source of morbidity and mortality among the growing elderly population. Better understanding of the reasons for falls could help identify those likely to fall and design effective interventions to reduce their risk. Maintaining balance requires the integration of sensory inputs from the visual, vestibular, proprioceptive, and auditory systems, but they are complicated by different arrival times to the brain. This difference presents as a measurable “perceptual lag” on the order of milliseconds and is called the point of subjective simultaneity. The brain compensates by allowing stimuli that arrive within a certain length of time, called the “temporal binding window,” to be perceived as occurring simultaneously. Previous literature has shown that older adults have wider temporal binding windows than younger people. Its duration for stimulus pairs involving visual and auditory stimuli has been shown to shorten with increasing stimulus intensity. Changing the characteristics of balance-related sensory signals could normalize the length of the temporal binding window and improve balance function. On the other hand, point of subjective simultaneity is known to be more variable across individuals. It is hypothesized that increasing the volume of the sound stimulus would decrease the duration of its temporal binding window and the length of the perceptual lag when combining with a vestibular stimulus.
The Saccade Main Sequence Is Built by the Inverse Model of the Eye Movement

Jeffrey Chiou

Mentor: Pablo M. Blazquez

Saccades are fast and accurate eye movements that show a fixed relationship between movement parameters called the main sequence. This results in stereotyped movements arguably reducing the computation load to the nervous system. We used a simple behavioral task and a model for motor control to investigate where in the central nervous system the main sequence is built. This model for motor control includes a forward model, which transforms motor commands into actual movement, and its inverse model, which transforms desired movement into motor command. Rhesus monkeys were instructed to make horizontal saccades at different gaze elevations. Saccades that do not pass through primary position have a torsional velocity present in the output of the forward model but not in the output of the inverse model. We used the amplitude and peak velocity of saccades that pass through primary position to calculate the main sequence, which was then used to predict the peak velocity of the remaining saccades. Our results suggest that the torsional component of the eye movement is not represented in the main sequence, thus indicating that the structures holding the forward model do not form the main sequence. Our results also support the current view that torsional eye movements are not represented in the motor output but are mostly implemented by the mechanics of the orbit. Based on our results, we hypothesize that the main sequence is formed by structures responsible for constructing the inverse model.
Identification of miR-186 As a Novel Regulator That Represses BACE1 Expression

Dah-eun Chung

Mentor: Jaekwang Kim

Alzheimer’s disease (AD) is the most common form of dementia. Although details of AD pathogenesis still remain unclear, abnormal accumulation of amyloid β (Aβ) peptide in the brain has been suggested to be the primary cause of AD. Given its critical role in Aβ generation, BACE1 has been intensively studied as a therapeutic target for AD. However, the regulation of BACE1 expression is poorly understood to date. Understanding regulation mechanisms of BACE1 is critical to develop a new therapeutic strategy for AD. Recently, microRNAs (miRNAs) are getting more in diverse disease settings attention as important regulators of disease-related genes. Therefore, we sought to identify a novel miRNA that regulates BACE1 expression.

In this study, we identified miR-186 as a novel regulator of BACE1 expression. miR-186 suppressed BACE1 expression dose-dependently through targeting the 3’-untranslated region (3’-UTR) of BACE1 mRNA in neuronal cells. In contrast, inhibition of miR-186 significantly increased BACE1 levels in neuronal cells. miR-186 is enriched in the brain among different mouse tissues with relatively high expression in hippocampus compared to other brain regions. Furthermore, the expression level of miR-186 is much higher in neurons compared to astrocytes. Of note, miR-186 level in cortex of the mouse brain is dramatically decreased in the aged mice compared to the young.

Taken together, we suggest that miR-186 represses BACE1 expression through targeting the 3’-UTR of BACE1 mRNA. The decrease of miR-186 level by ageing might be implicated in AD pathogenesis. Further studies are warranted to elucidate the pathological roles of miR-186 in AD.
Deficiency in Hepatic MTTP Reverses Gallstone Susceptibility in L-Fabp Knockout Mice by Reducing Canalicular Cholesterol Secretion

Ho Yee Joyce Fung

Mentor: Nicholas Davidson

Cholesterol gallstone disease (GS) is a common affliction that is linked to the imbalance of biliary lipid content, including cholesterol (CH), phospholipids (PL) and bile acids (BA), which results in the precipitation of cholesterol crystals. This study is aimed at examining the role of liver fatty acid binding protein (L-Fabp) and hepatic microsomal triglyceride transport protein (Mttp) as genetic modifiers of the gallstone susceptibility trait.

L-Fabp is a cytosolic cholesterol sensor that regulates hepatic lipid metabolism; Mttp regulates lipoprotein assembly and secretion from hepatocytes into plasma, but its role in biliary canalicular lipid secretion remains unknown. Our earlier studies showed that L-Fabp -/- mice exhibited increased susceptibility to diet induced GS through increased biliary CH secretion. Other studies demonstrated that liver specific Mttp deletion (Mttp-LKO) prevent diet-induced GS by increasing biliary PL secretion. My studies explored the hypothesis that hepatic Mttp deletion in the L-Fabp null background would abrogate diet induced GS formation. Accordingly, we used two strategies to generate mice with deficient hepatic Mttp in the L-Fabp -/- background, through conditional genetic Mttp deletion (L-MttpLKO) and antisense mediated Mttp knockdown (L-MttpASO). We fed all groups of mice a lithogenic diet for two weeks and evaluated GS formation, serum and hepatic lipid content, biliary lipid secretions and gene expression of hepatic lipid transporters and lipogenic genes.

After LD feeding for two weeks, L-MttpLKO and L-MttpASO mice were both protected against GS formation when compared to their control mice respectively. There was decreased biliary H secretion in L-MttpLKO mice. L-MttpASO mice exhibited the same trend with a significant decrease in the expression of the cholesterol transporters. These data suggest that ablation of hepatic Mttp protects L-Fabp -/- mice from diet-induced GS formation by reducing canalicular CH secretion and implies that Mttp plays a dominant role in pathways regulating canalicular CH secretion.
To date, most neuroimaging and behavioral studies have reached consensus on the functional role of the orbitofrontal cortex (OFC) in emotional processing and sensory integration. However the distinction, or lack thereof, between the functions of medial versus lateral regions of the OFC remains a controversy. Some studies report a functional dissociation between these two areas, such that medial OFC shows increased activation during receipt of rewarding stimuli whereas lateral regions respond to punishment. Other studies, however, have failed to report such dissociation. While some studies suggest that primary and secondary rewards may result in different activation patterns in the OFC, few have made within subject comparisons. Those that do make such comparisons are limited in their interpretation by the fundamental difference between how primary and secondary rewards are delivered. The significant difference in delivery time between the two reward types may account for the differential OFC activation patterns. To address this problem, we measured brain activity using fMRI while subjects completed a modified version of a card guessing game task.

We observed dissociation between activity patterns in medial and lateral regions of the OFC, however this dissociation was not the medial/reward-responsive and lateral/punishment-responsive pattern most often reported in the literature. More specifically we found activation to receipt of high quantity rewards in lateral regions of the OFC, but not with low quantity rewards or punishments. Medial OFC did not show significant activation upon receipt of either high or low punishments. We also found a positive correlation between subjects’ lateral OFC activation patterns during receipt of high rewards and their reward sensitivity as measured by the BIS/BAS scale. Our modified reward paradigm allowed comparison with previous secondary reward studies free of many of the confounds associated with other primary reward paradigms. Our result provides insight to the reward circuitry in human OFC, and the distinctive roles medial and lateral OFC played in reward processing.
Characterization of Spontaneous \([RNQ^+]\) Prion Variants and Their Effect on the \([PSI^+]\) Prion in \textit{Saccharomyces Cerevisiae}

Vincent Jing-Ping Huang

Mentor: Heather True-Krob

Prions are infectious, self-propagating proteins that have misfolded from their native conformation and aggregated to form a \(\beta\)-sheet rich structure called amyloid. In mammals, formation of the prion \(\text{PrP}^{\text{Sc}}\) causes a set of neurodegenerative diseases termed transmissible spongiform encephalopathies. Interestingly, \(\text{PrP}^{\text{Sc}}\) can assume multiple different infectious conformations called prion strains or variants. These distinct structures ultimately confer differences in pathology and disease onset. However, the factors that dictate which prion strain will propagate remain largely unknown.

\textit{Saccharomyces cerevisiae} has proven to be a useful model organism in investigating the structural basis of prion strains. Sup35p is a yeast translation termination factor that can misfold and aggregate into the \([PSI^+]\) prion, thereby causing readthrough of stop codons. Moreover, spontaneous formation of \([PSI^+]\) depends on the presence of a second prion, \([RNQ^+]\). In fact, different \([RNQ^+]\) variants display variation in their ability to induce \([PSI^+]\). The general model in the field, derived largely from \([PSI^+]\) studies, proposes that the stability of prion aggregates and kinetics of amyloid formation are the major determining factors of prion strains and their resulting biological phenotypes. Yet, it remains unclear if these same principles explain the differences between naturally occurring \([RNQ^+]\) variants.

In this study, we have isolated a set of spontaneous \([RNQ^+]\) variants and shown that they are indeed novel, having distinct physical properties from the set of \([RNQ^+]\) variants originally described such as thermal stability and aggregate size. Furthermore, these properties did not correlate with the ability of each \([RNQ^+]\) variant to induce \([PSI^+]\). This suggests that the previous model is too simplistic and our current understanding of the molecular basis of prion variants is incomplete. In turn, our data indicates that other factors, such as differences in chaperone interactions, may play a major role in influencing the prion strain that propagates \textit{in vivo}. Obtaining further insight is crucial to understanding how these prion strains can dictate pathological differences in mammalian disease.
Biology

Gene Duplication Events in the Early Evolution of Photosynthetic Reaction Center Complexes
Yamini Krishnamurthy

Mentor: Robert Blankenship

Photosynthesis arose on Earth more than three billion years ago, and evidence suggests that the earliest forms of photosynthetic life were anoxygenic (non-oxygen evolving). Oxygen-evolving photosynthesis is a more recent development that has revolutionized the energetic and enzymatic fundamentals of life. The origin and evolution of the photosynthetic reaction center complexes, which are the center of the energy storage process, have been perplexing from a phylogenetic perspective. Reaction center proteins clearly evolved from a homodimeric core structure to a heterodimeric structure, and evidence strongly suggests that at least two independent duplications took place to give rise to the Type I and Type II groups of reaction centers. However, it is uncertain whether there were multiple or a single duplication within the Type II group. Reaction center proteins of known peptide sequences have been compared using ClustalW alignments and two different phylogenetic tree algorithms. The proteins include photosynthetic reaction centers from the anoxygenic proteobacteria and filamentous anoxygenic phototrophs and the oxygenic cyanobacterial Photosystem II. The phylogenetic analysis strongly suggests that the independent duplication model better explains the evolution of the anoxygenic Type II reaction centers and the cyanobacterial Type II reaction centers than does divergence followed by a single gene duplication event. This in turn implies that the asymmetry in electron transfer pathways and quinone function in the anoxygenic and oxygenic Type II reaction centers has arisen via convergent evolution. The selection pressures that may have given rise to this remarkable convergence will be discussed.
Barrel Cortex, Principal Trigeminal Nucleus, and Spinal Trigeminal Nucleus Interpolaris Neuronal Data Coding

Hannah J. Lee

Mentor: Mark Jacquin

The barrel cortices of mice and rats are common models for studying central nervous system information processing and developmental mechanisms. However, many functional properties of inputs to the barrel cortex are unknown, and this lack of knowledge is an obstacle for understanding the cortical circuit. For this study, the acute effects of reversible allatostatin-induced silencing of trigeminal brainstem and cortical neurons were observed by whisker-mediated discrimination behaviors in male rats of the Sprague Dawley strain in order to better understand neuronal data coding. This study tests the hypothesis that the Spinal Trigeminal Nucleus Interpolaris (SpVi) codes coarse neuronal data due to responses to externally generated whisker deflection with head orientation and that the Principal Trigeminal Nucleus (Vp) codes more precise neuronal data due to smaller receptive fields.

Transduced neural cells in the adenovirus vector injection sites should incorporate and express the payload genes AlstR and EGFP. Therefore, only the transduced cells are silenced when allatostatin is infused into the brain. Positive control rats had vector injection sites in the barrel cortex; experimental rats had vector injection sites in the SpVi or Vp. All control and experimental animals were trained to discriminate between rough and smooth surfaces with high accuracy. However, no statistically significant behavioral changes in whisker-mediated discrimination and other relevant behaviors were seen in positive control animals due to reversible silencing. One experimental rat, with an injection site in the SpVi, showed a significant difference in discrimination in only two trials out of five different allatostatin infusion trials; for this rat, EGFP-immunohistochemistry did not reveal fluorescently tagged cells in the SpVi or in nearby regions. Therefore, as the results do not give much insight into the functional properties of inputs to the barrel cortex, it is clear that future work would require improvements on the selection of control injection sites and on targeting the entire desired region.
Identification of Cellular Determinants of Human T-Cell Leukemia Virus Entry

Kevin Levine

Mentor: Lee Ratner

Human T-Cell Leukemia Virus Type 1 (HTLV-1) infection is the cause of adult T-cell leukemia and a demyelinating disease known as HTLV-1 associated myelopathy/tropical spastic paraparesis. Because of the uncertainty surrounding the mechanism of HTLV-1 binding and fusion to host cells, the current project sought to identify cellular factors that can function as receptor or co-receptor for the virus. Identification of the HTLV-1 receptor would likely lead to a better understanding of the mechanisms that lead to the progression of disease and could lead to direct clinical interventions targeting the receptor-envelope interaction. Previous studies used a retroviral cDNA screen, introducing a cDNA library from HeLa S3 cells that are highly permissive to the HTLV-1 virus, into NIH 3T3 cells that are poorly permissive to the virus. This was followed by infection with viral particles expressing the HTLV-1 envelope, and growth in selective media to identify candidates important for infection. Of the roughly 441 potential factors identified from the screen, there are 210 unique protein coding sequences. The twenty most plausible candidates were selected on the basis of localization of protein products to the cell membrane, number of times identified in the screen, and correlation with gene products important for HIV infection. The current study examines these twenty candidates using a luciferase assay to measure viral entry in stable and transiently transfected NIH 3T3 cell lines. Further analysis of these cell lines, each expressing one of the candidate receptors, is needed to validate the role of these candidates in HTLV-1 infection.
Lung S100A8 Expression Induced in Bronchopulmonary Dysplasia in Baboon Model

Ruth Lewit

Mentor: Richard Pierce

Previous studies have identified differentially expressed genes in the baboon model of Bronchopulmonary Dysplasia (BPD); they have not, however, identified genes that are differentially expressed with increased severity of BPD. This study set out to identify biomarkers that track with BPD severity and can predict clinical outcomes. Baboons were delivered prematurely at 125 days of gestation (65% of gestation) and placed on a ventilator for fourteen days, during which time physiological parameters were monitored. The gene expression profiles from baboon lungs with BPD were analyzed according to two physiological indices, ventilatory efficiency index (VEI) and oxygenation index (OI) using Partek Analysis Software. These indices are measures of BPD severity and may thus provide a means to track changes in gene expression with increased severity. Thirty-seven genes were found that correlated significantly with OI using a p-value less than .005 and a fold change greater than ±1.5 as criteria. One gene, Calgranulin A (S100A8) was found to have increased expression with increasing OI values with a fold change of -41.2. To further investigate this gene, S100A8 expression was analyzed by Realtime RT-PCR in RNA from 47 baboon samples and validated using immunohistochemistry. Expression of S100A8 mRNA was found to be increased 3.4 fold in ventilated, premature baboon lung when compared to gestational controls. S100A8 was also found to be increased 3.76-fold by immunohistochemistry in ventilated lungs compared to gestational controls. Increased S100A8 was localized to clusters of inflammatory cells in BPD lungs, but not gestational controls. Additional studies expanding the data set to other BPD models including sheep and human models are currently underway.
**Mdx Mice Have a Defect in Autophagy That Is Restored by Rapamycin-loaded Nanoparticle Treatment**

*Allison J. Li*

*Mentor: Samuel A. Wickline*

Duchenne Muscular Dystrophy (DMD) is a genetic disorder caused by mutations in dystrophin, a cytoskeletal protein in muscles, leading to progressive muscle wasting and ultimately death in the second or third decade of life. The current standard of care for DMD patients is corticosteroid therapy which slows down the natural progression of the disease but is also associated with several unwanted side-effects such as excessive weight gain, behavioral abnormalities, and osteoporosis. Our lab’s previous studies of therapeutics in the *mdx* mouse, an *in vivo* DMD model, has demonstrated that *mdx* mice treated with rapamycin-loaded nanoparticles showed an increase in grip strength, an improvement in a clinically relevant measurement of disease progression. No strength increase was observed with rapamycin administered orally without nanoparticles. Because rapamycin is known to induce autophagy, we assayed for autophagy in *mdx* mice treated with rapamycin-loaded nanoparticles. Western blot analysis of LC3B-II, the processed form of a protein used in autophagy, suggests that there is a previously unknown defect in autophagy in *mdx* mice, as shown by a lack of LC3B-II accumulation after blockade of autophagic flux by colchicine. Rapamycin nanoparticle treatment rescues autophagy to levels comparable to the control, suggesting that defective autophagy may contribute to the physical manifestations of muscular dystrophy in *mdx* mice and that restoration to normal levels may contribute to the observed strength increase.
TELOMERES ARE PROTEIN-DNA COMPLEXES AT THE ENDS OF LINEAR CHROMOSOMES THAT PROMOTE GENOMIC STABILITY. DUE TO THE IMPORTANCE OF TELOMERE REPLICATION IN MAINTAINING GENOMIC STABILITY, MANY MECHANISMS HAVE EVOLVED TO ENSURE THE FAITHFUL REPLICATION OF THE TELOMERE. CENTRAL TO THESE MECHANISMS IS SHELTERIN, A MULTI-PROTEIN COMPLEX OF SIX PROTEINS (TRF1, TRF2, RAP1, TIN2, TPP1, AND POT1) THAT BINDS TO TELOMERES AND COORDINATES DNA REPLICATION AND REPAIR ACTIVITIES AT THE TELOMERE. ADDITIONALLY, MANY DNA REPLICATION AND REPAIR PROTEINS ASSOCIATE WITH THE TELOMERE AND PARTICIPATE IN TELOMERE REPLICATION, PROCESSING, AND MAINTENANCE.

PREVIOUS WORK DEMONSTRATED THAT FLAP ENDONUCLEASE 1 (FEN1), A DNA REPLICATION AND REPAIR PROTEIN, LOCALIZES TO THE TELOMERE DURING THE S AND G2 PHASES OF THE CELL CYCLE. FURTHER STUDIES SHOWED THAT WHILE FEN1 DEPLETION DOES NOT ABRUPT REPLICATION ACROSS THE GENOME, IT DOES INDUCE TELOMERE INSTABILITY CHARACTERIZED BY SISTER TELOMERE LOSS (STL). FEN1-DEPENDENT STL IS RESTRICTED TO LAGGING STRAND-REPLICATED TELOMERES AND DEPENDENT ON FEN1’S DNA REPAIR AND GAP ENDONUCLEASE ACTIVITIES. FURTHERMORE, FEN1 DEPLETION LEADS TO TELOMERE FRAGILITY, IN WHICH TELOMERE FISH SIGNALS APPEAR AS DOUBLETS OR SMears ON THE TERMINI OF CHROMATIDS. INTRIGUINGLY, FEN1 DEPLETION-INDUCED TELOMERE FRAGILITY IS RESTRICTED TO LEADING STRAND-REPLICATED TELOMERES, SUGGESTING THAT FEN1 PARTICIPATES IN LEADING STRAND DNA REPLICATION AT THE TELOMERE. BECAUSE FRAGILE TELOMERES ARE ALSO INDUCED UPON DELETION OF TRF1, AND PRELIMINARY WORK HAS SHOWN THAT FEN1 AND TRF1 CO-IMMUNOPRECIPITATE FROM CELLULAR LYSATES, WE PROPOSE A MODEL IN WHICH FEN1 IS RECRUITED BY TRF1 TO THE TELOMERE DURING LEADING STRAND DNA REPLICATION TO PREVENT TELOMERE FRAGILITY. HOWEVER, BECAUSE FEN1 INTERACTS DIRECTLY WITH TRF2, FEN1’S INTERACTION WITH TRF1 COULD BE MEDIATED BY TRF2. HERE WE USE IN VITRO BINDING ASSAYS TO SHOW THAT FEN1 DIRECTLY INTERACTS WITH TRF1. THIS DATA IMPLICATES A PREVIOUSLY UNKNOWN AND DISTINCT ROLE FOR FEN1 AT THE LEADING STRAND DURING DNA REPLICATION.
The human inflammatory bowel diseases (IBD), Crohn’s and ulcerative colitis, affect millions of individuals worldwide and can cause severe diarrhea, rectal bleeding, abdominal pain, and weight loss. Heightened states of depression and anxiety are also commonly observed in humans with active IBD and have been reported in mouse models of colitis. In humans and animal models, acute tryptophan depletion induces depressive symptoms. The Ciorba lab recently reported that during active Crohn’s disease, serum tryptophan levels are depressed relative to healthy controls or patients in remission. We used a murine colitis model to evaluate whether supplement based intervention along the serotonin synthesis pathway could attenuate colitis-associated anxiety and depression. The impact of these supplements on colitis severity was also assessed.

Colitis was induced in age-matched wild-type mice by 7-day cycles of dextran sodium sulfate (DSS) in drinking water. Colitis severity was examined by clinical parameters and histology. Following each course of DSS, experimental groups received amino acid treatments (5-HTP, tryptophan, or alanine) ad libitum or via oral gavage. Depressive behavior was assessed using the forced swim test and tail suspension test. Anxiety behavior was assessed using the step-down test and light-dark box test. A locomotor activity test was performed to verify that differences in behavior were not due to physical impediment.

Our results suggest orally administered tryptophan and 5-HTP do not worsen disease severity or alter locomotor activity in DSS colitis. Colitis mice receiving 5-HTP by gavage more closely resemble healthy controls than colitis controls in behavioral tests of anxiety. No differences between groups were observed in tests assessing depressive behavior. These results suggest that 5-HTP supplementation lessens anxiety associated with chronic colitis and has an acceptable safety profile. These experiments will be extended to determine if the observations hold true across different mouse strains and models of colitis.
Characterizing the Role of Five Putative Capsule Regulating Genes in Cryptococcus neoformans

Alyssa L Marulli

Mentor: Tamara L Doering

Cryptococcus neoformans is a pathogenic fungus that poses a serious threat to the health of immunocompromised individuals. The large protective polysaccharide capsule of C. neoformans is induced by the environmental conditions these cells encounter when they enter the human body and is required for their virulence. Five genes from the KN99α serotype A strain were selected to study their roles in the stress-response pathways leading to capsule induction: BCY1, HOG1, CNAG_07797, CNAG_07924, and CNAG_00883. Each of these genes was deleted using the homologous recombination split-marker approach. The capsule of each mutant strain was induced, measured, and compared to wild type. The growth of these mutant strains under differing stress conditions was also tested and compared to wild type as was their melanin production. The results show that the bcy1Δ and hog1Δ mutant strains showed increased capsule radius while the other three genes showed no change in capsule size when compared to wild type. Bcy1Δ had inhibited growth under the stress conditions of disturbing the cell wall, osmotic, and high temperature. Hog1Δ had increased growth under basic pH and inhibited growth with osmotic and disturbing the cell wall stresses. CNAG_07924Δ and CNAG_00883Δ had increased growth under osmotic stress while CNAG_07797Δ showed no difference in growth under any of the stress conditions tested. The bcy1Δ, hog1Δ, and CNAG_07924Δ strains all showed decreases in melanin production as well. All of the effects seen were heightened as the temperature and concentration increased. These results indicate that BCY1, HOG1, CNAG_07924, and CNAG_00883 are all involved in at least one of the stress-response pathways that eventually lead to capsule formation upon entering the body. Further studies are needed to determine each gene’s exact role in these pathways.
Vector-borne diseases serve as a major threat when humans interact differently with their environment due to changing global processes and relationships with natural landscapes. Because previous trends in ecologic behavior are altered, infectious disease trends are affected since the majority of infectious diseases are zoonotic in origin (i.e., transmitted from animals to humans). In the United States and in the Midwest, vectors like mosquitoes and ticks have contributed to disease risk. While research in Missouri has been conducted resulting in integrative mosquito vector control measures to combat Yellow Fever, Dengue, West Nile Virus, and St. Louis Encephalitis, tick-transmitted diseases are highly important in the U.S. as they are the most prevalent vector-borne infectious diseases afflicting human health. Different ticks inhabit different areas in the U.S., uniquely transmitting diseases like Lyme Disease and Rocky Mountain Spotted Fever. In Missouri, the high abundance vector in the St. Louis region is the lone-star tick (Amblyomma americanum), which transmits the bacterial infections Ehrlichia chaffeensis and E. ewingii, causative agents of Human Ehrlichiosis, for which Missouri has the highest human incidence in the country. Symptoms typically appear 1-2 weeks after a bite and can range from fever, headache and fatigue to even death in rare cases. To better understand the disease ecology, a novel technique for this disease in the region was used to visually depict through Geographic Information Systems the separate and combined contributions over a three-year period of density of nymphs, nymph infection prevalence and density of infected nymphs to disease risk around the forest-covered regions of the 32 parks sampled in the St. Louis region. Using interpolation maps and calculated landscape variables, gradients of disease risk and landscape-linked correlations were determined. Enhancing understanding of the cascade of human-mediated environmental changes allows public health experts to target regional prevention efforts.
Identifying Proteins that Interact with Drosophila melanogaster Heterochromatin Protein 2 (HP2) and Characterizing Their Contribution to Heterochromatin Formation

Patrick Ng

Heterochromatin Protein 2 (HP2) interacts and co-localizes with Heterochromatin Protein 1 (HP1) within D. melanogaster chromatin and is itself involved in heterochromatin formation. Several mutations in the HP2 gene cause suppression of position effect variegation (PEV), a loss of reporter gene silencing. Of the 17 HP2 mutations recovered, three missense mutations, 288, P2763L, and 230, have been identified, one each in exons 6, 8, and 9 of HP2; the latter two have been selected for further study. We postulate that interactions between HP2 and its binding partners at the sites of these mutations impact heterochromatin formation. A Yeast-2-Hybrid (Y2H) mating screen was utilized to find proteins potentially interacting with HP2 exon 9, and identified 37 protein-coding clones from the D. melanogaster library. None of these clones displayed a loss of protein interaction with the mutant form of HP2 exon 9 relative to its wild type counterpart. Future explorations could quantify differences in association between these proteins and wild type or mutant exon 9. Prior Y2H work identified genes coding for proteins that distinguish between the wild type and missense mutation in HP2 exon 8. We examined one of these proteins, cheerio, for possible Su(var) effects by comparing expression of lacZ in D. melanogaster stocks with wild type or mutant cheerio. In these experiments the lacZ gene has been juxtaposed with a region of heterochromatin; this arrangement is similar to the juxtaposition of the white gene with heterochromatin in the classical assay for suppression of PEV. Differences in the β-galactosidase activity are observed qualitatively in tissue staining and quantitatively in whole fly assays. Differences in wild type and mutant suppression of PEV for white activity are observed in another exon 8 interacting protein, sinuous. The results indicate that cheerio and sinuous are associated with gene silencing due to heterochromatin formation.
GLP-4 ENCODES THE VALYL AMINO-ACYL tRNA SYNTHETASE VARS-2

Suchita Rastogi

Mentor: Tim Schedl

GLP-4 is defined by the mutation bn2, which at a restrictive temperature (25°F) results in adult hermaphrodites that are apparently normal somatically but that possess few germ cells. GLP-4(bn2) has been widely used to generate germline-deficient animals for studies of aging, pathogenesis, and stress resistance and to assess germline versus somatic gene expression.

To identify the encoded gene product, GLP-4(bn2) was sequenced to >30x coverage using the Illumina Genome Analyzer. Within the ~2Mb genetically mapped region containing bn2, coding changes were identified in 5 genes. RNAi of these genes identified only one that gave a sterile phenotype, Y87G2A.5 vars-2. GLP-4(bn2) failed to complement the vars-2 deletion tm3947 for fertility at 25°C. Tightly linked suppressors were isolated, and sequencing identified missense mutations within vars-2 for bn2bn39, bn2bn40 and bn2oz283.

vars-2 encodes a cytoplasmic class I valyl amino-acyl tRNA synthetase that catalyzes attachment of valine to its cognate tRNA. bn2 Gly296Asp and the intragenic revertants are in different parts of the editing domain. Homology modeling of VARS-2 with the crystal structure of valRS from T. Thermophilus suggests a molecular mechanism for the bn2 mutation and suppression by the revertants. The sterile phenotype of GLP-4(bn2) at 25°C likely results from a reduced pool of charged valyl-tRNA leading to reduced protein synthesis. VARS-2 likely also functions in the soma: 1) vars-2(tm3947) is larval lethal; 2) in situ hybridization shows somatic expression; and 3) structural analysis suggests that vars-2 has unique functions that can not be compensated by paralog vars-1 – VARS-2 is predicted to charge tRNAs with all four Val anti-codons while VARS-1, which has a bulky Trp residue in the anti-codon recognition pocket, will likely be unable to bind anti-codons with third position purines. Thus GLP-4(bn2) may also result in a reduction in protein synthesis in somatic tissues even though there is no obvious somatic phenotype; the rrt-1(gc47) mutation in the arginyl-amino-acyl tRNA synthetase has reduced protein synthesis yet does not display strong somatic phenotypes. As it is known that reduced translation can lead to alterations in lifespan and stress resistance, this property rather than germline depletion may be the cause of the GLP-4(bn2) organismal aging and stress resistance phenotypes.
The regulation of organ size during development is tightly controlled by a network of signal transduction pathways that instruct cells to grow and replicate until the organ has reached its appropriate size. The recently-described Hippo (Hpo) pathway is a central signaling pathway contributing to tissue growth by transmitting cell density cues to the nucleus. At low density, the pathway is “inactive” and cells proliferate (cell size and number are regulated by different pathways). At high density, when cells make contact with one another, the Hippo pathway is “activated” leading to cell growth arrest. To activate the Hippo pathway the protein kinase LATS phosphorylates the transcriptional co-activators YAP or TAZ leading to their nuclear exit and sequestration in the cytoplasm. While many of the components required to activate the Hippo pathway have been discovered over the past decade, how this pathway is negatively regulated or inactivated is less well understood. The Ajuba LIM proteins are adaptor proteins that localize to the cell surface at sites of cell-cell adhesion when cells come into contact with one another but also can translocate into the nucleus. Recent genetic experiments have identified the Ajuba LIM proteins as negative regulators of the Hippo pathway at the level of Lats kinase, however the precise biochemical mechanisms whereby they do so are not known. To answer this question we asked whether the subcellular localization of the Ajuba LIM proteins affects their ability to regulate the Hpo pathway. To do this, we generated myc-tagged versions of Ajuba constitutively targeted to various subcellular localizations, including the plasma membrane, mitochondria, cytosol, and the nucleus. After verification of proper protein expression by Western blot, and subcellular localization via immunofluorescence, we measured Hpo pathway activity as represented by phospho-YAP levels. To stimulate the Hpo pathway these experiments were performed in cells grown at various confluence. We found that Ajuba was able to negatively regulate the Hpo pathway when cytoplasmic, by interacting with and inhibiting Lats kinase. Once Ajuba is recruited to the plasma membrane it is unable to interact with Lats1/2 and thus did not inhibit the Hpo pathway.
WBS Homologs Are Regulated with Behavioral Changes in Drosophila Females: Evidence of a Conserved Sociogenetic Program

Michael Schultz

Mentor: Yehuda Ben-Shahar

Evolutionary developmental biology has demonstrated that conserved genetic programs, even in distantly related species, control many developmental processes. We hypothesize that conserved genetic programs control other complex phenotypes, including social behavior. To that end, we seek to identify conserved regulators of social behavior across metazoa. The human genetic disorder Williams-Beuren Syndrome (WBS), caused by a heterozygous deletion of 25-28 genes, is associated with hypersociability, making all the WBS genes candidates for novel regulators of human social behaviors. Unpublished research from the Ben-Shahar lab suggests that WBS genes are involved in social decision-making in the honey bee Apis mellifera. Here, I present evidence that WBS-loci are similarly involved in social decision-making in the fruit fly Drosophila melanogaster. I found that seven of the fourteen WBS homologs in D. melanogaster are regulated in the heads of virgin versus mated females. Virgin females are more receptive to male courtship behavior than are mated females, suggesting that transcriptional regulation of one or several WBS homologs is responsible for the mated females’ decreased interest in male courtship, or their increase in aggregation. Current experiments aim at directly implicating candidate genes in regulating social decision-making. Using a reversed-genetics approach, we seek to knockdown the expression of each of these seven genes using RNAi, and to perform behavioral assays of male receptivity in virgin and mated females. In addition, I analyzed in-situ hybridization data of gene expression in the mouse brain, to identify spatially co-expressed genes in brain regions that may be involved in the hypersocial phenotype. While I found no localized expression pattern shared among WBS genes, many genes showed spatial overlap. These results, while not yet conclusive, do suggest that WBS loci are involved in regulation of social decision-making in several species, supporting the hypothesis that conserved genetic programs control social behavior.
Effects of Subthalamic Nucleus Deep Brain Stimulation Location on Set-Shifting and Regional Cerebral Blood Flow

David Sternheim

Mentors: Meghan C. Campbell and Joel Perlmutter

Deep brain stimulation of the subthalamic nucleus (STN DBS) improves motor function in Parkinson disease (PD), but recent work suggests that STN DBS can have a variable and even negative effect on cognition. The purpose of this study was to compare the effects of electrode contact location on cognition, motor function, and regional cerebral blood flow (rCBF). Based on the proposed functional heterogeneity of the STN, we hypothesized that stimulation of the dorsal portion of the STN (D-STN) would be most beneficial for motor function whereas stimulation of ventral STN (V-STN) region would exert a greater effect on cognition. For this study, 30 PD patients with bilateral STN DBS and electrode contacts in the dorsal and ventral STN regions contralateral to their more affected side completed a set-shifting task with three different levels of difficulty (no distraction [ND], irrelevant distraction [ID], competing distraction [CD]), PET scans, and motor assessment during 3 DBS conditions (OFF stimulation, unilateral D-STN DBS, unilateral V-STN DBS) after overnight withdrawal of medications. DBS conditions were administered in a counterbalanced, double-blind fashion. Blood flow changes were measured in a priori defined regions of interest, including the dorsolateral prefrontal cortex (DLPFC), anterior cingulate cortex (ACC), intraparietal sulcus (IPS), and caudate.

Set-shifting performance depended both on stimulation condition and task difficulty. In the ND condition, we found that the effect of V-STN resulted in an increase in reaction time shift cost and therefore a decrease in performance compared to the effect of D-STN (p=.033). There were no significant effects of DBS on rCBF in any of the a priori regions. However, there was a significant, negative correlation between reaction time set-shifting performance and rCBF in the ACC in response to V-STN DBS in the ID task condition (r=.57, p=.008), but not the ND (r=.03, p=.89). Specifically, V-STN DBS-induced increases in ACC rCBF were associated with decreases in set-shifting performance. These results support the idea of a heterogeneous STN in which the ventral portion mediates cognitive function, but also highlights the individual variability in response to STN DBS even for a selectively targeted region.
The Gram-positive Enterococci are responsible for a wide variety of diseases including endocarditis, bacteremia, meningitis, wound infections, and urinary tract infections. Conserved among Enterococcus and other Gram-positive species is the utilization of sortase enzymes to catalyze the attachment of proteins to the cell wall. In Enterococcus faecalis, SrtA and SrtC are involved in the attachment of monomeric surface proteins and the biogenesis of endocarditis and biofilm-associated pili, respectively. The sortase machinery has previously been shown to localize with the Sec secretion apparatus to distinct foci in the cell. This localization is crucial for normal pilus secretion and assembly, yet to date little is known about the mechanisms that underlie it. In this project, we investigated the effects of domain swaps and directed mutagenesis of the cytoplasmic tails of the sortases on sortase and Sec localization in order to identify the specific cytoplasmic signals that are involved in the proper targeting of these proteins to their foci. An extensive panel of SrtA and SrtC mutant constructs was created and expressed in E. faecalis for use in immunoelectron microscopy (IEM) experiments. From the IEM data we were able to determine that a negatively-charged SrtA cytoplasmic tail is sufficient to disrupt SecA localization, which is consistent with our hypothesis that a positively-charged tail is needed for proper localization. Data on the localization profiles for other mutants are currently being collected. In addition, we also engineered SrtA/C cytoplasmic tail- and transmembrane helix-tagged GST constructs for use in pulldown assays. So far we have identified two putative interacting partners for the SrtA and SrtC cytoplasmic tails; identification by mass spectrometry is pending. Future studies confirm the cytoplasmic tail interacting partners identified here and further investigate their roles in Srt/Sec localization. Future studies will also include examining the effects of Sec (mis)localization on generalized secretion.
Distribution of Dopamine Transporter (DAT) and Vesicular Monoamine Transporter 2 (VMAT2) Within Striatum of MPTP-treated Monkeys

Kainan Sally Wang

Mentor: Joel Perlmutter

Parkinson’s disease (PD) results from loss of nigrostriatal dopaminergic neurons with greater loss in posterior parts of the striatum. 1-methyl-4-phenyl-1,2,3,6 tetrahydropyridine hydrochloride (MPTP) is a neurotoxin that selectively destroys dopamine neurons in non-human primates but the distribution of that loss remains unknown after intracarotid administration of MPTP. These dopaminergic neurons contain dopamine transporter (DAT) and vesicular monoamine transporter 2 (VMAT2) that can be labeled with radioligands, (+)-[3H] DTBZ for VMAT2 and [3H]WIN 35,428 for DAT. This thesis examined these two radioligands to determine the distribution of neuronal loss in different anatomical subregions of the caudate and putamen in 10 male macaque monkeys. The monkeys were unilaterally treated via internal carotid infusion with MPTP dosage ranging from 0.0 to 0.31mg/kg. Two months later, the brains were removed and the caudate and putamen were anatomically divided into a total of 7 subregions to determine the distribution of specific radioligand binding to the DAT and VMAT2 on both the control side and MPTP side of each monkey. Using one-way ANOVA with repeated measures with a Greenhouse-Geisser correction, we found that the striatal subregional binding of DTBZ to VMAT2 was statistically different among the 7 subregions on the control side ($F(1.887, 16.979)= 5.824, P<0.05$). However, MPTP did not affect the heterogeneity of VMAT2 distribution in the monkey striatum ($F(2.104, 18.938)= 5.324, P<0.05$). We also found that the striatal subregional binding of WIN to DAT was statistically different among the 7 subregions on the control side ($F(2.627, 23.642)= 7.824, P<0.005$). Similarly, MPTP did not affect the heterogenous distribution of DAT in monkey striatum ($F(2.104, 18.938)= 5.324, P<0.05$). Our quantitative results support the conclusion that DAT and VMAT2 are heterogeneously distributed in the caudate and putamen of monkey striatum. This heterogeneity of DAT and VMAT2 distribution in striatal subregions was largely preserved in MPTP-induced monkeys.
The Association of Holter-based T-wave Alternans with Depression, Gender and All-Cause Mortality in Post-Myocardial Infarction Patients: An ENRICHD Sub-study

Austin Evans Wilmot

Mentor: Phyllis K. Stein

Both depression and T-wave alternans (TWA), an abnormality seen on the electrocardiogram, are associated with increased mortality in cardiac patients. It is unknown whether significant TWA might help explain excess mortality among depressed cardiac patients or whether gender affects the magnitude of TWA. N=135 patients were selected from the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Holter sub-study, and all patients who died (N=40) of any cause were matched by age and gender with one survivor who had major depression and one who had no/minor depression. Twenty-four hour ambulatory Holter recordings that had been obtained from post-discharge monitoring of patients admitted for acute myocardial infarction (AMI) were re-analyzed in order to measure TWA using the modified moving average (MMA) method. Results were compared between survivors and non-survivors as well as between depressed and non-depressed and male and female patients using t-tests for continuous and chi-square analyses for categorical variables. Males had significantly higher average TWA (p=0.050) or higher maximum TWA on either channel (p=0.031) with data restricted to patients with measurable TWA on both channels. Survivors had a trend for higher TWA compared to non-survivors, which became significant on channel 2 (p=0.030). When the analysis was limited to patients with no/minor depression, survivors had significantly higher average TWA (p=0.047) and maximum TWA (p=0.014) on channel 2 than non-survivors. Among patients with major depression, there were no differences by gender in TWA parameters. Further studies are needed to elucidate whether depression might abolish the effect of gender on TWA in this patient population. Our conclusion is that TWA does not appear to be associated with major depression in post-MI patients and is unlikely to explain the increased mortality found in this group.
Depletion of Geminin in Medulloblastoma Triggers Cell Cycle Arrest and Sensitizes Cells to DNA Damage

Jacob Samuel Witt

Mentor: Kristen L. Kroll

DNA replication is a tightly controlled process that occurs once per cell cycle in normal cells. Geminin is an inhibitor of DNA replication and ensures that only one round of DNA replication takes place per cell cycle, thus maintaining genome fidelity and preventing aneuploidy. Additionally, Geminin is highly expressed in many aggressive cancers, including medulloblastoma. Our previous work has shown that reduction of Geminin does not compromise growth and viability of normal neural stem and precursor cells. However, loss of Geminin in several types of cancer cells has been found to trigger DNA re-replication, cell cycle arrest, and apoptosis. We therefore hypothesized that Geminin represents a potential therapeutic target for the treatment of medulloblastoma. In this study, we evaluated the effects of Geminin depletion in a medulloblastoma cell line (DAOY) in vitro. We employed siRNA-mediated knockdown of Geminin and stained cells with propidium iodide to evaluate the effects of Geminin depletion in the cell cycle. We also employed a selective inhibitor of the G2/M checkpoint to test the effects of Geminin knockdown in combination with CHK1 inhibition. We found that depletion of Geminin in DAOY cells triggered cell cycle arrest at the G2/M checkpoint and increased levels of phosphorylated histone H2AX, a marker of DNA damage. The combination of CHK1 inhibition and Geminin loss enhanced gamma-H2AX positivity. These data suggest that Geminin may protect cancer cells from checkpoint arrest and DNA damage in medulloblastoma, and may represent a useful therapeutic target for future research.
A mouse model of peripheral neuropathy was recently established by Viader et al that was secondary to mitochondrial dysfunction in Schwann cells. This was accomplished through a tissue-specific deletion of the mitochondrial transcription factor A gene (Tfam) in Schwann cells, the peripheral glia. Molecular analysis indicated a maladaptive stress pathway was active and likely contributing to the accumulation of toxic lipid intermediates in the peripheral nerves of these mice. This pathway has been dubbed the Integrated Stress Response and activates a transcriptional profile with a broad range of metabolic consequences, including changes in lipid metabolism. Since lipid species were shown to be driving much of the pathology, elucidation of the specifics of pathway activation in this context could allow for the development of therapies that alleviate this phenotype. The pathway is known to have four protein kinase sensors, among them Heme Regulated Inhibitor Kinase (HRI), Double Stranded RNA Protein Kinase (PKR), Double Stranded RNA Protein Kinase-like Endoplasmic Reticulum Kinase (PERK), and General Control Non-Depressible 2 (GCN2). Each activates the common pathway by phosphorylating translation initiation factor α (eIF2α) at serine 51. As a first step in elucidating the specific activation of the pathway in this context, I modeled the insult in vitro with pharmacological mitochondrial inhibitors and infected 3T3 cells with siRNA constructs against the different kinases to discriminate between their activation. Quantitative PCR analysis didn’t conclusively differentiate between their activation, indicating that either (1) it is a broad insult that causes several, distinct problems within the cell, (2) it instead inhibits the phosphatases that normally regulate eIF2α, or (3) my model is too simple and failed to correctly reflect the in vivo conditions. Further work will be needed to corroborate one of these possibilities over others.
Proper DNA damage repair is essential for maintaining genomic integrity and stability of all living organisms. In instances of improper or inefficient repair by the cell, DNA double-strand breaks (DSBs), the most lethal form of DNA damage, can cause mutations and truncations of genetic material and lead to human diseases such as cancer and premature aging. A great deal of research effort has been focused on the mechanism of DSB repair, using a variety of techniques to induce DSBs in cells. Examples of these techniques include gamma radiation and radiomimetic drugs. While effective in creating DSBs, these conventional techniques lack the precision and control necessary for investigating finer details of DSB repair processes. A newly developed “laser-scissors” technology overcomes drawbacks of traditional DNA damaging methods by inducing clustered DSBs in specific locations in cells in a user-defined manner. With advanced microscopic techniques, including live cell imaging, this laser method can visualize the DNA damage response in individual cells with high sensitivity and precision.

During my undergraduate research in Dr. Zhongsheng You’s laboratory in the Department of Cell Biology and Physiology at Washington University, I used a customized “laser-scissors” system to study the human DNA damage response. Under the supervision of Dr. You, I investigated the recruitment of the DNA repair protein 53BP1 (p53 binding protein 1) to DSBs. Using laser irradiation and imaging tools, we demonstrated that 53BP1 damage recruitment requires the function of the MMSET protein, which modifies the histone protein H4 in the chromatin region flanking the DSB ends, creating binding sites for 53BP1. The role of MMSET in DNA repair may provide an underlying mechanism for the function of MMSET in the formation of multiple myelomas. Thus, the “laser-scissors” system has lead to important insights into DSB repair and its relation to cancer.
Cellular processes such as DNA replication, transcription, translation, recombination, repair, and ribosome biogenesis involve the separation of nucleic acid strands. Helicases/translocases are motor proteins that move directionally on DNA and separate the nucleic acid strands using energy derived from ATP hydrolysis. How these motor proteins couple ATP binding and hydrolysis to movement on DNA/RNA is of immense significance, and here we present analysis of such coupling using the *E. coli* UvrD helicase as a model protein.

A monomer of UvrD can translocate on single stranded DNA (ssDNA), but oligomers are required to unwind double stranded (dsDNA). UvrD translocates with a 3′→5′ polarity on ssDNA, but the molecular basis for this directional movement is not well understood. Our lab has previously shown that UvrD also translocates on ssDNA using precise steps, where it moves rapidly in single nucleotide steps and pauses after moving four to five steps then repeats the movement resulting in net directional translocation along ssDNA. During this process, UvrD uses the energy from hydrolyzing one ATP molecule to translocate each nucleotide during the fast steps. My research project focused on dissecting the mechanism of ATP binding and hydrolysis by UvrD during translocation on ssDNA.

A structural motif (called motif VI) is present in this class of helicases. The motif couples ATP binding/hydrolysis to translocation on ssDNA. Previous research on RecB, another member of the SF1 class of helicases, has shown that the point mutation Y803H in the protein was able to significantly slow down its translocation rate on DNA. Using site-directed mutagenesis, I engineered a similar mutation in UvrD (Y600H) and purified the mutant protein. Stopped-flow translocation assays demonstrated that unlike the RecB Y803H mutation, the UvrD mutation did not slow the translocation rate significantly. The UvrD-WT and UvrD-Y600H proteins had translocation rates of 185±9 nt/s and 172±16 nt/s respectively. This surprising result suggests that the lack of significant reduction of translocation rate in UvrD-Y600H can be attributed to the Tyrosine in UvrD having a lesser role in mediating the coupling of ATP hydrolysis and translocation activity than the corresponding Tyrosine in RecB. It is also possible that this mechanism is different, and further investigation will be required to better understand these differences.
Old Age and Flawed Kingship in Vergil’s Aeneid

Aaron C. Mace

Mentor: Catherine Keane

This thesis examines the convergence of the theme of old age in Vergil’s Aeneid with the hero of the poem, Aeneas. In the epic world of the Aeneid, a man’s athletic and military glory secures his social stature. Old men in the poem struggle to remain relevant in their militaristic culture because they suffer from the anxieties of old age which stem principally from their inevitable, physical decline. I show that a significant aspect of old men is their role as fathers to their own sons and/or as father-figures to Aeneas. Aeneas’ interactions with the aged are edifying, yet certain prominent death scenes of old men either trouble Aeneas directly or they force the reader to make the difficult determination of whether he is an honorable character. Mezentius, the most complex representation of old age in the poem, serves as the culmination of the issues which I identify in this study. His grand transformation in characterization before his death robs Aeneas of the satisfaction of slaying a monstrous tyrant and contributes to the hero’s abiding sense of frustration and unfulfillment. Co-operative with the anxiety of old age in the Aeneid is the honor shown to the aged as evidenced by the desire for continuity from old to young. In his role as supervisor of the Troy Game in Book V, Aeneas positions himself as an upholder of this continuity. I argue, however, that although he ostensibly values continuity, he himself prevents it through failing to protect Pallas and, most significantly, through killing Mezentius and his son Lausus. Aeneas’ failure in these instances reveals him to be at best an incompetent leader, at worst a hypocrite. Whatever else he may be, Aeneas fails as a monarch because he injures the institutions he is supposed to enshrine.
Evidence and Anakrisis: Pretrial Procedure in Athenian Courts
John Moynihan

Mentor: William Bubelis

The Athenian court system in the 4th century B.C. had well-developed procedures for resolving disputes and addressing violations of the law. One of the most important types of procedure was a pretrial hearing, a magistrate’s initial questioning of litigants. This examination occurred after charges were filed but before the trial began. Since no records of pretrial hearings were kept, it is difficult to determine the exact details of what happened and why the procedure existed, particularly for a type of hearing called anakrisis. This paper attempts to define the function and purpose of anakrisis by examining the existing sources of evidence about the procedure: legal oratory, the Athenaion Politeia, and a painted inscription on the lid of an echinos, a clay pot used to store documents for use at trial. There are two primary theories about the purpose and function of anakrisis. The first holds that anakrisis existed to determine whether the prosecutor could present a prima facie case. The second holds that anakrisis required litigants to disclose all evidence they planned to use at trial, and that no new evidence could be presented to the jury. Neither proposal provides a complete account of the procedure. However, the first theory, that anakrisis was a hearing on the prosecution’s prima facie case, is the better explanation. This paper updates that explanation to account for more recently discovered evidence and to address questions about the presentation of new evidence. Since the sources of information regarding anakrisis are limited, a perfect picture of the procedure cannot be given. This work, however, gives a more thorough account of what happened during anakrisis and explains why the procedure’s purpose is more likely to be limited examination of the prosecutor’s case, rather than an extensive evidentiary hearing.
Lovers as Soldiers in Ovid’s
Metamorphoses
Anastasia Niedzielski

Mentor: George Pepe

In this work, I trace the evolution of a motif common in ancient literature and to elegy, specifically the “lover as a soldier.” Looking at Ovid’s Metamorphoses, it is possible to find evidence of this theme, but in a manner substantially different from the literary precedent. Typically, the motif is used in elegy in an anti-structuralist sense: love and war, which by extension implies an accepted set of Roman virtues, are set at odds, and the heroic soldier is said to make a poor lover. Ovid consciously draws on the theme of lovers as soldiers from the literary tradition, along with his own use of it in his Amores to create a deeper and more evolved image in the Metamorphoses. Many times, these lovers and soldiers seem to stand in for elegiac and epic poetic styles themselves, allowing the poet to explore the nature of genre through his discrete vignettes. With his usual playfulness, Ovid creates a complex work that defies a single analysis or definitive statement. However, the conscious play on this trope of “lovers as soldiers” through many disparate stories develops the motif into a more complex picture of lovers and soldiers and the related aspects of human nature, both positive and negative. Ovid has fashioned the Metamorphoses not only as a collection of stories each featuring a literal metamorphosis, but also a metamorphosis of the epic genre and the central theme of love itself in nova corpora.
Quintus Ennius looms large in Latin literature, but it is difficult to think of another poet with less control over his legacy. Called by many the “father” of Roman poetry and once regarded as the dominant force in Latin poetics, since antiquity he has gradually faded from view. His poetry has been almost entirely lost, and today lives on only in the words of others, who, with an eye toward Ennius’ neologisms, sound play, and ideological temperament, preserved him through incorporation in their own writings.

We see in many of our sources attempts to incorporate Ennius into their own ideological and philosophical framework, and bring him into congruence with literary, political, and philosophical trends in some cases more than 100 years after his death. This results in a subjective and partial Ennius, whose textual presence is often conveniently tailored to the source author’s argumentative or ideological needs. In the absence of an at all complete Ennian text with which to parry these partisan constructions, these *ex post facto* characterizations have gradually accumulated and have over time begun to eclipse the historical Quintus Ennius. And so we are left with not one Ennius but many Ennii, each with its own source, and its own source’s agenda.

My thesis concerns itself with these problems of Ennian study, and the ways in which later Roman authors use, and in many ways manipulate, Ennius and his poetry in order to support their own textual arguments, resulting in an Ennius perhaps far removed from the objective historical personage.
Examining Carbon Isotopic Gradients Across a Basin-Seamount Paleobathymetry in Jurassic-Cretaceous Limestones of the Umbria-Marche Basin, Italy

Rachel Folkerts

Mentor: David Fike

In the modern ocean biological pumping creates a distinctive $\delta^{13}C$ depth gradient; however, it is difficult to observe this depth-gradient in paleo-oceans, in part because there are few locations where time-equivalent and depth-variant samples can be collected. As a result, the ancient biological pump is not well understood. This study uses the Monte Nerone seamount and associated basin of the Jurassic Umbria-Marche Basin in Italy’s Apennine Mountains to investigate biological pumping in the paleo-ocean. The unique seamount-basin topography of the region makes it well suited for studying the ancient biological pump.

A $\delta^{13}C$ offset consistent with biological pumping is observed in the Early Jurassic. In the Middle Jurassic a 0.2‰ offset is observed between the Bugarone 3 Mbr. of the Monte Nerone seamount and the basinal Marne a Posidonia Fm., with heavier $\delta^{13}C_{\text{Carb}}$ values appearing in the basin. The modern biological pump results in increased $\delta^{13}C_{\text{Carb}}$ values in shallow waters; therefore, the Middle Jurassic $\delta^{13}C_{\text{Carb}}$ offset between seamount and basinal strata does not appear to be caused by biological pumping. Water mass aging is the most likely cause of the relatively low $\delta^{13}C_{\text{Carb}}$ values in the seamount.

In addition, this study investigates two prolonged depositional hiatuses that occur in the Jurassic seamounts of the Umbria-Marche Basin. A positive $\delta^{13}C_{\text{Carb}}$ excursion precedes the first (20 Myr) depositional hiatus. This data is consistent with the hypothesis that eutrophication or increased ocean acidity shut off carbonate productivity in the Middle Jurassic. By contrast, the 10 Myr hiatus in the Late Jurassic-Early Cretaceous is preceded by a small (0.3‰) negative $\delta^{13}C_{\text{Carb}}$, which suggests that another mechanism is responsible for shutting off carbonate productivity. One likely scenario that could have halted carbonate deposition and contributed to regional platform drowning is the influx of colder, less saline waters from the basins due to a newly formed connection between the Umbria-Marche basins and the Tethys Ocean.
We have conducted deformation experiments to test the relative strength of pseudotachylyte fault veins to their host rock in two types of natural samples: a tonalite from the Gole Larghe Fault in Italy and a foliated mylonite from the Alpine Fault in New Zealand. The purpose of these experiments is to investigate strain localization in brittle-to-ductile shear zones. Deformation experiments are conducted using a Griggs apparatus at a confining pressure of 1 GPa and temperatures of 450°C to 800°C. The sub-planar pseudotachylites in the core samples are oriented 45° to the loading direction. Experiments are run at convergence rates of 0.5μm/sec, corresponding to strain rates of about 2x10⁻⁵s⁻¹. The deformed samples exhibit discrete fracture surfaces sub-parallel to and often cross-cutting the pseudotachylite veins in the high temperature experiments. Low temperature experiments exhibit deformation unassociated with the pseudotachylite vein. In the lowest temperature experiments, we see evidence for cataclasis within the pseudotachylite. In the highest temperature experiments we see reduced contribution of brittle fracture-type deformation. In the absence of other relatively weak surfaces in the wall rock (e.g., favorably oriented fractures), future deformation may localize along pre-existing, pseudotachylite-bearing faults at lower crustal conditions.
THE QING CRACKDOWN ON THE MIAO IN SOUTHWEST CHINA
Paul Fetter

Mentor: Robert Hegel

In this thesis I compare the policies of the final decade of the Kangxi period (1661 C.E. - 1722 C.E.) towards non-Han peoples on the Southwestern periphery of the Qing Empire with those of the subsequent Yongzheng period (1722 C.E. - 1735 C.E.) by focusing on how and why these policies differed so greatly. This essay will provide the historical context for the policy shift in the Yongzheng period including the economic, military, political and cultural aspects surrounding the change. For the primary analytical framework I will use the work of James C. Scott in his book *The Art of Not Being Governed*, explaining the rationale behind early modern states expansion of authority into previously lawless periphery. I will bring to light the economic concerns that surrounded the incorporation of previously autonomous regions, such as salt deposits and trade routes that were important to the empire. I will examine the change in the broader military context of increasingly violent confrontations between tribes of non-Han people and Han migrants, as well as the possible relation of the project to a campaign of extensive centralization of authority in the Chinese state. On an administrative level, I will examine the ways in which prominent civil servants of this period used the administrative bureaucracy to implement these assimilation policies. I will then use this information to argue that military considerations were the most likely impetus for the change, and show how these military considerations informed both the cultural campaign and the administrative aspects of the incorporation campaign.
Spatial Price Equilibrium with Convex Marginal Costs of Transportation: Applications to the Brent-WTI Spread

Max Bennett

Mentor: Bruce Petersen

Standard models of spatial price equilibrium assume that transportation costs are constant and therefore conclude that a spatial price spread must be bound by the constant marginal cost of transportation. However, the empirics of many spatial price spreads, such as the Brent-WTI spread, demonstrate clear violations of this condition. This paper explains this phenomenon by instead assuming that the marginal cost of transportation is convex. Furthermore, this paper rationalizes the sensitivity of spatial price spreads to localized demand and supply schedules as well as to expected future costs of transportation, an endogeneity that standard models are unable to explain.
I model the sale of nuclear goods as a monopoly screening problem in which a seller offers two distinct contracts of inspections (i) and price (p) to buyers, with the knowledge that the goods may be intended for energy (“good”) or weapons (“bad”) purposes. In a market with asymmetric information and buyers with both types of intentions, I find that the seller copes with adverse selection by sorting between types of buyers. However, it does not transact efficiently with “bad” buyers. Thus the optimal contract accepted by the “good” buyers will entail rigorous inspections and a low price but the optimal contract accepted by the “bad” buyers will entail minimal inspections and a high price. Significant heterogeneity between contracts offered to countries newly interested in purchasing nuclear goods is consistent with the underlying sorting mechanisms I model.
Were Bank Mergers Following the 2008 Financial Crisis Efficient? 
Three Case Studies
Wenting Song

Mentor: Costas Azariadis

Were bank mergers following the 2008 financial crisis efficient or just taking advantage of the too-big-to-fail policy? I use distance to default to compare bank default risks pre- and post-merger in three recent U.S. bank mergers. I conclude mergers of smaller size were efficient, while mergers of larger size were not.
People have the natural tendency to be optimistic and believe that good outcomes in the future are more likely, but also want to avoid overestimation that could result in bad decision-making. Brunnermeier and Parker established an optimal beliefs framework that balances these two incentives. This paper follows and extends the optimal beliefs framework to consider optimal beliefs in the long run after successive generations. Assuming no short-selling, result shows that, in almost all cases, there does not exist a stable and interior long-term optimal belief.
In this study, I argue that Pope’s poetics model his larger historical engagements in the era of literary industrialization. I place the repetition of the couplet’s rhyming words against the repetition of mass printing in eighteenth-century England. Beginning with a discussion of Pope’s rhyme, I argue that Pope manipulates the repetitive to make it mean differently with each return, producing a repetition generative of meaning. I also address generation in terms of lineage, and suggest that repetition is a link into literary inheritance; thus the repetition of literary tradition clashes with the repetition of modernity. In the context of the eighteenth-century literary industry, repetition also arises on a material level. *The Dunciad*, besides being issued in four separate editions, appears with an increasing amount of textual paraphernalia with each issue. In contrast to a poetic proliferation of meanings, the material text accumulates a proliferation of words and pages. Pope stages this interplay of meaning and materiality on the printed page, in the clash between notes and verse. The tension among textual units allows Pope to represent both text and context on his page, differentiating between the two by placing them in pronounced tension. By the same turn, repetitions of both sound and print allow Pope to engage simultaneously with his contemporary world and literary past, with the Ancient and Modern. In his translations, literally *The Iliad* and figuratively *The Dunciad*, Pope combines the Ancient and Modern, ultimately claiming a material as well as literary right to both. As a concluding gesture, I discuss how these repetitions and claims to right culminate in Pope’s engagement with his rights to copy, that is, literally copyright.
“English Undefiled”: Textual Authority and Political Sovereignty in Book IV of *The Faerie Queene*

Matt Rickard

*Mentor: Joseph Loewenstein*

The thesis began as an attempt to grapple with the textual relations among Chaucer’s *Knight’s Tale* and *Squire’s Tale* and Ariosto’s *Orlando furioso* in book IV of Edmund Spenser’s *The Faerie Queene*—how the source texts interact with one another in the context of book IV and how Spenser’s reading of his literary antecedents models how we should be reading *The Faerie Queene*. In examining the sites of contact, I began to see that Spenser’s source texts compete with one another antagonistically. The presence of other poems in book IV broadens rather than narrows the semantic range of the allusive poem. At the heart of such an instability seems to be an anxiety about authority itself. Operating under the assumption that literary and political dimensions of authority are mutually reflective and, furthermore, that each type of authority proffers access points from which to analyze the other, I first consider the treatment of literary authorities as manifest in the technique of allusion and then progress towards an understanding of the poem’s representations of sovereignty and the import of these representations for Spenser’s assessment of and posture towards Elizabethan politics.
As ocean productivity declines, Marine Protected Areas (MPAs) have become a cornerstone of resource conservation. However, protected areas are not evenly spread across each distinct ecological region, or “ecoregion,” of the ocean. Consequently, ubiquitous anthropogenic pressures affect marine ecoregions differentially. To determine which marine regions lack protection in North America, I overlapped a three-tiered (divided by scale of ecological processes) marine ecoregion model with MPAs that fall within the United States, Canada, and Mexico. Following, I analyzed the management strategy of MPAs within the United States and created a protection classification system (increasing in protection strength from I – V) to further explore national marine conservation.

MPA coverage of large-scale, or Level 1, marine ecoregions (n=1) ranged from 0.0% (the Arctic Basin) to 97.85% (the Virginian Atlantic) with an average coverage of 30.14%. Coverage of smaller-scale ecoregions—those of Levels 2 and 3—was similar. Ecoregion MPA coverage differed dramatically between the United States and Canada and Mexico; MPAs in the U.S. covered Level 1 ecoregions by an average of 54%, while those in Canada and Mexico covered ecoregions by an average of 0.79% and 1.8%, respectively. As a result, marine protection—as defined by MPA coverage—is greatest in temperate waters of the United States, but is limited in both Arctic and tropical waters.

However, most MPAs in the United States are loosely protected (class IV) and restrict few human activities, while only 0.14% are strictly protected, class I MPAs. Therefore, to combat continued anthropogenic impacts, marine conservation efforts should focus on both creating new protected areas in the Arctic and tropical regions, while establishing strict management policies in existing MPAs in temperate, U.S. waters.
Strategies for Increasing Bikeability: A Closer Look at the St. Louis Regional Bike Plan

Megan McLean

Mentor: Robert Holahan

Transportation system planning in the latter half of the 20th century has largely focused on the needs of automobiles, pushing the bicycle out of the picture. In recent years, bicycling has re-emerged as a viable mode of transportation, especially with rising gas prices, the need to reduce greenhouse gas emissions, and a desire for more sustainable and livable development patterns. In response, the City of St. Louis, in conjunction with Great Rivers Greenway District, Missouri Department of Transportation, and East-West Gateway Council of Governments, is working to create the comprehensive Regional Gateway Bike Plan which seeks to “encourage and accommodate bicycling as a viable transportation mode.”

The goal of this thesis is to discuss strategies of increasing “bikeability” proposed by the St. Louis Bike Plan. For the purposes of this paper, “bikeability” encompasses the extent to which residents feel comfortable navigating their community by bike. Specifically, I focus on maximizing ridership in urban areas given budgetary constraints. To accomplish this goal, I first look at the culture of cycling and supporting infrastructure in the United States, and more specifically the City of St. Louis. I discuss the benefits of cycling to both a community and its citizen cyclists. Then I compare the different means of improving bikeability by looking at the three pillars of the City of St. Louis’s Comprehensive Bike Plan: Education, Infrastructure, and Law Enforcement. Finally, the discussion examines obstacles and opportunities to increasing ridership in the St. Louis Region and other American cities.
Glamorization of Defiance:
The Elizabeth Taylor Melodrama of the 1950s

Megan Boyd

Mentors: Gaylyn Studlar and Philip Sewell

Elizabeth Taylor was one of the most popular box office stars of the 1950s and is often discussed by film historians in terms of the unapologetic nature of her offscreen persona. However, any thorough examination of her onscreen persona has yet to be attempted. Female star personas have warranted serious study on the part of film scholars since they offer valuable insight into certain concepts of female cultural representation and can even psychologically influence the female spectator through identification. In this thesis, I propose that Taylor’s onscreen persona offers potential liberation for female viewers and a unique representation of femininity in the 1950s melodrama through her persona’s glamorization of defiance against certain patriarchal constructions of 1950s femininity that feminist Betty Friedan famously termed “the problem with no name.”

I analyze seven of Taylor’s films between 1951 and 1963, limiting myself to films that reveal different progressions in her character’s dissatisfaction, how she is still portrayed as sexually desirable, and how her methods of challenge evolve over time. I also include contextualizing analysis of the 1950s melodrama and 1950s cultural discourse on femininity, in order to show how Taylor’s presentation of femininity will defy both melodramatic and cultural coding of the ambitious, non-domestic female as sexually and personally undesirable. I discuss Taylor’s responsibility in shaping this persona, what she represented to directors, and how her star presence often necessitated the alteration of her films’ original source materials. I also examine her films’ plot structuring, dialogue, costuming, and shot choices, Taylor’s placement within mise-en-scene, and her own performative presentation through physicality and voice.

This thesis hopes to rescue 1950s female stars and sex symbols, such as Taylor, from mere feminist derision within film scholarship and to suggest their relevance and liberating qualities for female audiences.
Jewish presence on the Iberian Peninsula had a long and influential history, spanning more than a millennium and a half. By the end of the fourteenth century, pressure had considerably increased on the Jews to convert to the Christian faith. In 1391 massive conversions occurred where tens of thousands of Jews were either forced to submit to baptism or sacrifice their lives. Jews who converted were known as “New Christians” as opposed to long-established “Old Christians.” By the fifteenth century the Spanish Inquisition was instituted to investigate the behavior of these New Christians, judging whether they were secretly still “judaizing” and, thus, heretics. Ines Lopez epitomizes the dilemma of conversos. She was born around 1465 and it is believed that her (great) grandparents converted to Christianity, perhaps during the massive conversions of 1391. Although nominally a Christian, she apparently still retained Jewish rituals. In 1495 Ines was brought before inquisitors and questioned about her actions and their relevance to Jewish identity. She confessed to lighting candles on Friday nights, to not eating pork, and to preparing for the Jewish Sabbath on Saturday. Although she confessed ignorance as to the meaning of these rituals, the inquisitors judged her to have been Jewish. In 1496, she was sentenced to house arrest and was reconciled to the Church. Fifteen years later she was again interrogated; although now she was burnt at the stake for her “Judaizing, backsliding” ways. This thesis evokes the life and world of Ines Lopez through her two trials.
From Mehmed Ali’s consolidation of power in 1805 to the mid-twentieth century, venereal diseases functioned as a public source of anxiety and a site for larger debates about the intersections of gender, class, and sexuality. An examination of archival documents, newspaper articles, and medical journals from the Egyptian semi-colonial period dealing with venereal diseases reveals that the years immediately after Egyptian independence in 1922 represented a unique, transitional moment in which elite men contested and articulated ideas of nationhood. The discourse around venereal diseases provides a lens to determine how marginalized groups of people (the lower class, Egyptian prostitutes, and middle- and upper-class women) fit into nationalists’ and elite men’s idealized nation.

Elite men determined each group’s status in the nation according to their reproductive and sexual value. While the state constructed lower-class Egyptians as sites of reform and treatment for venereal diseases in the nation-building process, it did not deem them reproductively or sexually valuable and excluded them from national citizenship. Bourgeois women, on other hand, were reproductively and sexually valuable, allowing them to enter the confines of the nation if they remained venereal disease free. Among the groups of marginalized people, lower-class prostitutes were the worst off. Because they were sexually valuable to middle- and upper-class men but not reproductively valuable, they functioned in a dangerous, liminal space in which they could neither be the sites of larger state reforms nor prove their value by spawning children. This narrative of venereal disease control in the early semi-colonial period demonstrates the historically dynamic process through which male elites repeatedly sought to dictate the terms of disempowered groups of peoples’ citizenship in order to substantiate their own political power and determine the nation’s development.
In the winter of 1916–17, Britain transformed its military strategy by advancing the Egyptian Expeditionary Force across the Sinai Desert and into Ottoman lands. A momentous decision that irrevocably shaped modern Middle Eastern history, this thesis explores the reasons accounting for Britain’s entrance into Palestine during the First World War. Disheartened by stalemate on the Western Front, Britain sought military victories and a means of improving national morale. In search of alternative theaters of war, Palestine appeared both viable and attractive. Not only would it divert troops from slaughter in France and Belgium, but it also presented a deep-seated romantic and religious allure. Laying territorial claim to Palestine would also improve Britain’s standing in the region, as well as bolster its postwar bargaining position. After Germany announced its policy of unrestricted submarine warfare, protecting existing shipping lanes, particularly to India, became a matter of vital necessity. As the Suez Canal’s defense grew in importance, the danger of Ottoman assault was deemed unsustainable. Palestine was consequently sought as a strategic defensive barrier. Turning to the Anglo-Zionist alliance, I investigate prejudice and exaggeration associated with perceptions of Jewish influence. After evaluating international Jewish leverage, especially within Russia and the United States, Britain concluded that “world Jewry” was an interest group worth courting. Prompted by Chaim Weizmann and a notable entourage of Zionists, Britain decided to endorse a pro-Zionist agenda. By so doing, the government hoped to secure widespread Jewish support, thereby strengthening its political and financial standing. Britain thus altered its Near Eastern strategy, resolving to advance troops past the Suez Canal and stake claim to the land of Palestine.

Naomi Campbell

Mentor: Paul Ramirez

The Mapuche, Chile’s largest indigenous minority group, like many indigenous peoples in Latin America, have struggled to balance regional autonomy with political and economic incorporation throughout the twentieth century. This work investigates the evolving relationship between the Chilean state and the Mapuche during the presidency of Salvador Allende and the military dictatorship under Augusto Pinochet, highlighting struggles over identity and over the concept of the Chilean nation. Salvador Allende, president from 1970 until the military coup in 1973, used the narrative of Mapuche activists to promote a political agenda though simultaneously responded to the community’s demands for greater regional autonomy. Allende’s government enacted agrarian reform laws and the Indigenous Peoples Act of 1972, expanding the rights of the Mapuche to what they considered ancestral lands. An internal document published by the Office of Agricultural Planning revealed the intentions of the government to incorporate Mapuche demands into its socialist program and vision of the nation. The relationship between the state and indigenous groups changed again after the military coup. Pinochet and his military junta reconstructed the nation to fit a new ideology and, in the process, attempted to assimilate the Mapuche and put an end to communal landholding practices. Neoliberal economic policies, along with legislation passed during the dictatorship, targeted Mapuche groups while reversing many of Allende’s agrarian reform laws. Violent police action and the development of a new Anti-Terrorist Act served to silence the regime’s opposition and, by extension, indigenous dissenters. However, the Mapuche were by no means pawns in the struggle over national identity. From Allende’s presidency through the authoritarian regime, Mapuche groups actively engaged with the Chilean government to create their own narrative, attempting to negotiate the terms of their incorporation into the national political and economic system. To accomplish common goals, indigenous organizations formed alliances with a diverse coalition of social forces, from left-wing political parties, to international human rights bodies, to the Catholic Church. In turn, those alliances shaped perceptions of indigenous identity in the public sphere. This research aims to trace the current struggles of the Mapuche community for recognition and autonomy to the changes that occurred between 1970 and 1990.
St. Louis Jews and Jewish institutions were far from unified. In the 1880s, the already established German Jewish population was faced with a mass immigration of Yiddish speaking Eastern Europeans. Language was one of the many fragmenting forces. Differences in geography, religious beliefs, and economic status resulted in the formation of separate synagogues, charitable institutions, and newspapers. By the 1920s, the Jews of St. Louis, whether from Eastern Europe, Germany, or the United States, came to see themselves as having common interests and formed shared institutions. Organizations initially founded and supported only by German Reform Jews began to unify the diverse Jewish population by providing venues for social interaction. Zionism spurred separate groups to unite both politically and economically. With the onset of the Great Depression, Jewish institutions were financially centralized in order to save administration costs, further uniting previously separate groups. This study, through the lens of immigrant history, traces the ways that St. Louis immigrants fashioned a new collective Jewish identity in an American city.
On March 24, 1989, Joel Steinberg, a New York City criminal defense attorney, was convicted of first-degree manslaughter. He was found guilty of killing a six-year-old girl named Lisa whom he had taken in as his daughter. His conviction came after an exhausting trial of nearly two years. Countless expert witnesses took the stand testifying to the contested issue of how Lisa died. The most important witness, however, was Hedda Nussbaum, a former children’s book editor and Steinberg’s ex-girlfriend. After making a deal with prosecutors, she testified against Steinberg, offering vivid testimony of the night in question as well as the extraordinary physical and psychological abuse she endured at his hands. When she testified, her bruised and battered face came to symbolize the middle class dream gone horribly wrong.

After Steinberg was sentenced to twenty-five years in prison, many began to ask whether an innocent man was punished for a crime he did not commit. Their inquiry was primarily focused on the court’s decision to allow television cameras in the courtroom in which Steinberg was tried. Such had been done before in the U.S., but People v. Steinberg marked a shift in the evolution of the American television trial in that it broadcast large portions of the trial gavel-to-gavel, or without interruption, rather than simply airing segments. The central question of this thesis is whether this inclusion and broadcasting is unfair to defendants. To answer this question, the thesis first considers theoretical arguments for and against inclusion. It establishes a framework for analyzing fairness in light of potential impact on key court participants. Then, the thesis outlines the narrative of the Steinberg trial. Finally, it argues that, while the inclusion of the cameras and broadcasting inspired changes in the behavior of key court participants, such behavior did not wholly render the trial unfair as fundamental legal processes whose preservation is necessary for due process, such as witness examination or closing arguments, remained intact.
An Imperial Actor in the Late Ottoman Empire: Performativity and Status in the Travelogues of Cenap Şehabettin

Ali Aydin Karamustafa

Mentor: Nancy Reynolds

This thesis is a primary source analysis of the travel accounts written by Cenap Şehabettin, a Turkish Ottoman health official who travelled in the Arab lands of the Ottoman Empire at the turn of the twentieth century. Are these imperial texts representing colonial ambitions? How might historians today view the relationship between Ottoman officials and the imperial lands in which they traveled? Given that by the eve of World War I the empire was not an expansionist military power driven by capital interests like many European states, I argue that we must look differently at texts produced in the Ottoman context. The writings of Şehabettin demonstrate how foci of power in the empire had shifted from the person of the Sultan to a state-bureaucracy system in which prestige and power were derived from the possession of cultural capital and status in the public sphere. These texts suggest how this shift was precipitated by technological advances in transportation and communication that allowed Şehabettin to publish his travel writings in serial form in the Ottoman press. A literary analysis further reveals how he employed several specific “gazes” during his travel in Arab lands that would have won him favor among his elite Ottoman readership. I describe this as the performativity of status and exploitation of cultural capital, through which Şehabettin derived elite status and social power in the expanding Ottoman public sphere. His travel accounts also reveal how the range of Ottoman cultural capital was diverse and contradictory. Technologies of travel and communication created new power networks and a new stage for performing and creating status. A biographic view of one of the many actors on stage, Cenap Şehabettin suggests the reorganization and increased public nature of imperial status during the emergence of the Ottoman nation-state.
This thesis represents the first full study of the Hamburg Massacre of 1876, an event little known among historians but one that had major significance for African-American political culture in South Carolina as well as for race and public memory in the post-Reconstruction era. After the Civil War, African Americans had begun to play a creative role in Southern society as free citizens and voters. They formed towns, gained wealth, and even got elected to the state legislature. Their newfound citizenship offered them the chance to build their own future and establish a political culture that would be the foundation for their future success in America. However, the former planter elite, a group of whites who had been slave owners before the war, would not let this endure. They despised any form of African-American advancement that threatened the tenets of the antebellum society of old. Left with few other options, these whites resorted to violence in order to return freed people into a state of subjection. These dynamics represented the root of the Hamburg Massacre, which happened on July 8, 1876, and resulted in the death of six African Americans. Not only did the perpetrators of the massacre begin a campaign of violence that would culminate in the end of Reconstruction in South Carolina, but they also ensured that history vindicated their actions by distorting the narrative of the massacre, establishing the white men as the victims rather than Hamburg’s black citizens. This distortion was critical as to why Hamburg’s story was lost for decades and why the town would eventually disappear from the landscape and the maps in the years after the massacre. In the end, the flowering and destruction of Hamburg, that life and death of an American town, represented a key to the deepest stakes of the Reconstruction struggle, which included not simply political power, but political culture in its broadest parameters involving the self-rule, the public life, and the existence of the town in all of its political, physical, and aspirational dimensions.
In this thesis, I examine portrayals of Stalin in various Russian-language textbooks for university students of history, beginning with the late 1940s and continuing up to the present day, and how these portrayals have shifted depending on the political climate in which textbooks were written, as well as the authors’ desire to ingratiate themselves with the leadership. After World War II, when Stalin was still in power, textbook authors enthusiastically praised him. During the Khrushchev thaw, authors were free to criticize Stalin, and they did so enthusiastically, condemning Stalin’s crimes and the cult of personality that sprang up around him. When Brezhnev was in power, the government did not pursue such an anti-Stalinist line, and Stalin’s role in history was often ignored or glossed over. Textbook authors were freer to examine Stalin during Gorbachev’s perestroika, though there was still some restraint, and they became even more openly critical in the 1990s when Boris Yeltsin was president of the Russian Federation. Textbooks from this decade openly discussed the costs of collectivization, reasons for the Great Terror, and other subjects that were previously controversial. However, since Vladimir Putin’s rise to power in 2000, the government has resumed its ambivalent stance towards Stalin, evident in textbook authors’ treatment of Stalin during the last decade. Some textbooks published in recent years have received condemnation for being too favorable, even praiseworthy, towards the dictator. These shifting portrayals of Stalin show how the Soviet (and, later, Russian) government’s view and treatment of its own history has changed and sheds light on the troubling trend in modern Russia to use historical accomplishments for propaganda purposes.
The Norman influence in pre-Conquest England increased considerably over the course of the eleventh century, culminating in the Norman Conquest of 1066. This thesis reassesses the political contours of Anglo-Norman relations in the form of a series of mini biographies. The biographies are of Emma of Normandy, Edward the Confessor, and William the Conqueror, with Godwin and Harold also receiving extensive treatment. We can learn through the political history of Anglo-Norman relations of the eleventh century that although there was a significant change when William the Conqueror took control, that change was less substantial than commonly thought.

During this time England shifted from an orientation towards Scandinavia to that of Normandy. Emma of Normandy was one of the first Normans to move to England upon her marriage to the Anglo-Saxon Ethelred the Unready in 1002, and she married the Danish Canute in 1017. One of her sons with each man eventually became king of England. Despite her Norman roots, Emma primarily identified as English and showed preference during her life for the Danish marriage and son over the English. Her son, Edward the Confessor, who ruled England from 1042 until 1066, spent around twenty-five years living in exile in France, particularly Normandy. Upon unexpectedly becoming king he brought Norman advisers with him, a move that upset the existing nobles. Edward’s reign became something of a battle between the Normans and supporters of the Anglo-Saxon Godwin, who was Edward’s father-in-law and whose son Harold briefly succeeded Edward in 1066.

Edward’s long exile shaped his later reign as his policies of bringing in Normans while diplomatically attempting to continue the policies of his predecessors created a tinderbox. He died without an apparent and uncontested heir, leading to a clash between these two influences as Harold Godwinson and William of Normandy each fought for one side of Edward’s policies, and the Norman won out in the end. Edward had paved the way for this while never obviously aligning himself with the Norman side, preferring to keep England as it was during his reign. There was a gradual alignment with Normandy, but no genuine unification until 1066.
The Origins of Discontent: Pakistan, the Baghdad Pact, and the Foreign Policy of the Eisenhower Administration

David Levine

Mentor: Sonia Lee

Although past historians of the early relationship between the United States and Pakistan have advanced narratives of American false assumptions, wishful thinking, and misguided policies, their arguments have been based on a mistaken notion of American goals for the relationship and a use of sources which is far too narrow to accurately assess it. This study, which utilizes a broadened primary source base incorporating both South Asian and Middle Eastern sources, analyzed against recent scholarly breakthroughs on Eisenhower's foreign policy, argues that American policymakers wanted Pakistan to facilitate the creation of the Baghdad Pact, a collective security organization in the Middle East. For Eisenhower, the pact would serve as a tangible manifestation of the benefits of a pro-Western orientation and counter growing anti-colonial nationalist movements in the Middle East which the administration considered susceptible to communism. The leaders of Pakistan, the Eisenhower administration believed, could act as catalysts for the agreement, as their strong Islamic faith could persuade other Muslim leaders in the Arab Middle East to join. For reasons both historical and political, Pakistani leaders supported these American notions of Islam's role in the world.

While Pakistan did its part in promoting the burgeoning pact, the pact did not turn out the way policymakers had hoped. Soon after its creation, it became a tool of inter-Arab politics, rather than a base of pro-Western unity. Since American policymakers planned on substantially aiding Pakistan only after the pact’s creation—this timeline the result, among other reasons, of inter-departmental bickering within the Eisenhower administration—the State Department was largely able to back out of their oral commitments to Pakistan once the pact had failed. By late 1956, not only did Eisenhower regret the relationship, but so did the Pakistanis.
Although baseball was the most popular sport in the United States throughout the first half of the twentieth century, Major League Baseball did not arrive to California until the 1958 season. In addition to describing the circumstances leading up to—and resulting from—the Brooklyn Dodgers’ and New York Giants’ moves to Los Angeles and San Francisco, this thesis will investigate the history of California throughout the first half of the twentieth century to show how the growth of both California and baseball within the state were nearly directly correlated. Whereas Los Angeles and San Francisco were regional powers in the late nineteenth and early twentieth centuries (at which point baseball was confined to youth fields and unstable minor leagues), their rapid growth throughout the first half of the twentieth century, especially that of Los Angeles, resulted in a demand for major league-caliber baseball. After covering this background, this thesis will document the changes that came as a result of California’s entry to major league status. While the Giants’ and Dodgers’ departures from New York have been well documented (more so that of the Dodgers), there are fewer historical sources that describe the effects that baseball had on California, as well as a dearth of information about the rise and fall of the Pacific Coast League and organized baseball in California. While this thesis will touch upon effects on New York City’s baseball supporters, the wider focus will be on California and its new teams, focusing both on the cities’ past overtures to major league teams as well as what happened in the years immediately following 1958. Los Angeles Mayor Norris Poulson claimed that by the 1950s, Los Angeles was a major league city in everything except for baseball; this thesis will describe the events that led to Los Angeles’ and San Francisco’s “major league” statuses, using baseball as a concrete example to show how far the two cities came from their original roles in the United States in becoming the major international cities that they are now.
On May 22, 1856, South Carolina Representative Preston Brooks assaulted Massachusetts Senator Charles Sumner in response to a speech that Sumner delivered that not only insulted the South and slavery, but also slighted Brooks’ uncle, Senator Andrew Butler of South Carolina. Although the caning took place in Washington, far away from the conflicts of “Bleeding Kansas,” Northerners saw the two events as connected. In the aftermath of the caning, Southerners applauded Brooks for his actions to defend their honor against the defamation of an abolitionist. The caning provoked a response in the North that was unparalleled by any antebellum event up until that point. Northerners were angered by what they perceived as an attack upon their region. Anti-Southern rhetoric was widespread and abolitionist sentiment filled the air. The Sumner caning indeed was not any ordinary event because it inspired an “awakening” of democracy that had religious undertones that yielded to secular democratic nationalism. To explain this awakening, this study uses newspapers, letters written to Sumner, and the correspondence of notable abolitionists. Explaining the popular mobilization in the North in the aftermath of the caning is central to understanding assumptions about slavery, violence, sexuality, and ideas of republicanism that are not well understood. These themes are crucial to grasping the processes that led to the Civil War. This thesis argues that the first sectional tensions arose from the caning as a result of northern popular mobilization. The mobilization resulted from Sumner’s oration, which reached out to democratic ideals and transformed them into a new public communication that was accessible. Northerners were also transfixed on the violent nature of the attack, which made Sumner a martyr and a religious figure. The North’s democratic mobilization was the sign of war in practice, if not actually declared. It seemed that there was no turning back.
In our recent endeavor to fill the cavernous dearth of historical and anthropological scholarship pertaining to states subjugated by European imperialistic power, historians have given rise to a theoretical conception that seeks to both illustrate and elucidate the unique urban metamorphoses that accompanied colonial rule. Guided by the ostensible schisms that have historically divided both the colonial city and those dwelling within it, many have posited the theory of a “dual city,” one intensely stratified and, thus, transformed by the considerable divisive forces inherent to colonialism. While this model convincingly accommodates a number of colonial instances, some social historians and anthropologists have decried its failure to adequately explain the often-convoluted relationships and dynamics that can develop between the colonizer and the colonized. In order to consummate this discrepancy, this work will defend the colonial dual city model in its unique and specific applicability toward “settler-colonial” rule, that which presides over a significant metropolitan settler population in addition to a preexisting indigenous society. To this end, this work will comparatively analyze the evolution of colonial administration in Algeria, a definitively settler-colonial realm, and Egypt, which never incurred a significant metropolitan settler population. As this analysis will illustrate, the distinctive nature of colonial polity that resulted from the settler-colonial social dynamic played a definitive role in the formation of intense social and spatial stratifications upon the urban framework, substantiating the selective use of the dual city theory and, thereby, strengthening our understanding of the relationship between administrative polity and colonial urban and social development.
History

FROM SEED TO MIGHTY TREE:
SUSAN BLOW AND THE DEVELOPMENT OF THE
AMERICAN KINDERGARTEN

Madelyn J. Silber

Mentor: Margaret Garb

St. Louis is home to the first continuously running public kindergarten in the United States. In 1873, Susan Blow began teaching a small group of students at the Des Peres School using the methods of German educator Friedrich Froebel, “the father of the kindergarten.” Despite the rejection of Froebel’s ideas in Germany, Blow studied his pedagogy and implemented his curriculum into classrooms in America. Her first class was known as the kindergarten “experiment,” which would later become a standard in schools across the nation. Froebel’s kindergarten curriculum was unique because it was based on learning through play, an understanding of nature, and an appreciation for art. He believed childhood should be separated from adulthood and sought to create a learning environment that would interest and accommodate young people, asserting that children’s earliest experiences would shape their entire lives.

This thesis will explore the lives of both Froebel and Blow to better understand their motivations for creating and spreading the kindergarten movement. It will discuss how this movement brought women into the public sphere as educators, and how Blow worked to improve the reputation and competency of teachers through the rigorous training programs she created. It will look at the changing ideas about early childhood education since the seventeenth century, and argue that Blow’s kindergarten represented the culmination of centuries of theories about children. The curriculum she created allowed children, on a large scale, to benefit from the many theories about education developed by previous educators and scholars. The fate of the kindergarten movement came down to the experiment at the Des Peres School. Blow’s devotion to the project and careful implementation of Froebel’s curriculum made it possible for children across the country through age six to have a place to play, learn, and grow.
Malaria, “Development,” and Eradication Illusions: The WHO and the Global Battle Against Malaria in the Twentieth Century

Abby Sung

Mentor: Jean Allman

Malaria is probably the most notorious “tropical disease.” Given the global importance and prominence of malaria, this work interrogates twentieth-century efforts to eradicate it. Changes in medicine in the 1900s, experiments in the 1930s and 1940s, and World War II played important roles in replacing traditional malaria control methods with a new malariology based on insecticides and synthetic antimalarial drugs. Although the newly established World Health Organization (WHO) hoped to act in a political vacuum, the Cold War context encouraged the WHO to seek scientific solutions rather than incorporating medicine with social determinants of disease. The post-War period brought a wave of optimism for public health, and the WHO initiated a Global Malaria Eradication Programme from 1955 to 1969 under several assumptions: insecticide resistance jeopardized future attempts at eradication, sufficient resources could be mobilized, and “malaria blocks development.” As the campaign proceeded, the WHO’s Expert Committee on Malaria began to stress the need for health systems before eradication was attempted. In contrast to initial concepts that malaria had to be eliminated before development, it appeared that infrastructure had to exist prior to eradication. The idea that malaria control or eradication would be universally beneficial to local populations is one that has been widely accepted. However, the experiences of several malaria programs in Mexico, South Africa, and Liberia suggest that the relationship between malaria and development is far more complex. Malaria control is essentially linked to political interests and local patterns in ways that shape different malaria ecologies. This study traces the rise of global malaria eradication and argues against viewing the complex relationship between malaria and development as only “malaria blocks development.”
Anglo-Irish poet W.B. Yeats wrestled with the nature of symbolic representation—and its attendant problems—throughout his career. In this paper, I contend that we can largely understand the diverse stylistic shifts throughout Yeats’s corpus as attempts to negotiate the relation between the objective and the subjective as mediated by the symbol. Recent Yeats criticism has been concerned with the relation between the political and poetic in his verse. Gauging the extent to which Yeats was either a post-colonial revolutionary or an aristocratic conservative, this critical discourse often characterizes Yeats as either an “Irish” or “British” poet. In this paper, I examine Yeats’s symbolism at the fin de siècle in order to present a more nuanced picture of Yeats’s idiosyncratic cultural nationalist program by demonstrating both the mutually-supporting nature of the poetic and political and the significant influence of Decadent symbolisme on Yeats’s literary imagination.

My analysis proceeds through a chronological, literary-historical study focusing on 1895-1904. First, I demonstrate how Yeats unites the Intellectual Beauty of Shelley with Irish popular folklore through the symbol of the rose in order to support his cultural nationalist ideal of creating a national symbolic. I then demonstrate the pervasive influence of French Decadence in Yeats’s next volume, whose more arbitrary and suggestive language undermines his political ideal of a unified national symbolic. Finally, I argue that Yeats’s later adoption of an anti-symbolic poetry reflects his failure to articulate a unified and coherent theory of symbolism. This study contributes to a critical movement interested in understanding the relationship between Yeats’s political and literary imaginations. Equally, it justifies the critically neglected position that maintains the significant influence of French Decadence on Yeats’s poetic imagination at the fin de siècle and thus troubles the simplistic binary between “British” and “Irish” by triangulating Yeats’s poetic influence to France.
Causality As Explanation and Experience in Illness Memoirs

Gabrielle Surick

Mentor: Emma Kafalenos

Illnesses of all kinds are part of the many situations that both confine and give shape to the way human lives are lived and told, as well as being confined and shaped in their presentation by the spaces and times that came before. Narrative Based Medicine (NBM) is a newly founded discipline focusing on helping the medical profession understand the many ways patients interpret and experience their own illness. I chose to focus on illness memoirs written in the past 30 years, and determined three types of broad social-scientific causal explanations for how the illness occurred in order to classify the memoirs. The three types were: idiopathic, without any known and predetermined cause; genetic, with a known and predetermined cause; and accidents, with a known but not predictable cause. I use narrative theory, specifically Emma Kafalenos’ language of causal functions, in order to carefully draw out using close textual analysis how these broader causal concerns affect the structure of the narrative. Overall the idiopathic section showed a narrative structure focused on finding mental equilibrium, the genetic section had a complex structure where personal narratives were interrupted by broader historical narratives with a focus on family interactions, and the accident section has a structure that underplayed the illness moment and was weighted towards societal problems. The argument is not meant to be over-determined, but instead to provide a method for looking at the nuanced similarities that come from similar causal structures. Within each section I discussed two memoirs: The Diving Bell and the Butterfly and Autobiography of a Face in the idiopathic section; Eating Pomegranates: a Memoir of Mothers, Daughters, and the BRCA Gene and Mapping Fate: a Memoir of Family, Risk, and Genetic Research, in the genetic section; and A Leg to Stand On and My Body Politic, in the accident section.
Local Educational Development As a Method of Reducing Poverty and Social Exclusion in Ceará, Brazil

Tessa Baizer

Mentor: James Wertsch

Ceará, a state in the Brazilian Northeast, is known for its extreme levels of poverty and underdevelopment. Wealth disparities have led to high dropout rates and low employability among marginalized youth, which have in turn led to social exclusion and a greater proclivity for engagement in criminal behavior. In recent years, local governments have created numerous development projects in an attempt to diminish the saliency of risk factors and provide a proper education for disadvantaged youths. This paper looks closely at two such projects: a series of artistic mobile efforts in Aracati, Ceará, and a community center in Fortaleza, Ceará. The paper looks specifically at the currents and ideas that caused each to come about, as well as the major players involved in each decision making process. The main element that connects both projects is their heavy reliance on funding from foreign development organizations. Initially, this project was an attempt to find how using large amounts of money from outside institutions influenced the particulars of each project. Popular literature holds that partnering with such institutions is harmful, as they have an undue influence on the scope of individual projects. This becomes especially salient given that both projects discussed were unable to meet the goals that they intended to reach. Rather than place the blame on the institutions themselves, however, this paper argues that the organizations involved with these projects had minimal influence on each project. Instead, the onus for individual failures lies in problems with the way that each municipal government chose to create these projects, which did not properly address the needs of the population. This research is thus a rebuttal of the conventional research on development programs, and aims to discuss the ways in which the problems inherent to each project studied could possibly be mediated.
Through song, soap opera and sensationalist journalism, female, Mexican cartel bosses stamp themselves into the visual culture of Mexico. The internalization of this type of media within Mexican visual culture confirms machista stereotypes of women. This thesis studies how *narcorridos*, the telenovela *La Reina del Sur* and online newspapers present cartel women and influence visual culture. In sum, *narcorridos* highlight that feminine strength comes from beauty and sex rather than intellect. In *narcorridos*, women tend to gain power through the re-appropriation of male characteristics that make them symbolically inefficient as transformative cultural personas. *La Reina del Sur* offers opportunities to examine the use of the female body and persona in cartel-related visual culture and make judgments regarding national identity and gender. In essence, the show claims that powerful women are both dangerous and man-like; they are only salvageable through a return to their roles as mothers. Finally, written press perpetuates a certain imagination of these women and works on a critical level to shape national identity. Forging national identity around the convoluted imagination of a woman wrapped up in the drug trade offers a challenge for gender negotiation in Mexico as well as challenges for a future in which Mexican institutions must re-shape the imagination of popular audiences to support the state as a venue for female empowerment.
Online social networking has revolutionized the field of global communications. Millions of people are becoming increasingly connected with each other as the Internet penetrates our global culture and changes the dynamic of information sharing. In Latin America, where traditional news media hold disproportionate influence over political discourse, people are beginning to form online networks, as they engage in public dialogue and act collectively to influence public opinion. While substantial research exists on Internet usage statistics and blogging communities in Latin America, scholars have yet to determine the link between online communication and political activism among Latin American citizens. This research presents a comprehensive analysis focusing on two countries, Mexico and Brazil, and demonstrates how social media and Internet communications shape political discourse, foster governmental transparency, and encourage citizen participation in the political process. By tracking hundreds of political social media accounts, analyzing influential blogs, and examining the Mexican and Brazilian political climates, this paper investigates how digital networked communication can increase access to political information and improve the quality of democracy in Latin America.
The legal code of the Qing Dynasty is the last legal code of China’s imperial era. Known for its organized structure and complex intricacies, it contained over a thousand statutes developed over the course of more than three centuries. One significant area of the Qing legal code deals with rules that govern gender relations. In my thesis, I examine the role that shame plays in delineating the male and female identities in the Qing Dynasty. By looking at case records, official commentaries, and The Great Qing Code itself, I investigate the ways that shame manifests itself in the social and legal fabric of the time. Specifically, I argue that shame in Qing law is a three-fold concept: an internal notion relating to conscience, morality and guilt; an external notion relating to reputation and humiliation; and finally, as an instrument adopted by the penal system in order to reform and deter.

Internally, the concept of shame defines one’s moral standing. For women, the act of establishing one’s worth as an upright citizen often involved proving one’s proper sense of shame through the protection of her chastity. Thus, the concept of shame in the Qing courts occupied a highly internal realm, coinciding with one’s virtues. Externally, the notion of shame was a public one that correlated with one’s reputation. The defilement of one’s reputation was a publicly shaming issue, and I explore the way such concepts spurred the development of the “Cult of Chastity” and justified homicide in certain instances. Within the penal system, shame serves a dual purpose of both encouraging internal reform and acting as a public deterrent to crime. These three aspects of shame work together to define and shape the unique system of one of the most long-lived legal codes in the history of China.
Failing the Future: Discourses on Postwar Reconstruction and Society in Italian Neorealist Film

Sophia Cinel

Mentor: Jennifer Kapczynski

The post-war period in Italy was one marked by rapid political transformation, extreme economic hardship and a reworking of social structures that had been established during under the Fascist regime. One artistic phenomenon that emerged during this era of drastic national change was the Italian neorealist movement in film. These films were characterized by their innovative formal techniques, which lent them an air of gritty realism unprecedented in the international film industry. What interests me more than these formal elements, though, is the character relationships present in these films. In this thesis, I explore the role of the child in neorealist films in relation to that of the adult, as well as the portrayal of adult characters in and of themselves. To do so, I use the films of directors Vittorio De Sica, Roberto Rossellini and Luchino Visconti as examples. I begin by exploring the ways in which the child character subverts the adult and then is ultimately corrupted by the adult character, leading to the child’s own—sometimes fatal—downfall. My second chapter focuses solely on the figure of the adult, and how the adult characters interact—or fail to interact—with one another in the films. I explore two types of adult characters—the unappealing and the passive—and explore how each can be read as representative of Italians during the postwar period. Through the study of these relationships, I am able to discern two implications suggested by neorealist directors. Firstly, these directors were able to show that the way Italian society was executing its post-war recovery process was clearly not working. And secondly, they demonstrated to audience members the potentially grave consequences if post-war Italian society continued on this path.
Morales’ Bolivia: A New Paradigm in Egalitarian Governance?

Alieza Scurlock Durana

Mentor: Bret Gustafson

Through my research I sought to understand how issues of income inequality can be addressed through public policy and how these policies relate to models of political authority and the state. Over the last decade, many Latin American states have developed new strategies of governance, such as the developmentalist and social policy approaches, to address the issue of socioeconomic stratification. I am interested in Bolivia as a case study, given the policy changes that have occurred during the Morales administration. Since taking office in 2006, President Morales has enacted both universal and targeted social policies to address socioeconomic disparities in Bolivia, mainly through the nationalization of hydrocarbons and the allocation of the subsequent resource revenue to various social policies. This research examined the Juancito Pinto and Renta Dignidad cash transfer programs passed under the Movimiento al Socialismo-Instrumento Político por la Soberanía de los Pueblos (MAS-IPSP) administration to evaluate whether Morales’ policies are indicative of a larger paradigm shift in Latin American governance—a shift in how authority is claimed politically, how political authority legitimizes itself thereafter, and what poverty-reduction measures are both materially and politically feasible in the Bolivian institutional context.

Eventually, I determined that while the general material aspects of these two programs are insignificant, the nationalization of gas and oil has paved the way for public hydrocarbon taxes to fund social policy expansion. Furthermore, a significant shift in rhetoric of the role of the state and the notion of human rights has resulted from the funding shifts. In essence, President Morales has set an important precedent in terms of how pro-poor policies are articulated in Bolivia, and more largely in Latin America. Rather than continuing with the technocratic styling of his predecessors, Morales has assumed a hybrid form of moral and legal authority. Under his rights-based approach to governance, Bolivian citizens (or rights holders) are empowered to demand social and economic policy measures to ensure their own wellbeing.
“My Daughter Will Choose”:
Shifting Centres of Morality and Accessing Claims in Maasai Sexual Narratives

Alannah Glickman

Mentor: Shanti Parikh

The Maasai of East Africa are idealized in the West as an example of a “traditional” African ethnic group. In addition to their decorative dress and pastoralist production methods, the sexual practices of the Maasai are often viewed as “promiscuous,” “primitive,” and distinctly non-Western. The purpose of this study is to de-mystify Maasai sexual practices through the use of twenty sexual narratives of Maasai women. This study was conducted between April 8 and April 30, 2011, in Mto wa Mbu, Tanzania, and surrounding villages. Twenty females belonging to three different generations interviewed about their “lived” sexual experiences as well as the future of Maasai sexual traditions. Four main sexual practices were discussed: esoto, female circumcision, marriage, and sexual intercourse itself. I analyze the data using descriptive analysis. The women’s personal experiences and opinions about change demonstrate that sexual practices are indeed undergoing major changes. Esoto, a night ritual during which ndito (girls) and ilmurran (warriors) flirt, dance, and have sex, is going out of practice in the area. While female circumcision is still practiced, it is done so in private. In terms of marriage, the number of wives per man is decreasing and educated women now have the option of choosing their own husbands. Women are also becoming more active participants in sexual intercourse. The interviewees highlighted the following as causes for these changes: government influence, education, contact with outsiders, and religion. The majority of the women expressed positive feelings about the changes. Furthermore, the variation present among the narratives highlight the dichotomy between the historical “ideal” and lived experience. These gaps underscore the complexities of Maasai sexuality, challenging the Western notion of an “African sexuality.”
The relationship between the Roman Catholic Church in Cuba and the Castro-led Cuban government experienced a dramatic transformation in the 1990s. For the first time since the Cuban revolution, the government allowed the Catholic Church more freedom within the public sphere, and the Church in turn used its institutional abilities to achieve a greater degree of collaboration with the communist government than was previously thought possible. In the wake of these and far reaching changes in church-state relations, it is important to determine how these developments came about. In this thesis, I argue that the worldwide rise of liberation theology and the progressive church, the fall of the Soviet Union, and the perpetuation of an aggressive U.S. policy towards Cuba were all primary influential factors in allowing for the reforms and improved relationship of the 1990s between church and state in Cuba.

My analysis of the causes of reform in 1990s Cuba uses primary sources from the Castro government, the Cuban clergy, and the international Catholic community to map the changing ideological dynamics between the Church and government from the 1960s to the 1990s. I argue that liberation theology and the development of the progressive church served as a clear means of ideological reconciliation between the Cuban Catholic Church and communist government. I then turn to a historical analysis of the fall of the Soviet Union, arguing that it was a catalyst for societal change within Cuba. Finally, I explore the evolution of U.S. policy toward Cuba, investigating how the Catholic Church maintained its relevance within Cuba through its opposition to the embargo. This thesis allows for an analysis of the factors that led to the transformation in church-state dynamics within Cuba, as well as a better understanding of the current position of the Catholic Church within Cuban society.
Over the last 60 years, the number of Muslims living in the United Kingdom has increased nearly 300-fold. The majority of these Muslims come from the former Commonwealth countries of India, Pakistan and Bangladesh. Driven by widespread economic opportunity, immigration to the UK from the region surged in the aftermath of the Second World War. Family reunification, chain migration, and transnational marriage have continued this elevated level of immigration through the second-half of the twentieth century. As the number of South Asians living in the UK continued to increase, domestic concerns about identity, religion, and employment led the UK government to establish policies restricting further immigration. Through an examination of the language and content of immigration policy, court decisions, and statements made by government officials, this project explores the ways in which the UK used marriage-related immigration policy to specifically limit continued South Asian immigration. Throughout this period, the UK Home Office implemented policies targeting the Islamic practices of polygamous, telephonic, and proxy marriage, as well as the South Asian practice of arranged marriage. Because of marriage’s close relationship with culture, using marriage within immigration policy targets entire cultural groups, demonstrating the discriminatory nature of British immigration control. While previous scholars have addressed these policies in isolation, this project combines these policies into a single narrative of marriage-related immigration control during this period.
Negotiating Authenticity: Diasporic Traditions of Raas

Shweta Joshi

Mentor: Joan Brockmann

This thesis discusses Raas as a Gujarati diasporic tradition in the United States. The Gujarati diaspora defines Raas as a Hindu, Gujarati dance that involves short sticks termed dandia. Raas evolved from a communal tradition performed at celebrations and festivals by the Gujarati diaspora into a proscenium-viewed competition. Today there are more than 10 national competitions and 40 university-associated Raas teams in the United States, and the phenomenon is only growing. Collegiate Raas competitions have become a space for second-generation Gujarati-American students to display their unique interpretation of their hybrid culture, one that isn’t wholly Gujarati or American. However, the competitions have some tensions that are problematic for the dancers. The first-generation judges and the scoring guidelines ask for both tradition and innovation, two seemingly contradicting terms, in each dance. Through the use of videos, forums and official documents, this thesis argues that the Gujarati second-generation diaspora uses hybridity to their advantage in order to satisfy and reduce the conflict caused by the generational differences and scoring guidelines. The second-generation attempts to successfully balance tradition and innovation through their choreography, theme and music selection. Therefore, competitive collegiate Raas performances explicitly demand both first-generation customs and second-generation stylizations. The second-generation Gujarati choreographers use their own hybrid identity and knowledge they gained from the first-generation to produce performances that attempt an award-winning balance of tradition and innovation.
Indigenous peoples’ understanding of health and wellness often differs fundamentally from the western biomedical model. This project examines the Chilean intercultural health program, initiated in 2001. The program, known as Origins, marks an attempt both to foster cooperation between indigenous peoples and the state as well as to support the development of rural communities. I examine the relations of Mapuche healers and traditions with the national healthcare apparatus and biomedical professionals in order to assess Origins’ efficacy and satisfaction, from Mapuche patient as well as Chilean state perspectives. Intercultural health must be understood within the complexity of the opposing currents that shape it including market-driven policy history, the Mapuche struggle for autonomy, and formal rights like patent law or informed consent. Rather than solely addressing health disparities, health serves as a proxy for other Mapuche-state conflicts. As Chile and other countries move forward with intercultural projects, dialogue as well as interdisciplinary work will facilitate and strengthen initiatives.
“Vamo’ a Portarnos Mal”:
Imagining the Puerto Rican Nation
(and Beyond) from the Calle 13

Gabriel Magraner

Mentor: Joseph Schraibman

Calle 13, a controversial musical group from Puerto Rico that mixes rap with everything from bossa nova to cumbia, represents a useful subject for investigating how identity is negotiated within three overlapping and intersecting spaces: 1) the Puerto Rican island itself, 2) the colonial relationship between Puerto Rico and the United States, and 3) a larger Latin-American cultural discourse. While the group became popular during the reggaeton genre’s transition from *el underground* to the mainstream in the mid 2000s, Calle 13 also belongs to a broader, nascent genre of *música urbana* characterized by its generative hybridity. Through lyric analysis of the their discography from 2005 and 2010, this research highlights various strategies employed by Calle 13 in their social critique, such as how the group utilizes the language of performance to criticize class structures on the island and how the group culturally integrates the island into Latin America by invoking the space of the *barrio*, or slum, and ignoring the Puerto Rican diaspora in the continental United States. Despite professing a “subversive” message, the group’s music circulates within the market and supports dominant structures of power. This problematizes Calle 13’s attempts to destabilize notions of center and periphery by declaring that the spirit and value of Latin America resides in its marginalized subjects.
Chinese Migration to Latin America: A History of the Coolie Trade in Cuba, Peru and Panama, and Its Impact on Society

Lauren Olens

Mentor: Joseph Schraibman

This study synthesizes the history of the Chinese Coolie trade—also known as the shipment of indentured laborers—to Cuba, Peru and Panama in the nineteenth century. Scholarly articles and books are brought together, yielding a thorough analysis of this wave of Chinese immigration to Latin America. This essay first introduces the study of Chinese immigration in order to gain a basic understanding of this phenomenon. Then, the work expands on the Coolie trades and the impacts they had in each country. The study extensively compares the Coolie trades to the three host societies, which was not found in previous research. It finds that the Coolie trade to Cuba and Peru were very different from the trade to Panama due to the amount of Coolies, the labor they provided and the reasons they were needed. On the other hand, the Coolies’ voyage to the Americas, horrible conditions, and treatment in the three host societies were similar in all of the cases studied.
With the onset of modernization processes in Latin America, capitalism has become the hegemonic system within most of the region’s urban cities. This trend has been accompanied by a significant shift in urban cultures as societies adopt ideologies that stress individual gain above communal bonds or welfare. Within this changing urban context, we have the mutual assistance housing cooperatives, where membership within these communities entails a collaborative effort. This housing model is an intriguing example of a system that provides alternatives to Western notions of homeownership for working-class people, turning the tables on capitalist-inspired ideals of privatization and individualism in favor of solidarity and collective action instead. Though the cooperative system has survived and thrived for the past forty years, today it faces challenges associated with the cultural changes that have accompanied the modernization of urban cities in Latin America. The ideologies of political resistance, solidarity, and cooperation that resonated so strongly with Uruguayans during the labor union movements of the ‘60s and ‘70s, and then later during the military dictatorship in the ‘80s, have shifted and changed. Today’s urban cultures increasingly adhere to capitalist consumerism, which poses a serious challenge to the sustainability of the more traditional ideological narrative of Uruguay’s mutual assistance housing cooperatives. Nevertheless, as the ethnographic research in this paper will show, the problem of housing continues to exist for many working and lower-middle class people who do not have the economic resources to enter into the private housing market. Given this reality, people continue to acknowledge, accept, and appreciate the alternative the cooperative system provides for them.
This work attempts to identify the foundations of the roles religion plays in informing and legitimizing activism, concentrating on women’s rights movements in Morocco. Specific focus is given to how Islam and feminism have shaped one another and the forms humanitarian organizations have taken in view of those streams of doctrine. In doing so, I seek to clarify the genesis of the divergent narratives and justifications currently in use for women’s rights agendas across political and sector divides. This thesis contextualizes two prominent movements within Morocco’s “women’s rights landscape” that work to enable increased legal rights and services. Through them I will question and reject the traditional/progressive, secular/leftist v. conservative/Islamist paradigm, and hypothesize the existence of a historical foundation for current activist movements that push forward an international human rights agenda through utilizing Qur’anic principles. More broadly, I will question how gender equality can be articulated and reached within a legal system whose jurisprudential point of reference is fundamentally based on religion.
As the world economy expands, the impacts of the process of globalization are becoming increasingly visible in communities that are not often associated with globalization or were once thought to have been immune from its consequences. This is especially true in communities in the United States. The recent initiative led by businessmen and political leaders in St. Louis, Missouri, to create an international freight-forwarding hub at the city’s airport has brought the process of globalization into focus and into the public dialogue of development strategies in a major American urban center. This study utilizes geographic, ethnographic, and sociological methods to examine the intersection of the process of globalization with small-scale, grass roots development efforts in St. Louis. The study reveals how the process of insertion into a global commodity chain is constructed as a development strategy and how the process of insertion contributes to income polarization associated with globalization. Most significantly this study contributes to the understanding globalization by filling a gap in academic literature with a detailed examination of the creation the negative externalities of development strategies called “roads not taken” during the process of globalization.
The Intersection of Sexual Relationships and Sexual Rights: Comparing South Africa and Uganda

Clare Schroder

Mentor: Shanti Parikh

This work addresses the adoption of sexual rights by women in Uganda and South Africa. I perform a historical investigation into sexuality and the role of women in controlling their own sexuality, revealing major differentiations upon British involvement. Women lose control of their bodies, while men and states gain more power. Many of these changes are economically based, but Christianity also plays a major role in creating an immorality around sexual liaisons. I also analyze material gathered from interviews with youth in South Africa and Uganda about their perceptions on sexual relationships today. Themes of gendered economic inequity, sexual prowess, material gains, and threatened masculinities become apparent when discussing monogamy, multiple concurrent partners, cross-generational relationships, and transactional relationships. The nuances between South Africa and Uganda reveal a more individualized, regular, and poorly ascertained rights discourse in South Africa juxtaposed by a collective movement invoking sexual rights at opportune moments to challenge cultural norms. Ultimately this work indicates that before sexual rights are employed a strong consideration of the particular context and the viability of rights discourses in that environment should be assessed. This has implications for public health campaigns that call upon the use of sexual rights in HIV and AIDS prevention campaigns without first considering the context in which those rights will be named.
Female genital mutilation (FGM), often known as excision, has recently become a prominent issue in France. Immigrants from West Africa have brought the practice from their countries of origin, or return home with their daughters to have it performed. Reports vary, but it is estimated that between 13,000 and 27,000 girls and women have been exposed to some type of FGM. The extent of women affected is significant, but gains greater importance in the wider context of immigration in France. France has taken an unusually strong response to ending FGM. Proponents of stronger FGM regulations typically use rhetoric that mirrors the rhetoric of proponents of banning the hijab. Thus, FGM has become part of the French pushback against its Muslim immigrant population, a movement that includes the recent hijab and burqa bans.

My research looks at feminist stakeholders’ response to FGM, through advocacy and legislation. Much of this work is done by mainstream NGOs and the French state; in other words, by women who are frequently white, middle-aged, and French natives. These women make decisions for young, dark-skinned women who are the children of immigrants or immigrants themselves. Because of this disparity, I question the role of women-of-color feminism in France, particularly in a feminist movement that can appear extremely homogenous.
Kenya’s squatter problem was a colonial construction that developed as the first British settlers arrived at the start of the twentieth century. “Squatters” were individuals living and cultivating illegally on land to which they had no official titles of ownership. Population growth, diminishing arable lands, and the imposition of increasingly oppressive colonial legislation led to growing anxieties among both squatters and settlers throughout the first half of the century. When Kenya became independent on December 12, 1963, the national government inherited the social, economic, and political burden of landlessness. By 1965, there were 75,000 squatter families in Kenya, approximately half a million individuals, who had no claim to land. In response, the government appointed Zachariah Shimechero as the Special Commissioner for Squatters, who tried to prioritize Kenya’s development efforts to target poverty alleviation among the landless. However, President Jomo Kenyatta focused instead on increasing economic development, believing that the country’s overall growth would relieve poverty and also secure his own political power and authority. Kenyatta believed that large-scale agricultural development schemes, supported through foreign aid and investment, would produce domestic economic growth and provide spillover benefits to the greater population. Instead, the benefits were largest for the elite and negligible for the poor. Foreign aid was not a cure-all answer to poverty. In fact, there was no singular antidote for poverty in Kenya. This thesis shows that there is a fundamental difference between poverty alleviation and economic growth. Kenya’s development experience in the 1960s demonstrates a basic unwillingness of those in power to privilege the needs of the poor landless squatters. Yet, a commitment to provide sustainable relief to the world’s marginalized, disenfranchised, and peripheral communities must first start by understanding and prioritizing their actual needs for any hope of a sustainable future.
The Chinese Community in Chile

Yichen Wang

Mentor: Yuko Miki

The often overlooked Chinese community has settled in Chile for more than a century and plays a major role in Chilean life as China has become the top trading partner of Chile. Why are Chinese people migrating to Chile? How are they perceived by Chileans as their influence grows? What is it like being perceived ethnically/racially as Chinese/Asian in Chile? Will Chinese people have a more profound impact on Chilean society beyond its commercial role? Through interviews, government documents, and secondary sources, my research helps to understand what is it like being Chinese in Chile. I interviewed 10 members of the Chinese community in Chile. They are from diverse backgrounds that cover age, gender, class, and occupational differences. According to my findings, while many Chinese people in Chile are becoming more confident about their prospects and opportunities as their influence grows, they adopt a passive approach to engaging with Chilean society about issues concerning their existence in Chile, as the Chinese community is still perceived negatively by the host society. The claim “there is no racism in Chile” that many members of the Chinese community makes is more likely a result of avoiding conflict than active negotiation of their identity with Chilean society. The small but vibrant community has benefited from the increasing globalization of markets in the past 30 years and represents a part of the larger trend of Chinese migration to marginalized parts of the world in order to expand the market for Chinese goods. Therefore, the Chilean example will be useful for other researchers who are interested in contemporary Chinese migration.
Weaving a National Narrative:
The AKP Project in Turkey

Rachel E. Zemke

Mentor: James Wertsch

This project looks at the national narrative the Justice and Development Party (Adalet ve Kalkınma Partisi, or AKP) is constructing and transmitting to the public in Turkey. The AKP is marked by its great electoral success and by being one of the first political parties to succeed as an Islam-inspired party in the rigidly secular Turkish political establishment. Using narrativity theory and works by Ernest Renan and Benedict Anderson on the creation of a nation, I seek to understand how the AKP views itself, and what its understanding of a future and successful Turkey looks like.

The paper explores the history of Ottomanism, the Turkish nationalist project, and more recent Turkish Islamist parties, in order to clearly illustrate the interconnected roles of religion and nationalism in the history of the Turkish Republic. This, along with a discussion of economic shifts in Turkey and subsequent re-definitions of political legitimacy, clarifies extant narratives, which the AKP is now modifying, resurrecting and recycling. Drawing from general election campaign ads that ran in newspapers and as billboards during the spring of 2011, I examine the AKP’s goals, self-understanding and its view of the ideal, and future, Turkish state to delineate the AKP’s national narrative.

As the AKP continues to win elections, I argue that the party adheres to a vision of Turkey that accepts a larger swath of Turkish society than any other political narrative in Turkey's history: the party has been successful in creating a narrative of national democratic practice that is flexible enough to include secularism and Islamic practice. This common goal makes it possible for individuals anywhere on the spectrum of religious to secular to identify with and support the AKP narrative.
On May 14, 2011, the State of Israel celebrated 63 years of existence. Rewind 25 years back to June 1982, when the First Lebanon War resulted in one of the most devastating military experiences for Israel at that point. After a dangerous military operation and a tremendous amount of casualties, the country began to seek something different. Entering 35 years of existence, Israel was no stranger to death, loss and tragedy. Up until this point, opposition to the war had not been expressed in a significantly public manner. However, 1982 seemed to be the year that something was awakened in the Israelis’ souls as they began to voice their distress and concern with the war at hand. The body of literature about the First Lebanon War is full of prose, poetry, and visual representations of people’s experiences and reactions. Among all of the different pieces, some commonalities emerge. There are four main areas that I have found to be representative of the many different works surveyed for this analysis of this tumultuous time in Israel’s history: the life of a soldier, the prominence of youth and the significance of age, gender and the emergence of women’s voices as crucial ones, and retrospective recollections and collective memory. During the Lebanon War in 1982, the Israeli people found their voice. We begin to hear opposition to the war, something that today seems commonplace. We see the emergence of women as a vital part of Israeli society. We see the ways in which the war continues to impact people’s lives far beyond the year in which it took place. We see just how intertwined the culture of war has become with Israeli culture. The First Lebanon War is not a proud moment for Israel militarily. Yet by looking at the literature from the time period of and relating to the Lebanon War in 1982, we see just how important of an era this is for Israel culturally.
This paper examines the ways in which Jewish women in the modern world reconcile their identities as feminists and as Jews. The feminist movement of the 1960s changed the structure of American society, and Jewish communities were in no way immune from feminism’s demands. Given the social and historical milieu in which Judaism developed, traditional Judaism was a patriarchal system, thus bringing feminism and Judaism into conflict. Jewish women were therefore compelled to re-evaluate their religious roles and identities and to find ways to reconcile their identities as feminists and as Jews. Because of the centrality of time and place to Jewish identity, in the process, they also reshaped the relationship between Jewish women and sacred time and space. This reconciliation was achieved primarily in two ways: through the modern revival and reclamation of traditional women’s spaces in Judaism, and through the creation of new spaces for women in Judaism. In the first chapter of my paper, I discuss Jewish women’s assertion of themselves into the sphere of time, primarily through the reclamation and transvaluation of traditional women’s practices that are linked to the passage of time. In the second, I discuss the creation of new spaces for women within Judaism through the broadening of Jewish practice to welcome women into the ritual and legal spheres. I found that many women both of these types of Jewish feminism have been essential to modern women’s understanding of their roles and identities. Likewise, these techniques allow for a more cohesive and relatable feminist Judaism than simple ritual egalitarianism does alone.
Applications of Linear Mixed Effect Models: An Analysis of Missouri School Data

Daniel Kowal

Mentor: Jimin Ding

In this report, we analyze standardized mathematics exam scores from a Missouri school district. Using linear mixed effect modeling, we model student exam scores as repeated measurements in order to investigate the influencing factors on student performance. After considering several mixed effect models and comparing them using information criteria (AIC and BIC) and likelihood ratio tests, we settle on two models for the data: (i) a random intercept model that assumes constant variance across exams and equal correlation between exams, and (ii) an extension of this model that allows the variance of exam scores for low-income students to vary across exams. By analyzing fixed effect parameter estimates and random intercept predictions, we find significant stratification within ethnicity and economic status. We further investigate the presence of monotone trends of exam scores in order to identify groups of students whose performance significantly improved or declined relative to the national student population. By combining these results, we can identify student features that predict either strong or weak performance on the standardized mathematics exams.
In this paper, we look at cognitive data collected over thirteen years from patients at risk for Alzheimer’s Disease (AD). The goal is to evaluate the power of the questionnaire to predict the onset of AD. Answers to a set of 268 survey questions, such as “Who is the president right now?” and “Here is a string of numbers; can you tell them to me backwards?” are collected at each clinic visit. These answers are combined algorithmically to produce a score assessment of global cognitive ability. We first propose a functional Pearson correlation coefficient, taking into account longitudinal dependence within a patient. We then look at the correlations between the question responses at a time, $t$, and the global cognitive scores at a future time, $t+n$, for various values of $n$. Selecting a subset of the 268 questions by inspecting these correlations, we examine the subject, question, and demographic effects estimated by a logistic item response model on the subjects answers. We also look at how those effects can model global cognitive ability. Finally, we propose a multi-state survival model that we can fit when survival data from the study becomes available.
The prime number theorem (PNT) was first conjectured by Gauss and was finally proved in 1896. This theorem states that for large number $x$, the number of primes less than or equal to $x$ is approximately equal to $x / \log(x)$. That is, if $\pi(x)$ is the function that counts all the primes less than or equal to $x$, then the limit of the ratio $\pi(x) / (x / \log x)$ is 1 as $x$ goes to infinity. The theorem relates two seemingly unrelated functions $\pi(x)$ and $\log x$ in a remarkably simple way. The first proof of 1896 uses analytic function theory and an elementary proof was considered to be inaccessible until it was finally found in 1948 and 1949 by Atle Selberg and Paul Erdős. This elementary proof entirely avoids the use of analytic function theory and provides more fundamental view on the problem. This paper presents the elementary proof of the prime number theorem as it was originally done by Selberg who was then awarded the Fields Medal in 1950. The three fundamental asymptotic formulas in Selberg’s paper are thoroughly proved in this paper. The final step of the proof uses mathematical induction to construct an important sequence which ties all the complexities down to a beautiful theorem.
“I Propose Poverty in Theatre”:
The Role of Poverty in Jerzy Grotowski’s Theatre Laboratory

Anna Constantino

Mentor: Annamaria Pileggi

Jerzy Grotowski, the Polish director, visionary, and founder of the famous Theatre Laboratory in the 1960s, has been revered for his theory of physical action, as well as his troupe’s convention-breaking and highly sought-after performances. Despite the fact that Grotowski dubbed his theater the “Poor Theatre,” few critics have engaged the question of what, exactly, Grotowski meant by ‘poverty’ in his Theatre Laboratory. Drawing heavily from his texts and interviews compiled in his book, Towards a Poor Theatre, and focusing purely on the trajectory of the Theatre Laboratory, I argue that while Grotowski first capitalized on poverty as a reference to the absence of material theatrical elements (lights, props, makeup, etc.), his writings contextualize poverty within elaborate frameworks of spirituality and myth or taboo—thus forming his definition of poverty within his method. After examining responses to Grotowski’s poverty in theater through criticism of his celebrated production of Akropolis, I conclude that Grotowski’s poverty ultimately causes a rift between the actor and spectator in such a way that vaults the actors into a heightened status over the spectators; this heightened status is a result of a romanticized notion of poverty, constructed through specific referents tied to spirituality and myth or taboo.
“When wilt thou save the people?” ask the disciples in the musical *Godspell*. But what is the purpose of religion in a musical such as *Godspell*—is it to “save the people”? Three musicals about religion and religious belief—*Jesus Christ Superstar*, *Godspell*, and *The Book of Mormon*—reveal a great deal about musical theatre’s attitudes towards religion. All three musicals approach a subject that is not often portrayed in musical theatre. Although their topics appear similar, *Jesus Christ Superstar*, *Godspell*, and *The Book of Mormon* differ in how groundbreaking they were and are.

Both *Godspell* and *Jesus Christ Superstar* are focused on the character of Jesus as a person. Throughout the musicals, he is portrayed as a man, whether through his interiority or through the ways in which he interacts with his followers. The Jesus of these musicals is not the infallible son of God audiences would have been accustomed to at the time, and his portrayal was certainly groundbreaking, unexpected, and even controversial.

*The Book of Mormon*, on the other hand, while it bills itself as subversive and offensively funny, is actually less groundbreaking than either *Jesus Christ Superstar* or *Godspell*, both in its approach to religion and in its construction as a musical. The *Book of Mormon* certainly makes fun of religion and the Mormon faith specifically through its depiction of the tenets of Mormonism. In the end, however, even though Mormonism is made to look ridiculous, religious belief is upheld as helpful and a powerful force for good in the world. In this way *The Book of Mormon* is in fact not very groundbreaking at all—less groundbreaking, indeed, than the religious musicals of 40 years earlier, *Jesus Christ Superstar* and *Godspell*. 
Bertolt Brecht (1898–1956) and Augusto Boal (1931–2009) were both theatre practitioners who used their craft to teach the oppressed how to understand and engage with the oppressive agents in their respective societies. Brecht and Boal had similar ideas for how to attain this goal through the theatre. They wanted to teach audience members to view the play with a critical eye, free from the constraints of societal conditioning, and react accordingly. This lesson would ideally result in the spectator applying this skill and dealing with the injustice in his own life. Brecht and Boal worked towards their goals by redefining and manipulating traditional constructs of the theatre, especially the way in which the play interacts with the audience and the audience’s degree of autonomy to think and act during the production.

In this thesis, I argue that although Brecht and Boal focus on manipulations of the theatre that can be justified rationally, emotional manipulations also play a vital role in leading the audience to consider the need for social change.

My analysis of Brecht’s and Boal’s techniques begins with a discussion of their theatrical theories, and how these theories were manifested (or not) in their methodologies. Finally, I analyze how these methodologies worked not only on a logical level but also on an emotional level, and how these emotional aspects were necessarily a valuable part of Brecht’s and Boal’s self-described goals in the theatre. Although Brecht and Boal were highly critical of Aristotelian tragedy, I discuss how the Aristotelian tools of empathy and catharsis played valuable roles in Brecht’s and Boal’s respective theatre techniques. In essence, this thesis is an effort to study an aspect of applied arts—in this case, how the theatre can be used to achieve social goals.
A Place to Call Home: 
The Inescapability of House and Home 
in American Family Drama

Amanda Spector

Mentor: Henry Schvey

Though a distinction between the terms “house” and “home” is often disregarded, the two terms are hardly synonymous. The house is a physical structure whereas the home creates a collective sense of belonging that dictates identity. Defining home becomes a conduit through which we can define ourselves. Applying such an understanding of home becomes particularly useful in terms of identifying American cultural trends. Art offers a lens through which the American identity can be examined and the fatalistic ideas of home can be applied. This research examines the home in three canonical American plays: Long Day’s Journey into Night by Eugene O’Neill, Curse of the Starving Class by Sam Shepard, and August: Osage County by Tracy Letts. The similarities among all three texts reinforce the defining aspects of the American home and the perception of the self, and especially the woman, in American society. Their differences, however, provide insight into the evolving nature of the American home. Moving through the plays chronologically offers an examination of how the shifting nature of the home impacts our understanding of family and belonging from 1940 to the present. The generally accepted nature of the American home in all these texts reveals something quite frightening—that there is no escape for any of us, no matter the decade or the circumstances. In each case, home represents a kind of prison for the family.
In this work, I grapple with two issues concerning the interpretation of Friedrich Nietzsche's writings: first, the problem of valuing in the face of Nietzsche's strict anti-realism; and second, the question of whether it makes sense to talk about Nietzsche's work as extolling an ethics of self-creation commensurate with how he has been frequently interpreted—which is to say, that rational introspection is a viable method for promoting a project of self-overcoming.

Concerning the first question, I argue that Nietzsche is not to be read as a fictionalist. Rather, I suggest that Nietzsche employed a sense of aesthetic value alone when he agitated for the cultivation of human excellence—an interpretation that better makes sense of Nietzsche’s thoroughgoing anti-realism concerning value and his cryptic call to “become who we are.”

As for the second question, I argue for the common understanding of Nietzsche’s ethics of self-creation and against reading him as a fatalist. A fatalist interpretation of Nietzsche’s works, I propose, fails to make sense of his protestations that existence not be divested of its “rich ambiguity” nor reduced to an act of mechanical calculation devoid of multiplicity in meaning. Reading Nietzsche as a proponent of true self-creation acknowledges the thick illusion of separation between agent and action he was keen to expose, yet is not shackled to the false cosmology of the eternal recurrence or to the wholly predictable (un-ambiguous) results of a fatalist scheme.
The Autonomy of Life: Defending the Historical Validity of 19th-century Vitalistic Thought

Ajay Sundar

Mentor: Dennis Des Chene

In this paper, I challenge several critiques of vitalistic thought: that it lacks empirical substantiation, is unfalsifiable, and makes reference to otherworldly entities. Drawing upon the work of Hans Driesch, I present a vitalist theory that fulfills all three of these criteria. Furthermore, I explicate a classification of vitalistic thought in the 19th century. I show that vitalism not only resisted the critiques, but also positively influenced the development of scientific thought. Along the way, I contrast vitalistic thought with the mechanism that opposed it, and contend that mechanism had several flaws. In addition, I argue that vitalistic thought, in challenging these flaws, pushed mechanism to develop progressively. Ultimately, I reject the criticisms of vitalism, and advocate including vitalism in the historical understanding of scientific development.
David Armstrong’s combinatorial theory of modality promises a reduction of modality at a very reasonable ontological cost. The goal of this paper is to meet three challenges that his theory faces. First, it fails to meet our intuitions about modality. Specifically, it does not allow the possibility of universals not instantiated in our world and it does not respect the S5 axiom. Second, it requires adherence to the independence thesis which says that whether a particular instantiates a universal is independent of whether it instantiates any other universal, and Armstrong’s argument for the thesis is questionable. Third, Armstrong’s theory seems unduly optimistic about reduction of properties to simple ones. I look at these problems in turn and try to adapt the theory to solve them.
Interactions Between Emotion and Semantics in Linguistic Processing

Emily Carras Cokorinos

Mentor: David Balota

The present thesis aims to examine the ways in which emotion and mood state interact during linguistic processing, specifically, to tease apart some of the corresponding cognitive and neural processes. The research explores differences in the semantic processing of highly emotional stimuli when participants are in either positive or negative moods. Both emotional and sentence-level semantic contexts are known to affect the ease with which individuals are able to process language, but when considered together it is unknown which context will dominate: the congruency of the participant’s mood state with the valence of the sentence-final word or the congruency of the sentence’s local context with the sentence-final word. Before sentence presentation, participants were presented with either positively or negatively valenced International Affective Picture System images to induce global mood state. Participants were then presented with emotional sentences, which were either positively or negatively valenced and ended with either semantically congruent or incongruent final words. Sentences were tested in an ERP paradigm focusing on the N400 component, and later in a speeded naming time task. Plausibility ratings for each sentence were collected to characterize the stimuli. Main effects of emotional congruence and sentence-level semantic congruence were found. However, overall, sentence context effects were much stronger than emotional context effects. Positive mood participants showed an effect of sentential congruency only for the mood incongruent items. Discussion focuses on the combined influence of global mood and local sentence context.
Dualism is no longer a prevalent view in philosophy or the cognitive sciences, but its foundation in introspection and intuition remains hazardous to an empirically-informed account of human agency. Countering the Cartesian paradigm and the consistently misleading influence of folk psychology requires adopting a naturalistic framework for understanding the mind, as Daniel Dennett has outlined and others have supported with empirical work on consciousness. With this framework in place, it is evident that many conclusions made in the psychological literature on decision-making, rationality, control, and volition—primarily those about the power of the unconscious and the corresponding impotency of consciousness or the conscious self—are partially misguided and indicative of a Cartesian worldview. I focus on four researchers in particular (Ap Dijksterhuis, Daniel Kahneman, John Bargh, and Daniel Wegner) to demonstrate the ways folk psychological distinctions tend to get hastily imported into a scientific context and used inappropriately, leading to similar assertions about our impoverished agency. Seen from a naturalistic perspective in which our agency is de-centralized and distributed throughout the organism, these claims reveal a failure to fully eradicate the old paradigm and embrace the complexity of the processes that enable the counterintuitive but robust agency we actually have.
Tourette syndrome (TS) is a developmental neuropsychiatric disorder characterized by chronic motor and vocal tics. Disturbances in cortico- striato-thalamo-cortical (CSTC) circuitry have been implicated in the pathogenesis of TS. Subcortical structures involved in this circuitry have been examined for TS-related volumetric abnormalities in adults and children with TS, with and without comorbid diagnoses and on and off of medications used to treat the disorder. Prior results do not appear to converge on a set of structural abnormalities characteristic of TS, though reductions in the volume of the caudate nucleus have been identified in multiple studies. In the present study, subcortical volumes were obtained from high resolution MRI scans from 29 participants with TS and 29 age-matched control participants. Comparisons between these two participant groups revealed a significant decrease in the volume of the left hippocampus, and marginally significant reductions in the volume of the left putamen and left nucleus accumbens. Within the TS group, individuals with more severe symptoms had smaller bilateral hippocampus volumes, and the participants with comorbid psychiatric diagnoses had a reduction in the volume of the right globus pallidus. Caudate volumes did not differ between groups, however the participants with TS who were taking medications had smaller left caudate volumes. In addition, increased tic severity was associated with an increase in the volume of the caudate nucleus. The caudate findings indicate that medication could be mitigating tic severity via the caudate nucleus. The findings in the hippocampus indicate that the limbic portions of the CSTC circuitry are likely involved in TS.
Influences of Prime Type and Age on Tip-of-the-Tongue Phenomenon

Julia M. Habbert

Mentor: David Balota

Previous research has yet to come to a consensus on what causes tip-of-the-tongue (TOT) experiences, how age affects TOTs, and whether or not various types of related words increase or decrease the quantity/duration of TOTs a person experiences. The present study seeks to explore these issues by introducing novel manipulations into the experimental design. In a series of three experiments, we presented participants with definitions or descriptions of low-frequency words, and participants attempted to retrieve the target words. In Experiment 1, younger adults were primed with a sub-threshold prime (48 milliseconds) and showed facilitation of related words in subjectively reporting whether or not they knew the answer, with the phonological prime producing the best performance on response accuracy. Experiment 2 confirmed that the prime effects in Experiment 1 were unlikely due to conscious processing, as most participants in this experiment were unable to consistently report the prime even when told about it and asked to report it. Experiment 3 investigated the effect of a conscious prime (300 milliseconds) on younger and older adults and found that younger adults showed even more effects of prime type, both objectively and subjectively, with a conscious prime than they did with a subconscious prime. Phonological primes still produced the most facilitation across measures. Older adults performed largely the same as younger adults, though they showed additional facilitation of phonological primes in that they elicited the fewest TOTs.
Social Anxiety on Facebook
Bethany McCord

Mentors: Brett Hyde and Thomas L. Rodebaugh

Previous studies of socially anxious individuals’ Facebook use indicate that people with high social anxiety have much to gain (e.g., bridging social capital) and lose (e.g., other users may be able to detect the individual’s social anxiety from his or her profile) from Facebook use. However, little is known about how people with high social anxiety actually use Facebook.

Two hypotheses were tested in this study. The poor get poorer hypothesis predicts that users with high social anxiety will interact on Facebook less than other users, presumably because social interaction is anxiety-provoking. The second hypothesis predicts that Facebook users with high social anxiety will report feeling symptoms of social anxiety while interacting with others on the site.

Participants (n = 216) completed an online survey consisting of the shortened versions of the Social Interaction Anxiety Scale (SIAS-6) and Social Phobia Scale (SPS-6), a questionnaire assessing how frequently individuals use the interactive features of Facebook (FBQ; e.g., writing a post), and a measure of social anxiety experienced while using those features, the Facebook-SIAS.

No significant correlation between the SIAS-6 and SPS-6 and the FBQ was supported (r = 0.05, p = 0.23). A correlation was found between the SIAS-6 and SPS-6 and the F-SIAS (r = 0.66, p < .001). These findings indicate that even though socially anxious individuals do experience anxiety while interacting with others on Facebook, they still interact on the site just as much as other users. This may simply reflect the difference in degree of symptoms experienced in each situation. A second possibility is that the extra time and space involved in Facebook interactions allow socially anxious users to employ coping strategies that they are not used in face-to-face interactions.
A Review of the Potential Influence of Neuroinflammatory Processes on Changes in BOLD Signal in the Early Pathology of Alzheimer’s Disease

Bryan R. Shalloway

Mentor: Denise Head

The emergence of noninvasive neuroimaging methods such as functional Magnetic Resonance Imaging (fMRI) has aided researchers in characterizing neuropathology at clinical and pre-clinical stages of disease. The change in the blood oxygen level dependent (BOLD) signal used in fMRI methods emerges as a result of the complex interactions of the neurovascular unit and is thought to most closely correspond with synaptic activity. Measurements of BOLD fMRI during memory tasks show that prior to the onset of Alzheimer’s Disease (AD) there is an increase in signal in regions that will later atrophy. Neurovascular changes in abnormal populations complicate interpretations of BOLD fMRI. Alzheimer’s disease, along with various other neurodegenerative diseases, is accompanied by chronic inflammation in the brain. Inflammatory processes cause significant modulations in the neurovascular unit and may alter the relationship between neural and cognitive activity, and the BOLD signal. Inflammatory processes are also shown to contribute to synaptic hyperactivity and may cause some of the synaptic changes seen in early AD pathology. The following work reviews the physiological origins of the BOLD signal and the current explanations for BOLD signal changes in AD pathology. The thesis closes by discussing the possibility that increases in BOLD activity in early AD pathology may be influenced by neuroinflammatory processes.
This paper examines the complex trajectories of a classical particle in the potential $V(x) = -\cos(x)$. Almost all trajectories describe a particle that hops from one well to another in an erratic fashion. However, it is shown analytically that there are two special classes of trajectories $x(t)$ determined only on the energy of the particle and not by the initial position of the particle. This first class consists of periodic trajectories; that is, trajectories that return to their initial position $x(0)$ after some real time $T$. The second class consists of trajectories for which there exists a real time $T$ such that $x(t + T) = x(t) \pm 2\pi$. These two classes of classical trajectories are analogous to valence and conduction bands in quantum mechanics, where the quantum particle either remains localized or else tunnels resonantly (conducts) through the crystal. These two special types of trajectories are associated with sets of energies of measure 0. For other energies, it is shown that for long times the average velocity of the particle becomes a fractal-like function of energy.
Fabrication and Characterization of a Whispering Gallery Mode Microtoroid Add-Drop Filter

Jacob Friedlein

Mentor: Lan Yang

In this report we will detail the fabrication and performance of an on-chip add-drop filter constructed of a high quality factor (high-Q) whispering gallery mode microresonator. We report an overall Q-factor of 4.5x10^6 for the filter and a drop efficiency of 55.4%.
α-decay of Excited States in $^{12}$C
Juan Manfredi

Mentor: Lee Sobotka

High-resolution triple-alpha coincidence data were used to reconstruct the decay of the excited states in $^{12}$C at 7.65 MeV ($J\pi = 0^+$) and 9.64 MeV ($J\pi = 3^-$). These data are consistent with the α-particle decay of both levels proceeding exclusively through $^8$Be$_{gs}$. In the first of these cases, the Hoyle state, upper limits of 0.45% and 3.9% (at the 99.75% confidence level) are set for an equal-energy alpha particle decay process and a process uniformly spanning three-body phase space (respectively).
LIMITS ON ULTRA-HIGH ENERGY COSMIC RAY POINT SOURCE FLUX

Nicholas Orlofsky

Mentor: Francesc Ferrer

One hundred years after the discovery of cosmic rays, much remains uncertain about their origin and composition across the energy spectrum. Ultra-high energy cosmic rays (UHECR), the most energetic particles ever observed with energies exceeding $10^{20}$ eV, are perhaps one of the least understood classes of cosmic rays due to their extremely low flux. Our study seeks to characterize the anisotropy of observed UHECR arrival directions in a source-independent way. We utilize a statistic which analyzes the clustering in the arrival directions of observed events in order to determine the percentage of flux that results from point sources, as opposed to diffuse flux. Applying this method to the 27 UHECR events above the Greisen-Zatsepin-Kuzmin cutoff energy published by the Pierre Auger Collaboration in 2008, we find that a purely isotropic flux may be rejected with 98.28% confidence for a test radius of 3.2 degrees or with 99.85% confidence for a test radius of 6.4 degrees, corroborating earlier findings.
HEALTH CARE REFORM THAT ALMOST WASN’T:
HOW RHETORIC SHAPED THE 2009
HEALTH CARE DEBATE

Kelsey Lynn Berkowitz

Mentor: Randall Calvert

The Obama Administration’s health care reform legislation, the Patient Protection and Affordable Care Act, was one of the most contentious pieces of legislation ever to have moved through Congress. Yet in the early months of the Obama Administration, members of both parties in Congress stated their desire to approach health care reform in a bipartisan way. In this analysis I attempt to solve the puzzle of why, given that the two parties had stated their willingness to work together to devise and pass health care reform legislation, the legislation’s passage was far from certain up until the very end. To do this I analyze the rhetoric of the two parties during the debate, using computational linguistic analysis coupled with traditional textual analysis to understand how that rhetoric influenced the debate’s progression.
Becoming Singapore and Rich: Singapore and Malaysia’s Natural Experiment with Property Rights and Economic Growth

Stuart Davis

Mentor: Andrew Sobel

The recent global economic downturn has reinvigorated the question of economic growth. In this study, I aim to elucidate the causes for economic growth by examining the particularly revealing case of Singapore and Malaysia. Since the emergence of Malaysia and Singapore as two independent countries in 1965, and despite their structural and cultural similarities, the Singapore economy grew at a significantly faster pace than Malaysia. I posit that this puzzling divergence in growth trajectories is a function of Singapore’s relatively stronger commitment to property rights demonstrated by their more credible network of laws, regulatory institutions and commercial practices. Moreover, my natural experiment design, afforded by the exogenous relationship between Singapore and Malaysia’s separation and their respective property rights regime, offers a novel insight into how the specific institution of property rights affect countries’ development.
In this paper, I examine the efficacy of the Tea Party based on its ability to attract support and pursue a specific legislative agenda. In order to accomplish its goals and be a lasting force in politics, a political movement needs to achieve three factors of success: a Substantial Constituency, Policy Specificity, and tangible Legislative Influence. I utilize a computational model to determine that the Tea Party has reached the critical mass of followers necessary to effectively pursue goals. I use survey data from 2010 and 2011 to determine that the unifying issue of the Tea Party is fiscal responsibility and the role of government. Because Tea Partiers share this narrow interest, I argue that they can accomplish their goal if they focus and function as an interest group. I use the Anti-Saloon League’s push for Prohibition as a comparative case study to demonstrate the increase in efficacy that comes with consolidation of a disparate movement. This thesis makes a larger point about social movements in general: with a Substantial Constituency, Policy Specificity, and the organization that leads to Legislative Influence, any movement can be successful.
A Tough Balancing Act: Institutional and Political Factors in the Budget Process

Corey Donahue

Mentor: John Patty

This thesis examines both the effectiveness of congressional budgeting rules that have been put in place over the last two decades as well as the impact of public opinion regarding the size of the deficit. The issue is important both to settle past debates regarding the value of budgetary procedure and also in order to understand how best to restrict the growth of future deficits. This study attempts to differentiate itself by combining an examination of the legislative history of important budgeting laws with a quantitative analysis. In this thesis, I will argue that while public anger over the deficit is important for congressmen to reach agreement on how to eventually balance the budget, the implementation of lasting institutional restraints on discretionary spending is an effective method to reduce the deficit.
Political Science

Is Your Workforce Legal?
E-Verify Laws in the U.S. States
Sarah McDonald

Mentor: Gary J. Miller

Frustration over the absence of federal immigration reform has led states to pass their own laws that raise barriers to undocumented immigrant employment. One type of law requires that public and/or private employers use E-Verify, an internet-based work authorization verification system run by the Department of Homeland Security, to verify that their employees are eligible to work in the United States. Fifteen states passed mandatory E-Verify laws between 2006 and 2011. Political Science scholars have studied factors that influence federal immigration policy but they have yet to explore the factors that drive state-level E-Verify laws. My study asks: What factors influence a state’s decision to pass mandatory E-Verify legislation? Answering this question will help the political science and the immigration policymaking communities understand why certain states passed mandatory E-Verify laws and predict whether certain states are likely to pass similar laws in the future. I use ordered logistic regression and linear regression to determine the effect that economic conditions, interest group representation, public opinion, and political ideology have on a state’s likelihood of passing E-Verify laws. I find that economic conditions, specifically measured by unemployment rates, and interest group representation, specifically measured by labor union representation, have the largest influence on the type of E-Verify policy a state passes. There is a positive relationship between the unemployment rate and the odds a state will pass E-Verify legislation. There is a negative relationship between the percentage of workers represented by labor unions and the odds a state will pass E-Verify legislation. Therefore, states with high unemployment and low labor union representation should be the most likely to pass mandatory E-Verify laws in the near future.
Reserved seat systems are a unique method for ensuring a baseline level of minority representation. They require that certain seats be occupied by members of a particular minority group. This study seeks to advance the debate on reserved seats by addressing their potential to influence minority substantive representation. I extend existing theories of ethnicity and electoral systems to the context of substantive representation of Maori, a minority group for which seats are reserved in New Zealand. Most notably, I hypothesize that the incentives generated by reserved seats will prompt the Maori legislators in those seats to pursue a greater degree of substantive representation than those Maori legislators who hold non-reserved seats. Using original data sets of written parliamentary questions and member’s bills, I construct two models to test the effects of ethnicity and tier on a legislator’s pursuit of substantive representation. My results indicate that reserved seats matter for substantive representation, above and beyond simply increasing the number of minorities in the legislature.
Blowing Away the Competition: Who’s Leading the Pack in Wind Power Use and Why

Amy Plovnick

Mentor: Itai Sened

Wind power use in the United States has increased considerably over the last decade. However, there is a great deal of variation across states in the amount of wind power generated and the percentage of electricity obtained from wind power. In addition, the states that use the most wind power are not necessarily the states with the greatest wind resources. In this paper, I investigate what accounts for this variation in wind power use across states. I argue that the institutions—the rules and government structures—that govern the wind power industry determine its growth within states. I find that the types of renewable energy policies that a state adopts and the state’s economy and resource availability have a significant effect on its wind power use, while the political environment within the state does not. As renewable energy policies diffuse between states and to the federal government, it is important to recognize that some policies are more effective than others in promoting renewable energy development.
Talking Torture:  
A Democracy’s Guide to Interrogation Ethics  

Dan Rebnord

Mentor: Andrew Rehfeld

The practice of torture, as a method of interrogation, has attracted a noted increase in public scrutiny and academic research since September 11, 2001. But despite its contemporary pertinence and moral significance, no consensus exists as to whether the use of government-sanctioned torture may ever be justified in order to prevent future, mass-casualty terrorist attacks. This study therefore serves to provide a comprehensive analysis of various deontological and utilitarian arguments that are frequently cited in order to either affirm or deny the moral permissibility of resorting to the use of torture as an interrogation technique. However, unlike the majority of previous academic scholarship that has generally fixed its attention on the justice of the act of torture itself, this study aims to advance a second-order argument by outlining a set of normatively justifiable procedures through which democratic societies can resolve for themselves the first-order moral question of whether the use of torture can ever be justified. In doing so, this study concludes that in those circumstances for which it is ultimately unclear how intelligence officials ought to act when confronted with the possibility of employing torture during an interrogation against an uncooperative detainee, it is normatively desirable to leave such determinations in the hands of deliberative citizens who, through the processes of political reflexivity and collective responsibility, can place epistemic safeguards upon the moral justifiability of their nation’s interrogation policies.
There is tremendous variation in the level of hospitality that host countries extend to their refugees. Some countries provide refugees with nearly the same rights as they provide their citizens, other countries restrict the freedom of their refugees, while another set of countries refuses to recognize refugees as anything more than illegal foreigners. In this paper, I try to understand why certain countries are more hospitable to refugees than others. I focus on understanding how a past conflict influences refugee hospitality. A country with a past conflict may be apprehensive about creating hospitable conditions that invite in refugees since refugees may create security risks. However a country with a past conflict also may be more sympathetic to refugees and therefore treat them more hospitably. To determine refugee hospitality, I created scores that reflect how well countries’ refugee laws comply with international refugee laws. I perform statistical tests to determine the impact of different types of conflicts occurring less than 10 years, 10-19 years and more than 20 years ago. My results indicate that a past ethnic conflict may result in inhospitable treatment regardless of when the conflict occurred. A country with an adverse regime change should initially provide inhospitable treatment, though it should become hospitable as the conflict becomes farther in the past.
Swing Vote: The Impact of the Health Care Vote in the 2010 Midterm House Elections

Jun Heong Yoon

Mentor: Gary J. Miller

In the 2008 elections, the Democrats won 257 seats in the U.S. House of Representatives, receiving support from the Obama coalition composed of minorities, white professionals, students and a substantial number of white middle-class voters. But just two years later in the midterm elections, the Democrats lost 63 seats to the Republican Party, marking the biggest midterm loss since 1938. What caused such a historic turnover in the House of Representatives? In this paper, I argue that the incumbents’ vote on the Patient Protection and Affordable Care Act played a significant role in whether or not the candidate was reelected. The empirical analysis supports this argument, showing that marginal Democrats who voted for the passage of the health care bill were likely to be voted out of office in the midterm elections, while safe Democrats who voted for the bill were more likely to be reelected.
Targeting Exercise Self-Efficacy to Increase Physical Activity in Older Adults

Jacqueline Greb

Mentor: Brian Carpenter

The older adult population is of great importance due to its projected increase in the next few years. Lack of regular exercise for older adults is a significant public health concern, since physical activity reduces morbidity and mortality in this population. This study tests the ability of two interventions based on Bandura’s social cognitive theory to increase self-efficacy in older adults. Participants’ self-efficacy was measured at baseline and following observation of two short interventional videos: vicarious learning, and verbal persuasion by a physician. Results indicated a significant increase in self-efficacy over time due to participants’ responses to the doctor video.
Although self-report measures are the most obvious method of assessing personality and, consequently, are the most frequently used assessment technique, research has shown that informant reports provide unique information not otherwise provided by self-reports. Spouses are the most common sources of informant reports on personality, as they historically have had the highest levels of agreement with self-reports, but recent research exploring other sources of informant information have shown that family sources (e.g., siblings) can reach similar levels of agreement as spousal informants. Reported inconsistencies in depression’s impact on long-term personality, and reports of changed or strained close relationships due to depression, led the present study to address the question of whether depression impacts self-other agreement on personality, between the self and a family member. It was expected that spouses would have the highest levels of self-other agreement, and that a lifetime depression diagnosis would be associated with lower self-other agreement for all informants. Data was collected from a regionally representative, community-based sample of 1,630 adults, from which individuals with a spouse, sibling, or child informant were selected. Both participants and informants completed the NEO-PI-R on the participant’s personality, and participants were screened for a lifetime diagnosis of depression. Results show that child and sibling informants showed levels of agreement not significantly different from spouses. Also, depression did not impact self-informant agreement of personality; except, self-other agreement on neuroticism was significantly higher for children whose parent qualified for a lifetime MDD diagnosis than children whose parent did not qualify.
Psychology

Discounting of Probabilistic Rewards in Pigeons

Eliot Piering

Mentor: Leonard Green

Previous research has shown that humans discount probabilistic rewards according to a hyperbolic function: the decrease in the subjective value ($V$) of a probabilistic amount ($A$) of reward (i.e., its certain equivalent) as the odds against ($\Theta$) its receipt increase is described by $V = A/(1 + b\Theta)$, where $b$ is a free parameter that reflects the rate of discounting. To test the generality of this finding of hyperbolic discounting, the present study had pigeons choose between smaller amounts of food available for certain and a larger amount of food available with a specific probability. The amount of the certain reward was adjusted in order to determine the certain equivalent of the probabilistic reward. In addition, we extended the study to examine choices between two probabilistic rewards, a larger amount of reward with a lower probability of receipt and a smaller amount with a higher probability of receipt. Results showed that pigeons’ choices, like those of humans, were well described by a hyperbolic discounting function both when choosing between a certain and a probabilistic reward and when choosing between two probabilistic rewards. Unlike humans, however, who tend to discount less steeply (i.e., become less risk averse) when choosing between two probabilistic rewards compared to when they choose between a certain and a probabilistic reward, the pigeons showed equivalent discounting under both circumstances. Interestingly, the pigeons’ behavior is more consistent with normative economic theory in this regard than that of humans, who show a “certainty effect.”
Perfectionism in the Life Domains: The Relationship Between Domain-Specific Perfectionism and Eating Disorder Symptomatology in a Non-Clinical Sample

Elizabeth N. Riley

Mentor: Rebecca Lester

Eating disorders are psychiatric disorders characterized by a drive for thinness, bulimic behavior, and body dissatisfaction. Multidimensional perfectionism is currently conceptualized as a stable construct that is pervasive across all domains of an individual’s life. Previous research has demonstrated a unique and robust relationship between eating disorder symptomatology and general multidimensional perfectionism. Some authors have posited that perfectionism can exist disparately in different life domains, but little research has been done on this understanding of domain-specific perfectionism. The present study seeks to examine the relationship between perfectionism in different life domains and levels of eating disorder symptomatology.

Forty-nine undergraduate participants completed self-report measures of general multidimensional perfectionism, eating disorder symptomatology, and domain-specific perfectionism. In-depth interviews were conducted with 10 participants regarding their subjective understandings of the definition, adaptiveness and dynamism of perfectionism. Eating disorder symptomatology was significantly and uniquely correlated with perfectionism in specific life domains but not with general (domain-pervasive) perfectionism. Perfectionism in individual life domains was not significantly correlated with domain-pervasive perfectionism. Qualitative interview data suggest that individuals conceptualize perfectionism as both domain-specific and domain-pervasive; most participants considered perfectionism adaptive for themselves but maladaptive for others and view domain-pervasive perfectionism as an enduring, unchangeable construct.

Results of the present research suggest that domain-specific perfectionism is distinct from domain-pervasive perfectionism, and that domain-specific perfectionism may better explain perfectionism relating to eating disorder symptomatology. These findings call for a revision of the theoretical framework of perfectionism to one that includes an understanding of domain-specific perfectionism. A domain-specific conceptualization of perfectionism may be more manageable and accessible to clients in therapy and may allow treatment more tailored to the needs of individual clients. Future research should address the development of a valid measure of domain-specific multidimensional perfectionism and should explore the relationship between this construct and other forms of psychiatric distress.
Happiness Increasing Strategies: What Do People Do in Everyday Life to Feel Happy?

Youyou Wu

Mentor: Randall Larsen

One hundred university students reported what they do in everyday life to maintain or promote their happiness. These descriptions were coded for the content, characteristics and purpose of the activities involved. Participants also provided ratings of their personality traits and happiness level. Analysis of the self-reported happiness activities produced eight factors, which we call “happiness increasing strategies.” These general strategies are Conversation and Relationships, Casual Socializing, Small Achievement, Self-reward, Entertainment, Hobby, Music, and Thoughts and Attitudes. The relationship between strategies and long-term subjective happiness was not as pronounced as seen in previous studies. However, we found that the effectiveness of strategies to a large extent depends on people’s personality. These findings point to the importance of considering person-strategy fit when evaluating happiness increasing strategies. They also shed new light on the promising possibility of pursuing happiness.
An Explanation of the Credit Premium Using a Lexical Decision Task
Laura Xiao

Mentor: Cynthia Cryder

The credit premium refers to the increased willingness to spend using credit compared to using other forms of payment (e.g., cash) and has been accounted for by a variety of explanations. In the current study, we hypothesize that there is a terminology heuristic for the word, credit—a novel explanation for the credit premium. The word credit itself may shift consumers’ subjective outlook on a payment because of its positive connotation in comparison to similar terms, such as loan. Consumers may actually associate spending with the term credit as spending down a gain, which is less psychologically aversive than incurring an equivalent-sized loss.

The current experiment used a Lexical Decision Task (LDT) to gauge automatic processing and establish whether priming participants with credit encouraged them to think in terms of gains rather than losses and, therefore, respond more accurately and quickly to gain-related words. Accuracy and latency scores of gain, loss, and neutral word responses were captured using a three condition (control, credit, and loan) within-subjects experimental design.

Results indeed showed that participants responded to gain-related words more accurately when they were primed with credit rather than loan, and this difference was marginally significant. The heightened awareness of gain words in response to the word credit offers a new explanation for the credit premium. Inconsistent results occurred with reaction time data, as participants were faster at responding to gain words across the board, independent of any primes. This effect may be due to an overall faster tendency to respond to approach-oriented words. Future studies using implicit paradigms, such as a LDT, to gauge underlying processing can enhance the current knowledge in the field. In sum, this experiment finds initial evidence that semantics make a difference in automatic reaction and perception of credit-related spending.
Past studies investigating the relationship between levels of processing and spacing have generally only obtained spacing effects for deeply encoded items under incidental learning conditions. As B.H. Challis argued, such findings indicate that semantic priming may play a role in the spacing effect. However, the current study, which manipulated levels of processing, spacing, as well as retention interval under incidental learning conditions, obtained spacing effects in both deep and shallow encoding conditions at the shorter retention interval, suggesting that an alternative explanation of the spacing effect is needed. The finding that long lag items showed forgetting across the two retention intervals, although short lag items did not, lends support to the remindings account of the spacing effect, which attributes the benefit of spacing to the difficulty with which a prior presentation of a particular item is retrieved.
LA FEMME ET LA MODE DE LA BELLE ÉPOQUE :
UNE ÉTUDE DU RAPPORT ENTRE LA FEMME, LA MODE
ET LA SOCIÉTÉ À LA FIN DU 19IÈME SIÈCLE

Catherine Garabrant

Dans cette étude, j’examine le rapport entre la femme, la mode et la société à la fin du 19ième siècle et au début du 20ième siècle dans le but de comprendre comment les vêtements reflétaient le statut social et la condition psychologique de la femme. En étudiant le parallélisme entre les changements vestimentaires et le statut social de la femme à travers la Belle Époque, j’ai noté que sa position sociale et sa condition vestimentaire se complémentaient: enfermée, entravée, domestiquée. Employant des représentations de la femme dans la littérature et la peinture de cette époque, ainsi que des gravures de mode et des publicités, je fournis des illustrations concrètes de la manière dont la mode de la fin du siècle servait à renforcer l’objectification de la femme.

Puis, je me concentre sur la révolution vestimentaire qui s’est effectuée dans la mode féminine entre la fin de la Belle Époque et la période de l’après-guerre, mettant l’emphase sur les dessins de Paul Poiret, Sonia Delaunay et Coco Chanel. Ayant découvert un nouveau rôle social durant l’absence de son mari pendant la première guerre mondiale, la femme voulait sortir simultanément de ses contraintes sociales et vestimentaires. Sa nouvelle vie exigeait une nouvelle mode plus confortable, moins encombrante et surtout libre. Elle ne voulait plus s’habiller comme un objet digne seulement d’admiration et du désir. Par contre, elle avait envie de projeter une image d’indépendance et de professionnalité qui ressemblait plus à celle de l’homme.

J’analyse cette révolution vestimentaire comme étant une expression de l’indépendance dont la femme rêvait. Je conclus, alors, que la mode était un langage visuel, fortement influencé par le cadre politique et social de cette période, qui communiquait les transformations de la volonté de la femme par rapport aux événements historiques.
In this study, I examine the relationship between women, fashion and society at the end of the 19th and beginning of the 20th century in order to understand how clothing reflected the social status and psychological condition of women. In studying the parallel between changes in both women’s fashion and their social status throughout the Belle Époque, I noticed that their social position and sartorial condition resembled one another: trapped, hindered, domesticated. Using representations of women in the literature and painting of this period, as well as fashion plates and advertisements, I provide concrete illustrations of the way in which end-of-century fashion served to reinforce the objectification of women.

I then concentrate on the fashion revolution that occurred in women’s clothing between the end of the Belle Époque and the post-war period, focusing on the designs of Paul Poiret, Sonia Delaunay and Coco Chanel. Having discovered a new social role during their husbands’ absences during World War I, women wanted to free themselves simultaneously from their social and sartorial constraints. Their new life demanded a fashion that was more comfortable, less cumbersome and above all freeing. Women no longer wanted to dress as objects worthy only of admiration and desire. In contrast, they wanted to project an image of independence and professionalism that resembled that of men. I analyze this fashion revolution as an expression of the independence of which women dreamed. I conclude, therefore, that fashion was a visual language, strongly influenced by the social and political climate of the period, which communicated transformations in the desires of women as influenced by historical events.
L’agression sexuelle est un sujet bien couvert dans les médias aujourd’hui. En mai 2011, Dominique Strauss-Kahn a été accusé de tentative d’agression sexuelle sur une femme de chambre dans un hôtel dans l’état de New York. La différence de mentalité entre le public français et le public américain a attiré mon attention. Je me demande quel rôle la différence de statut social et de « gender » entre l’accusateur et l’accusé a joué pour déterminer les conséquences de ces accusations et comment ce cas aurait été considéré à une époque antérieure. Cette curiosité m’a conduite à des recherches sur les opinions concernant l’agression sexuelle à la Renaissance, une époque où on commence à s’intéresser à l’individu et donc au concept de volonté individuelle, un élément essentiel pour déterminer la question du consentement. Un premier chapitre fournit la perspective historique pour comprendre comment l’agression sexuelle était considérée à l’époque. Le deuxième chapitre est consacré à l’étude de quelques représentations artistiques qui nous permettent de mieux comprendre comment l’agression sexuelle a pu être ressentie : Le rapt d’Europe et Danaé de Titien et Léda et le cygne d’après Michel-Ange. Les quatre chapitres suivants portent sur différents genres littéraires, la poésie (le sonnet XX des Amours de Cassandre de Ronsard) qui nous fait pénétrer dans l’imaginaire de l’époque et la nouvelle (quelques nouvelles de l’Heptaméron de Marguerite de Navarre) qui prétend donner une image du réel. À cause des pressions sociales et des idées sur la vertu requise chez la femme, les femmes victimes d’une agression sexuelle étaient interdites de parole si elles ne voulaient pas ternir leur réputation et ressentir de la honte. On peut comparer cette situation à ce qui s’est passé dans l’affaire Strauss-Kahn et conclure que les stéréotypes du « gender » et du statut influent encore sur la façon dont la société réagit à l’agression sexuelle.
Historical Perspectives on Sexual Aggression

Erika Fieldman Sims

Mentor: Colette H. Winn

The media often covers sexual aggression today. In May 2011, Dominique Strauss-Kahn was accused of sexually assaulting a maid in a New York hotel. The difference in mentality between the French and American public caught my attention. I wonder how the difference in social status and gender between the accuser and accused played a part in determining the consequences of the accusations, and how this case would have been considered in an earlier time. This led me to research the opinions concerning sexual aggression in the Renaissance, a time when people started to become interested in the individual and therefore in the concept of individual will, an essential element to determine consent. The first chapter provides a historical perspective to better understand how sexual aggression was considered at that time. The second chapter is devoted to the study of paintings that show how sexual aggression could have been viewed: The Rape of Europa and Danaë by Titian, and Leda and the Swan by Michelangelo. The following four chapters analyze different literary genres: poetry (sonnet XX of Les Amours de Cassandre by Ronsard) that gives an imaginary portrayal and the novella (novellas from l’Heptaméron by Marguerite de Navarre) that aspires to give a realistic image. Due to social pressures and ideas of feminine virtue, women were forbidden to speak after being attacked against their will if they did not want to tarnish their reputation and be ashamed. One can compare this situation with that of Strauss-Kahn and the hotel maid to conclude that gender stereotypes and status still influence the way that society reacts to sexual aggression.
Small-scale neighborhood sports build relationships amongst residents creating smaller communities within a larger city. Professional sports franchises bring residents closer together through both success and failure. This thesis looks at the effect of sports on an American city. More specifically it analyzes a city’s emotional connection to a team. Some cities need their teams more than others, and some teams develop closer connections to their fans. The case of the 2004 NBA Champion Detroit Pistons will be used to better understand the issue by offering an example of how a city with intense racial conflict, crumbling infrastructure, declining population and a shrinking economy rallied behind a professional sports team. The 2004 NBA Champion Pistons promoted nostalgia for Detroit’s great history while still infusing residents with pride in today’s Detroit. The case of Detroit can be used to better understand the fine line between simply being a resident and being a proud member of an urban community.
The Atlantic Yards Project in Prospect Heights, Brooklyn, is a prime example of fourth-wave gentrification in an intensely neoliberal context. This new model of gentrification necessitates new models of anti-gentrification activism. Two primary anti-gentrification coalitions emerged in response to the Atlantic Yards project: one used “classic” anti-gentrification organizing strategies (including direct action, grassroots community outreach, and legal action), and one entered into a “community benefits agreement” (CBA) with the project’s corporate developer, Forest City Ratner. As of March 2012, it appears that both coalitions failed to stop gentrification.

While many scholars have used the Atlantic Yards CBA to define discrete factors that contribute to the failure of CBAs more broadly, I reject that scholarship as short-sighted, arguing that it is more useful to conceptualize CBAs as a new tactic of gentrification resistance that arose in direct response to particularities of fourth-wave gentrification.

This analysis shows that the Atlantic Yards project CBA has failed and will continue to fail to stop gentrification not because it was particularly poorly constructed (although, by even the lowest community justice standards, it was), but rather because CBAs are strategic tools used by developers to perpetuate the fourth-wave gentrification paradigm that empowers profit-driven developers to dictate the agenda of urbanization at the expense of community agency and low-income neighborhood residents.

Using the Atlantic Yards project as a case study, I illustrate that CBAs divert critiques of new-build, urban mega-projects away from the broader social, political, and economic systems that naturalize fourth-wave gentrification. However, “classic” anti-gentrification organizing was similarly ineffective in the face of the Atlantic Yard project’s fourth-wave gentrification. Thus, anti-gentrification scholars, community organizers, and other non-corporate actors must recognize how unique elements of fourth-wave gentrification create new obstacles and new opportunities for anti-gentrification activism and then strategize with those obstacles and opportunities in mind.
Over the last few decades, Ethiopian immigration to the Washington, D.C., metropolitan area has rapidly expanded, reflecting larger shifts in immigrant demographics due to changes in U.S. immigration law and a rise in political conflict and economic instability in Ethiopia. This thesis examines the development settlement and assimilation patterns of the growing Ethiopian population in the Washington, D.C., metropolitan area. As an emerging immigrant gateway, the D.C. Metro lacks historic ethnic enclaves characteristic of earlier established gateway cities. Instead, Ethiopians within the capital city are increasingly settling into the more affordable inner-suburbs directly upon their arrival, in response to gentrification in the District and the growing migration of wealthy, native born residents to the area’s outer suburbs. Moreover, their settlement is dispersed across the metropolitan area with only minor concentrations emerging. These new trends call into question the relevance of the classic Chicago School ecological model that is more aptly understood through Zelinsky and Lee’s model of heterlocalism. Despite residential dispersion, Ethiopian ethnic communities are held together by heterlocal ethnic places such as ethnic businesses and organizations, which provide Ethiopian immigrants with many of the benefits previously afforded by community institutions and places within ethnic enclaves. The recent expansion of Ethiopian ethnic places has also contributed to the re-imagining of the “Habasha” identity, a specifically separate ethno-racial identity emphasized in this context to avoid assimilation into the American racial hierarchy as Black. This identity can be understood through Massey and Sanchez’s framework of “assimilation as boundary-brokering,” which accounts for the negotiation of the Habasha identity within America’s racial hierarchy and provides valuable insight into the Black African immigrant experience.
The issue of illegal dumping has become a pervasive environmental problem in cities across the United States. Scrap tires are an especially insidious species of dumping material. The bizarre black mounds are more than eyesores in the inner city or excesses of an obese car culture. The tires constitute a considerable threat to public health and the environment. In St. Louis, most of the illegal dumping occurs in the poorer North Side of the city, largely housing persons of color. The illegal dumping of tires raises troubling questions of environmental justice and environmental racism. This thesis uses the Wellston Loop Area in North St. Louis as a case study to investigate the nature of illegal tire dumping, its consequences, and the ways in which a city can defend itself against the hundreds of thousands of tires left to rot in its core. Research methodology includes ArcGIS mapping to visualize and examine the issues involved. In addition, the thesis analyzes existing markets for scrap tires and the best practices of cities in reducing illegal dumping, culminating in its own recommendations to the city of St. Louis.
Urban Rural Divides, Class Tensions, and Comparative Advantage: Current Domestic Conflict and International Trade Relations in Chile

Victoria Lee Cacho Williams

Mentor: Carol Camp Yeakey

This study examines the urban-rural divides and class tensions and their impact on global political economy by employing comparative advantage theory. In addition, this study examines how internal political economy shapes countries’ stances on international trade. With highly urbanized populations and stratification between urban and rural residents, the urban-rural divide is germane to the Latin American and Caribbean regions, and specifically South America. Chile is utilized as a case study to examine its internal political economy and the resultant impacts on the urban-rural divide. By examining strategic coalitions within the Chilean economy, the study concludes that coalitions centered on urban-rural and class differences, dominated both internal conflicts and positions on international trade. The Chilean case is significant in that it informs the overall situation of international trade, and illustrates how the aggregate of these internal conflicts translate into international deadlocks.
Understanding the Impact of Sex and Gender on Legal Proceedings and Outcomes: A Case Study at the St. Louis County Domestic Violence Court

Ashley Brosius

Mentor: Jami Ake

This case study examines the impact of sex and gender on legal proceedings and outcomes at the St. Louis County Domestic Violence Court. Two main questions drive this research. First, is a victim/survivor’s experience in obtaining an order of protection impacted by the sex and gender of the presiding judge through court proceedings, rationales, or rulings? Second, does the sex of the petitioner and/or respondent affect judicial decision-making and case outcomes? Relying on both quantitative and qualitative methodology, I employed statistical analysis, participant observation, and in-depth interviews both to answer these questions and to determine when the sex or gender of the judge, petitioner, and/or respondent is salient. After highlighting the existing literature, shortcomings and general lack of research in this field, as well as providing a basic overview of the DV Court and its services, this case study considers findings from each respective research method independently and collectively, ultimately arguing for multi-method approaches to future studies in the field. Results from the statistical analysis indicate the sex of the judge is not significant in the granting of orders of protection, but that female petitioners are more likely to receive an order than male petitioners. Considered within the framework of Judith Butler’s theory of gender performance, findings from participant observation and in-depth interviews suggest an element of gender performance to judging whereby judges use their gender to leverage authority in the courtroom. In addition, these discoveries suggest that judges do not always conform to the stereotypical conceptions of gender roles cited in the existing literature. Nevertheless, the gender of the judge and litigants seems to bear some weight on judicial decision-making. In conclusion, then, this case study draws a distinction between the outcome of a case and the process by which judges arrive at this decision and highlights a need for greater judicial training and consistency across the bench. While judges may never be truly neutral arbiters, understanding the biases, perceptions, knowledge, and experiences they bring to the bench will not only provide insight into the judicial decision-making process at the Domestic Violence Court, but also help promote change, leading to a more equitable system for all parties involved.
Which Gender Makes Smarter Stock Recommendations?

Ginika Agbim and Andong Cheng

Mentor: Ohad Kadan

Wall Street’s financial analysts release recommendations advising investors to buy, hold or sell a company’s stock, and some analysts’ recommendations are more sophisticated and profitable than those of other analysts. Past research suggests that women are better investors in the stock market because they are more risk averse and less overconfident than men.

Study 1 of our behavioral finance research is based on data of roughly 15,000 separate analyst recommendations from four top investment banks during 2007-2009. We analyze whether gender as an independent variable affects the performance of the stocks recommended on both short-run and annual returns. By comparing the differences in returns on stocks covered by male and female analysts, we explore which gender’s buy/sell/hold recommendations leave investors with more money in their pockets. We then compare gender effects before and after the 2008 financial crisis.

In Study 2, we supplement our research by analyzing team data from an undergraduate investments simulation that mimics a real-world investment situation. We explore differences in risk-taking and portfolio performance, proxied by a Sharpe ratio, between male-dominated groups and female-dominated groups. This study is different from the previous study of professional analysts because 1. here analysts must make group decisions and come to agreements as a team, which may cause inter-group conflicts and sub-par performance, and 2. participants in this study are rookie analysts instead of professionals. Through our research, we hope to inform the financial world that the gender of an analyst may have interesting effects on one’s portfolio performance in the long run and in the short run.
Tectonic Study

Davis Owen
Invisible Hands: 
Digital Fabrication and the Dematerialization of Craft

Davis Owen

Mentor: Igor Marjanovic

This research investigates the increasing incorporation of digital technologies into the realm of architecture and the effects on the meaning of “craft” as it applies to architectural space. Within the past decade, contemporary digital drafting programs, such as Rhinoceros and 3DS SolidWorks, have coupled with digital modeling machines, such as Computer Numerical Control Milling (CNC). The merge allows for designers to seamlessly translate a digitally-conceived form through a largely autonomously-driven manufacturing process and into a perfect physical copy of the original digital form. The focus of a designer’s attention has shifted towards the preparation for fabrication and the review of the machine’s fabrication attempt. This is due in large part to the complexity of the graphic user interface in digital modeling programs, and a reliance on the machine’s ability to output a replica of the digital form.

This series of perfect translations contradicts the ancient understanding of quality in built forms and suggests that a new definition of craft must encompass more than the measurement of quality and skill in representation. With advanced drafting technology, architects less frequently engage in modeling as a method to develop the design. More often, models serve as test runs, rapid prototypes for quick criticism and revision of the digital source. The digital, three-dimensional drawings become the final forms, and any modeling of the form in real space acts as a proxy for an otherwise massless form. The result is a dematerialized understanding of craft. This new definition attenuates the role of physical modeling as a determination of quality and favors the precision of digital drafting as a precursor to realized form.
Richard (detail)

Sophie Lipman
In my work I explore oscillation between oppositions: past versus present, repulsion versus attraction, dark versus light. By combining these opposites I create a push and pull effect. A sense of unease subtly undermines a sense of attraction. Through this effect I blend past and present and illustrate the passage of time.

I am specifically drawn to how people evolve over time; how a single person can change both externally and internally throughout his or her life, presenting various appearances to the outer world but while still being that one person. In my pieces I draw portraits of people over the duration of their lives, creating snapshots of their past selves. Through the use of print and the multiple I combine and layer images to create a more true representation of that person. Introducing photography and light, I enliven these drawings and bring them into the present. By having the light change in my pieces I construct something that exists over a period of time, thus making both the material and the content of my pieces about duration. In this duration each drawn image is a memory trapped in a past time and space while the changing light is a perceptual experience, an insistent force of the present.
Cerebral Blood Flow Responses to Deep Brain Stimulation of the Dorsal and Ventral Subthalamic Nucleus Correlate with Gait and Balance Responses in Parkinson Disease

Kelly Hill

Mentors: Gammon Earhart and Joel Perlmutter

Deep brain stimulation (DBS) of the subthalamic nucleus (STN) is a common therapy for Parkinson disease, yet its effects on gait and balance are variable and the underlying mechanisms remain unclear. Anatomical evidence suggests heterogeneity within the STN region but the degree to which stimulation location within the region influences outcomes is not well established. The purpose of this study was to (1) compare effects of stimulation of dorsal versus ventral STN region on gait, balance and regional cerebral blood flow (rCBF) and (2) examine relationships between changes in rCBF and changes in gait and balance induced by stimulation of dorsal versus ventral STN region. We employed a validated atlas registration process to locate and selectively stimulate electrode contacts in the dorsal and ventral STN regions of 37 individuals with Parkinson disease with bilateral DBS. In a within-subjects, double-blind and counterbalanced design controlled for stimulation parameters we evaluated resting-state rCBF in a priori regions of interest (PET imaging with $^{15}$O-labeled water), gait velocity, cadence, stride length, and balance during each of three stimulation conditions: DBS Off, unilateral D-STN DBS, and unilateral V-STN DBS. Stimulation of either site increased stride length without producing significant group level changes in gait velocity, cadence, or balance. Stimulation of either region increased rCBF in subcortical regions near the stimulation site and produced variable changes in cortical and cerebellar regions. Stimulation-induced changes in gait velocity related to rCBF changes in the premotor cortex during V-STN DBS ($r = -0.40$, $p = 0.03$) and to rCBF changes in the cerebellum anterior lobe during D-STN DBS ($r = -0.43$, $p = 0.02$). Blood flow decreases in these regions were associated with gait velocity improvements. These relationships were dependent on location of stimulation, suggesting that DBS may produce similar motor outcomes by distinct mechanisms that vary with stimulation location.
Initial injuries to the spinal cord are often followed by a secondary injury that causes axonal degeneration and development of an inhibitory glial scar. This progression is mediated by reactive astrocytes, which gather at the site of injury and secrete a host of inhibitory signals including chondroitin sulfate proteoglycans (CSPGs). \textit{In vivo} experiments have shown potent inhibition of axonal extension on substrates containing CSPGs. Other research indicates that degradation of CSPGs by the chondroitinase ABC (chABC) enzyme increases axonal extension onto CSPG-containing substrates and may allow for enhanced recovery after spinal cord injury. The chABC enzyme is rapidly denatured, creating a vital need for a vehicle that preserves the activity of the enzyme while also providing sustained release. This study seeks to characterize the properties of poly(ethylene glycol) (PEG) microspheres for delivering active chABC to spinal cord injury sites.

Introduction of the kosmotropic salt sodium sulfate to PEG diacrylate (PEG-DA) solutions causes formation of microspheres with diameters near 3 microns. The model protein bovine serum albumin (BSA) was added to the solution to create loaded microspheres. The microspheres were crosslinked using 0.15% w/v Irgacure 2959 photoinitiator and 365nm ultraviolet light. The microspheres were then washed and the release study conducted in water over two weeks.

Release of BSA was dependent on the final sodium sulfate concentration present during microsphere formation. Total BSA release from microspheres formed in 600mM sodium sulfate was greater and lasted for a longer portion of the study compared to micropsheres formed in 725 or 800mM sodium sulfate. Continued optimization of the formation protocol will create microspheres that are better able to provide sustained release of active chABC for promotion of axon regeneration in the damaged spinal cord.
Heart failure (HF) is a widely occurring condition in older populations that impairs cardiac structure and function. HF results in electrophysiological (EP) remodeling, consisting of changes in ion channel protein expression and functional substrate for arrhythmogenesis. Currently, there is no defined treatment for HF due to the difficulty of interpreting symptoms, which lead to an appropriate diagnosis. Therefore, a large number of treatments are diet-based because of our limited knowledge of arrhythmia at the molecular level. In order to investigate mechanisms of electrophysiological substrate for arrhythmia in human end-stage non-ischemic cardiomyopathy, we performed extensive molecular and optical tests in both human and animal models.

Optical mapping of coronary-perfused left ventricle tissue in wedge and free wall preparations was performed with end-stage non ischemic cardiomyopathy (HF, n=10) and non failing hearts (NF, n=10). In order to visualize the optical data, immunostaining, western blotting, and histology were used as analysis techniques.

We found that conduction abnormalities were a result of Cx43 anisotropic down-regulation, Cx43 phosphorylation, as well as a rise in fibrosis. These causes lead to a substrate for the propagation of deadly ventricular arrhythmias and are the likely cause of sudden cardiac death in patients with non-ischemic cardiomyopathy.
Parking meters can be a source of inconvenience for police officers in that oftentimes the LCD display is foggy or difficult to read. Parking meters often have a default setting that display a red background even when cars are not present. Our project, the Ultrasonic Sensometer, seeks to address these issues by detecting when a car is present at the parking meter and displaying a light-emitting diode (LED) that is visible from ten meters away when lit.

The Ultrasonic Sensometer implements an alert system that detects the presence of a parked automobile within one meter. The parking meter sensor is able to determine whether the car is legally parked, overdue, or soon to expire. The Ultrasonic Sensometer receives two input signals from the parking meter: if the parking meter has been paid and if five minutes or less are remaining on the meter. In our demo, these signals are simulated by two external switches. The device will signal the state of the parking meter, overdue or within five minutes, with an LED. The project integrates a Parallax PING))) sensor; an Arduino Uno with an ATmega328 processor; and circuit elements including an LED, resistors, and switches.

To conserve energy, the device has a sleep mode which wakes itself up approximately every fifteen minutes. The Ultrasonic Sensometer will run on the parking meter’s battery. Future directions involve making a wireless module to alert the parker as well as the police as to the state of the parking event.