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INTRODUCTION:  
Research as Educational Paradigm

Research is disciplined inquiry. It is at the heart of human endeavor, for humans crave knowledge with every move we make. It is, of course, also at the heart of this University and the education we offer. The journal you are reading was made possible by donors who believe in what we do. It also emerges from the brilliance and dedication of the students whose work you will read and the faculty who mentored them during the academic year 2016–2017 in the College of Arts and Science at New York University. It is a celebration of the achievements of our most curious, driven students.

Research takes many shapes, as this publication attests. Students featured here spent time working in a lab with a team of scientists in order to understand brain development; they measured the dimensions of ancient human remains to understand cultural practices surrounding beauty; they picked through boxes in an archive, finding textual evidence to support a literary analysis; or interviewed living eyewitnesses to a major historical event in a foreign country. The benefits are many. Students work closely with a mentor, sharpen their problem-solving skills and learn about “the big ideas” of their chosen field. Students explore possible future careers, learn how to work independently and hone marketable skills such as effective written and oral communication. However, in personal terms, there is no greater achievement then meeting the challenges of a long-term project, following a passion to a wonderful conclusion and having a completed work to show for it. It is a thrill and satisfaction like no other. The internal standard of excellence that our students discover within themselves is perhaps the most salient personal outcome of undergraduate research, and a reward that keeps on giving no matter what one pursues after college.

This publication represents only a fraction of the research undertaken by College students, as individuals and in groups, under the close mentorship of faculty; for the most part, the projects featured here were supported by the Dean’s Undergraduate Research Fund, created through the generosity of alumni, parents and friends, which provides material support necessary to carry out their inquiries. (A list of the research scholarships that have been endowed in the Fund appears on page 2 of this journal.) These abstracts were also presented at the annual Undergraduate Research Conference, which was established over thirty years ago and encompasses the sciences, humanities and social sciences as well as creative writing.

At the start of this issue is the “Faculty Perspective,” in which we publish the remarks delivered by an NYU faculty member at the closing award ceremony of the previous Undergraduate Research Conference. The content of this issue underscores the crucial importance of independent inquiry as a paradigm for a liberal arts education for the twenty-first century. We are very grateful to the students, their faculty mentors and the generous funders who have made this sort of educational experience, and this journal, possible.

Chris Barker  
Vice Dean, College of Arts and Science
For this group, there is surely no need to enumerate all the many great and good reasons to engage in an act of research, to set out on a path of discovery. But today, I want to talk about one good reason you may have overlooked. The potential of the research act to occasion the experience of ecstasy.

I turned to the psychologist and philosopher Neel Burton to explain the term. Ecstasy, he tells us, in an article in *Psychology Today*, is the pinnacle of euphoria, an intense elation or positive feeling, especially one that has “an abstract or expansive quality.” In a state of ecstasy, boundaries dissolve and the ego merges into all of being itself.

This is not a common feeling. True, certain substances can induce it, as can several psychiatric or neurological disorders. But, Burton explains that ecstasy also can emerge from less potentially fraught experiences. He cites encounters with beauty, art, music, love, orgasm, and exercise and the emotion-producer that is our subject today: Triumph, specifically, for our purposes, the triumphs that can come from engaging in a full and passionate commitment to an act of research. I promise you this is true, because it is my repeated experience over decades of committing to the endeavor. I also know it is true for some of you, because I reported it out. Perhaps it is true for many others of you as well.

What image does the word “triumph” conjure for you? I think of moments of exultation, of overcoming odds, of the exhilaration at the end of exhausting effort, of hard-won victories, of the unbridled joy that even the smallest achievements along the research road can bring. One of the many great things about research is that achievement can mean many things. It can be the conceptualization of a project’s design, the success of the plan of attack. Obviously, it can mean actually meaningful results, but maybe it comes with just the flash of an amazing insight at some point along the way. Any of these have the potential to spark an experience of ecstasy.

This is true in art, and it is true in science. Scenes from two books come to mind. From fiction, I think of the riveting passage in the AS Byatt novel, *Possession*, when

the hapless young scholar, while plowing through fragile pages in the archives, discovers drafts of a letter by the subject of his research that no other scholar has ever even touched. From nonfiction, *The Immortal Life of Henrietta Lacks*. When, in 1951, after 30 years of trying, two researchers at Johns Hopkins find a sample of cancerous tissue that could survive and reproduce indefinitely outside the human body. I think of those researchers and then the researchers who came in their wake, who used those cells to help make scientific strides from the Salk polio vaccine to advances in space travel. And what about what the author experienced, the science journalist Rebecca Skloot, who heard mention of the HeLa cell line in a community college science class and began to wonder about its origins, about the person from whom these cells were extracted, about that person’s life, her family, her descendants and what they knew or didn’t know about her immortality? Imagine how Rebecca Skloot felt when the Lacks family agreed to let her into their lives to tell their story.

Professor Karen Adolph used the word “hair-raising” to tell me about the discoveries that have come out of her Infant Action Lab, including one that gave the lie to the long-held belief that infants walk to arrive at a destination. It turns out that they will take just as many steps and travel the same distance in an empty room.

A student of linguistics, Shaquille Sinclair, experienced such a feeling not in the act of researching why certain words come to us as so offensive, but because of the sheer freedom he was granted to create the project and have control over his question, unconstrained by his mentors.
“I had the opportunity,” he told me, “to ask myself what I care to know more about.”

Sally Buttars is hot on the trail of really understanding the nature of bacterial spores. Ecstasy for her sprung from putting all the pieces together, when she apprehended, she grokked, I would say, the ins and outs of her research and how what she had learned in her science classes could be applied in a research context. “Even though my study requires additional data to confirm my results,” she said, “I feel as if I was able to contribute to the scientific community.”

The great elation for Gaurika Mehta did not come from translating into English some 60 pages of a Hindu devotional text. It came from analyzing the mechanisms of gender and ritual performance in the text and developing those into models applicable in her field of female-ness and ritual adaptation.

In Journalism Honors class last year, the topic of Danny Costa-Roberts was the malaria drug mefloquine and the brain damage it can cause that has frequently been misdiagnosed as PTSD. It’s a pretty abstruse issue to explain to a reader, Danny recalls, so for the better part of a year he was in search of someone whose personal history illustrated the problem. The ecstatic breakthrough came when he at last found that person, a veteran who fleshed out Danny’s story, giving “Mefloquine Mondays,” in Danny’s words, “vividness and gut-level plausibility.”

For Larson Binzer, ecstasy came twice: first, as she realized that no one else had ever investigated how sexual traffickers recruit from inside prison walls to augment their stables of prostitutes, and again, when she realized that the prison system’s online “Facebook” of incarcerated has become a key tool for traffickers. In addition to the publication of “The Prison Pipeline” in our online magazine, Shoeleather, her piece ran as a three-part series for In Public Safety.

This year in Professor Robert Boynton’s class, Omri Bezalel got a key source to open up to him, to explain not only how but also what really motivated her in a way that allowed her to convince a wary Israeli public to support a lopsided prisoner exchange.

And Avi Gross had his giant YES moment when he found just the right pilot project in Vancouver to illustrate the latest public effort to reduce harm for opioid abusers.

I have more good news for you on this front. Burton tells us that once ecstasy has been experienced, it is possible to have aftershocks of that extraordinary emotion and that they can be triggered by so simple an event as hearing a bird song. I can confirm this. My own years rummaging around in archives have produced so many ecstatic episodes that I can summon one of those fabulous feeling aftershocks—and this happened just last Friday—from setting up a new printer and getting the wireless WiFi to connect to it after only three tries without any help.

The real payoff is even greater. Burton turns to another great researcher, Albert Einstein, to explain. Ecstasy, Einstein says, is “the mystic emotion,” “the finest of which we are capable,” “the germ of all art and all true science.” Now who wouldn’t want to be part of that? My advice? Stay inspired. There’s much in it for history and civilization, and there’s much in it for you.

Professor Brooke Kroeger’s address during the 2017 Undergraduate Research Conference at NYU College of Arts and Science.
There is today a good deal of confusion about the status of knowledge in the humanities. To some, the admission that we seek only an interpretation seems to allow all kinds of subjective opinion to count as knowledge. Or worse, it seems to endorse the principle that those with the power to impose “their” opinion define knowledge. Nothing could be further from the truth. Interpretation is a form of knowledge, not mere opinion. What distinguishes knowledge, even knowledge that makes no claim to absolute certainty, is evidence and rigorous analysis. That is the meaning of disciplined inquiry in any field.

—Thomas Bender, University Professor and Professor of History

Traditional Chickpeas and Trendy Chia Seeds: Surveying the Cohabitation of Berlin Neukölln’s “Hipster” and Arab Population
Grace Albright, German
Sponsor: Professor Doreen Densky, German

This thesis deals with the coexistence of two groups in the Berlin borough Neukölln: the Arabs, or long-time residents, and the “hipsters,” or newcomers. The former refers to a group of mainly Lebanese immigrants who came to Germany in the 1970s, while the latter is a name given to trendsetters in their twenties to early thirties. Before 2000, the area was characterized as a bleak “immigrant neighborhood” (Berlin Magazin, 2012). Along with the Arabs, the immigrants include people of Turkish and Eastern European backgrounds. Due to the immense research on Berlin’s Turkish population, it is necessary to look into the less-scrutinized Arab minority. Not only is this group a crucial component to Neukölln but its members are also in a precarious situation due to the escalating numbers of anti-Muslim attacks in the area (Reach Out, 2016). Thus, any change affecting the borough this group calls “home” must be examined in regards to the possible formulation of dangerous circumstances. “Hipsters” started to enter the borough around 2010 the same time Neukölln began being promoted as a stylish area (Ört run et. al., 2016). During the development of this newfound trendiness, the shifting neighborhood dynamics have been intimidating the long-term Arab residents. The goal of this thesis is to represent how this metamorphosis has affected the Arab Neuköllners, with a predominant focus on culinary establishments, which are a commodity both subject groups claim as part of their culture. To assess the situation, theories on the “hipster,” gentrification, and the “parallel society” are employed with the support of empirical data including interviews, spatial observation of eateries, and an analysis of printed material to construct a comprehensive picture.

Ontology of Existential Risk
Louisa Bahet, Comparative Literature
Sponsor: Professor Mikhail Iampolski, Comparative Literature

Oxford philosopher Nick Bostrom (2002) coined the term “existential risk” to connote threat of annihilation or permanent setback to intelligent life. A field was born which theorizes and so aims to prevent such adverse outcomes. Yet Bostrom’s found principles are multiply flawed—a threat. Stipulating that existential risk is necessarily “global” and “terminal,” Bostrom overlooks threats smaller in scope and intensity, which could nevertheless devastate human potential. In so doing, Bostrom categorically omits a range of existing causes, displacing the focus of “risk” from cause to effect. This project proposes an alternate theory of practical, moral bases in the quotidian lives of global citizens.

The Boundaries of Law and the University: Reading J.M. Coetzee’s Disgrace through Derrida
Carly Bortman, Comparative Literature
Sponsor: Professor Emily Apter, Comparative Literature

This project explores the boundaries of law in the university classroom. Using Jacques Derrida’s essays “Force of Law” and “The future of the profession or the university without condition (thanks to the Humanities, what could take place tomorrow),” this presentation examines the conditions that permit the translation of authority to, from, and within the university classroom. While most of the analysis is grounded in J.M. Coetzee’s Nobel Prize-winning novel Disgrace, this research also engages with the broader question of how
how it is ideologically possible that the credit money used on a daily basis appears to people as real money, using the theoretical tools of continental philosophy and literary theory to provide a new perspective on economics. The goal is not to understand the “real” behind the appearance of credit, but rather the very conditions of possibility of this appearance. In other words, this investigation is interested in how credit money is capable of appearing as real money to people and in what ways this appearance manifests. The first chapter uses Nietzsche to examine the modern banking system and argue the etiological and ontological nature of credit money is constant movement. The second chapter turns to psychoanalysis to argue credit money functions as a Freudian fetish. By focusing all of their attention on this fetish of credit, people avoid facing the ontological deficiency within the very nature of money and the capitalist production process. When this credit fetish fails to fulfill its function, credit stops seeming so real: the credit industry is revealed to be a house of cards and society finds itself in devastating financial crises like the recent one of 2008.

Infiltration of Confucianism and Daoism in Liaozhai Zhiyi
Yutong Cheng, East Asian Studies
Sponsor: Professor Moss Roberts, East Asian Studies

Pu Songling, a Qing Dynasty scholar and writer born in 1640, is best known for his work Liaozhai Zhiyi (The Strange Tales of the Chinese Studio). After failing the Imperial Civil Service Examination for the fourteenth time around 1671, at his wife’s urging, he set aside his hard ambition. Soon, he began working on Liaozhai Zhiyi, spending the next 35 years collecting, writing and editing five hundred fictional stories covering diverse social and political themes. Through the lens of Chinese philosophy, this paper explores the extent to which Confucianism and Daoism infiltrate this collection of stories. Through character and passage analysis, this paper examines key Confucian themes, such as loyalty, filial piety, propriety, righteousness, honesty and sense of shame, and the social commentary Pu Songling offers on these themes. At the same time, Daoism stands alongside Confucianism as one of the two great philosophical pillars of Chinese culture, and this paper further explores key Daoist themes such as the Way, virtuosity, nature and animism. This paper carefully analyzes how this literary work deeply engages with classical ideas of Confucianism and Daoism while also presenting avant-garde ideas such as political satire, sharp criticism of China’s feudal society, advocacy of animal rights and women’s rights, and freedom of love. Ultimately, this paper aims to provide deeper insight into this literary work, which is not well known in the West and examines the coexistence of and equilibrium between classical Chinese philosophy and forward-thinking ideas in this work.

Going beyond Diversity in Children’s Literature: Louis Sachar’s Holes and Jacqueline Woodson’s Brown Girl Dreaming
Louisa Brady, English
Sponsor: Professor Nicholas Boggs, English

In today’s children’s book publishing marketplace, there is an acknowledged lack of diversity. Industry folks have recently taken measures to diversify. However, merely calling for diverse books is not sufficient. Publishers should seek books that ensure portrayals of marginalized characters are authentic rather than stereotypical or tokenistic. To explore the insufficiency of the term “diverse,” this project looks at two middle grade books: Holes by Louis Sachar (1998) and Brown Girl Dreaming by Jacqueline Woodson (2014). Both works accommodate yet exceed calls for “diverse” representation, offering subtle and complex meditations on race and history in twentieth century America by imagining and exploring coming-to-racial-consciousness through their protagonists. The books explore separate aspects of race and history and offer different yet complementary reflections. Holes features a juvenile correctional institution, which can be read as an allegory for a modern form of slave labor, that must be rejected to restore justice to a space that has been governed by racism, speaking both to the cyclical nature of racism and the necessity of resisting it. Brown Girl Dreaming, a memoir, frames Woodson’s coming-of-age journey in terms of both her nascent identity as a storyteller and her early experiences with segregation, racism, and inequality, demonstrating that despite facing oppression, Woodson has not only retained agency over her own story but also turned it into literary art. It is concluded that reading these texts together highlights the fact that while racism in the United States cannot be erased or ignored, neither does it have the final word on the experiences of marginalized people.

When Credit is Due: Unmasking the Ideology of Money and Banking
Daniel Cheng, Comparative Literature
Sponsor: Professor Alys X George, German

Although people swipe their credit and debit cards everyday believing this is simply a new electronic alternative to exchanging physical dollar bills, this money is actually a form of credit often backed by little to no “real” money guaranteed by the Federal Reserve. This paper will explore...

Jinny Choi, English and American Literature
Sponsor: Professor Sonya Posmentier, English

The 1992 L.A. Riots, also known as the Rodney King riots, marked a series of concentrated violence and looting over the course of six days, in Koreatown, South Central Los Angeles. The riots were a byproduct of the acquittal of four white police officers videotaped beating an African American motorist, Rodney King. This research begins by asking why Korean American merchants were targeted as a consequence of what was clearly a symbol of white racism. Several semi-autobiographical texts of African and Asian American authors, published post-1992, were examined. The objective was to explore specific themes that constituted this shared literary space: violence, loss, language, religion, and biracialism served as such connecting threads. The work of scholars like James Baldwin and Julia H. Lee lend context for the Afro-Asian relationship. Conversations in these texts involve historicizing the two minorities’ placement in America by looking at various exclusionary laws and institutions throughout the centuries. These discussions of race relations were utilized to explore the literary and thematic elements found in the primary texts. The face of the black-white conflict in America has undoubtedly been altered with the emergence of Asian Americans; and this research is concerned with how such racial reshaping has been, and is being, represented by contemporary writers. Literature is a tool to explore the evolving nature of the Afro-Asian relationship and to challenge the notion established by American media that the two are inherently oppositional.

Divine and Demonic Women: Metamorphosing Bodies in the Italian Renaissance and British Gothic

Nicole D’Alessio, Comparative Literature
Sponsor: Professor Greg Vargo, English

This thesis studies the rhetorical operation of metaphor in Early Renaissance Italy and the British Gothic genre by engaging with a series of authors (Dante, Ficino, Richardson, and Stoker) in which the female body becomes both a source of demonic transmogrification and a portrayal of sublimity in human form. Some research reveals the continuing didactic trick which metaphor performs to transform female bodies. Two critical questions are significant for engaging this topic: (a) What would a synthesis of the Roman Catholic terms “angel” and “demon” into secular popular rhetoric mean for modern gender tropes and (b) Does the Victorian era blur the lines between myth, magic, and science to produce a metaphor-based rhetoric which affects gender narratives? Chapter one outlines how the practice of *compositio loci* and the belief in the *stigmata* that anchored Roman Catholicism is a metaphorical operation that conditions the body for transformation. Chapter Two examines the Italian Renaissance and British Gothic obsession with the female *salutare* (acknowledging) and the male *sguardare* (looking), such that the focus of gazing results in either angelic or demonic body transformation, as well as the paradox of female preservation with regards to the male gaze and the decaying female body. Chapter three finds traceable topics “demon-face” and “day-face” in literary topic models using 150 texts published between 1678–1897 (from *Princess de Cleves* (1678) by Madame deLafayette to Bram Stoker’s *Dracula* (1897)). The monster-metaphor narrative is only able to function when science and religion are not separate. Finally, the project invites a consideration of what is happening in terms of gender performance where religious metaphor is analogous to gender identity, where removing non-secular terminology from narration would also mean collapsing the gender binary.

“I Will Not Be the Girl”: Gender and Dual Narrative Power Structures Across Medium in *Gone Girl* and The Last Five Years

Auriane Desombre, English and American Literature
Sponsor: Professor Josephine Hendin, English

What happens when a text has two narrators each of whom brings their own, sometimes conflicting, perspectives and biases to the narrative? How does medium impact narratorial meaning? This project explores such inter-narratorial conflict through two dual-narrative works, Gillian Flynn’s novel *Gone Girl* (2012) and Jason Robert Brown’s musical *The Last Five Years* (2001), as well as their respective film adaptations. Drawing on Mieke Bal’s theory of narratology, and Susan Lanser’s work in feminist narratology, the project explores how each of these works employ two narrators to tell their stories: two heterosexual couples, each coloring the narrative with their particular biases. Inevitably, the clashes in bias lead to a struggle for narrative control. Turning to Helene Cixous’ characterization of narrative power through an active/passive gendered binary to contextualize and analyze that power, the project considers how breaking the binary Cixous discusses (in both cases through male infidelity) violates the power structure, allowing the female narrators to analyze and resist the gender roles of female victimization and male power. Moving from the narrators to their readers and listeners, the project considers the role of the audience in not only watching but also moderating and judging this power struggle. These works, though they have similar power struggles when considered through the lens of gender, play out to vastly different audiences and allow for a comparison of the audience’s impact on narrative power. Through these narratological techniques, the thesis aims to uncover the role that gender plays in the distribution and development of narrative power as perceived by both the narrators and the audience across mediums.
The Work of Literature in the Age of Technological Omnipresence
Jonathan Epstein, Comparative Literature
Sponsor: Professor Colm O’Shea, Expository Writing Program

In his groundbreaking book The Stack: On Software and Sovereignty, Benjamin Bratton proposes that, in allowing technology to infiltrate all aspects of our daily lives, society has constructed an accidental computational megastructure dubbed “The Stack,” the omnipresence of which disrupts the very foundations of geopolitical notions, relationship to the natural environment, and understanding of what it means to be human. Similarly, in a popular editorial piece for The Atlantic called “Is Google Making Us Stupid?,” Nicholas Carr proposes that, thanks to the anti-hierarchical, instantly gratifying nature of the internet, people have lost the ability to deeply focus on printed media, an integral space of self-reflection in which individuals build their sense of subjectivity. While this historical moment is surely unprecedented, this project proposes that we should not bemoan the computer as the hangman of Serious Literature, but instead endeavor to bring Serious Literatures into exciting new dimensions by incorporating computational technology into literary practice. By examining contemporary literary and media theory, the code of Aesthetics and the Aesthetics of code, and the creative potential demonstrated by early examples of “digital literature,” this thesis argues that the literary form is particularly amenable to our coming place in the shadow of The Stack, and endeavors to provide an impression of what this “literature of the future” might look like.

The Annual Festival of Apollo Delphinios: An Affirmation of Milesian Identity
Amanda Evans, Latin and Greek
Sponsor: Professor Joan Breton Connelly, Classics

This thesis considers the Hellenistic so-called “Molpoi Inscription” of Miletos, an ancient Greek city on the coast of modern-day Turkey, and its many interpretations since its discovery in 1903. The inscription describes an annual archaic festival and procession for Apollo Delphinios. The Molpoi (“singer-dancers”) were political leaders of Miletos and cult officials of Apollo Delphinios. They led a ritual procession from Miletos along the Sacred Way to Didyma, an oracular sanctuary of Apollo, stopping at several points to dance and perform paeans (Herda, 2011). The inscription provides a list of these stations, but in most cases their locations have not been accurately determined. This paper examines the physical evidence and previous scholarly interpretations to more accurately locate these stops and explain their significance within the procession. An emphasis is placed on one station that has been reasonably identified: a nymph sanctuary by a spring. This paper explores the potential participation of girls and women in the procession through that venue. The procession’s participants, stations and their implications provide insight into the cultural values of the Miletos in the Archaic period.

Brownstone Brooklyn: Two Blocks in Conversation
James A. Hayes, Politics, Urban Design and Architecture Studies
Sponsor: Professor Mosette Broderick, Urban Design and Architecture Studies

Brooklyn is home to some of the finest and most well preserved historic brownstone row houses in New York City. Each dwelling is best understood within its row of its architecturally similar neighbors, often developed simultaneously by speculators. This project traces the development of two blocks in the Fort Greene neighborhood of Brooklyn between 1855 and 1886 using historic atlases and property records. Dividing the two blocks are Washington (now Fort Greene) Park and Myrtle Avenue, boundaries across which significant differences in the built environment persist today. The block south of the Park and Myrtle Avenue, preserved within the Fort Greene Historic District, provides an extant foil to the north block—razed, de-mapped and redeveloped before World War II to house Brooklyn Navy Yard workers. By depicting the evolution of both blocks through the neighborhood’s development boom, and by contextualizing them within nineteenth-century Brooklyn’s industrial past, the project accounts for differences in land use, block and lot coverage, building materials and changing rates of development—characteristics which continue to impact the neighborhood’s urban dynamic.

Christina Hong, History
Sponsor: Professor Stephen Gross, History

Despite years under foreign occupation and the legacy of the Nazi Regime, Germany became a successfully rebuilt nation in the decades following World War II. Looking at the immediate post-WWII period, it is remarkable to see how quickly a semblance of German government was reestablished in the US zone of Germany. Dr. James Pollock, an American professor with expertise in German politics, was hired to aid the Military Government with the rebuilding of Germany’s government. This monstrous task proved to be the perfect one for Dr. Pollock, and with his recommendations, the Military-Government created the Länderrat in October of 1945. The Länderrat, an organization composed of German civilians, was responsible for coordinating interstate matters in the US zone. This paper explores the context behind the creation of the Länderrat, its structure and procedures, and the ways in which it adapted to each task it was given. Through
analysis of Pollock’s diary, personal correspondence, and the correspondence, directives, and resolutions of the Military Government and the Länderrat, this paper aims to reveal how, in one year, a coordinating agency of German civilians under the supervision of the Military Government lay the foundation for successful political reconstruction in Germany.

“Tu basura es mi tesoro”: Rise of the Garbage Economy and Worker Cooperatives in Buenos Aires
Vivian Hui, Global Liberal Studies, Spanish and Latin American Literatures and Cultures
Sponsors: Professor Maria de Lourdes Dávila, Spanish and Portuguese; Professor Joyce Apsel, Liberal Studies

Neoliberalism’s failure in Argentina, which culminated in an economic crash in 2001, brought about an increase in poverty and a rise in the informal economy. Urban recyclers, or cartoneros, are one such group of informal workers. Many cartoneros live in the villas, which are informal settlements found either surrounding or within urban cities in Argentina. They are set apart from the rest of the city and highly stigmatized. This project traces the spider web of effects that resulted from the economic crash and explores how the cartoneros, despite their discrimination, were able to revolutionize recycling in Buenos Aires and form cooperatives that found a way to produce outside of the neoliberal system. This project will connect the cartonero movement to a larger worker movement that was seeking to transform production in Argentina through the rise of worker-managed factories. Through César Aira’s novel Shantytown, this project will trace the intersection between the villa, the cartoneros, and popular Argentine society. Aira’s novel employs two of the most powerful images of marginalization and social crisis in Argentina, the villa and the cartonero, which will be used to open up a discussion on movement and progress within the villas.

Refusal and Response: Understanding Shamelism Today
Amber Hunter, English and American Literature
Sponsor: Professor Wendy Lee, English

Samuel Richardson’s novel Pamela (1740–1741) tells the story of a maid guarding her virtue in such a charming way that she eventually marries her master despite his attempted rape. Though Pamela is a canonical text, the phenomenon it sparked—Shamelism—in which those critical of Richardson’s narrator spoke out against her, has not been brought into a contemporary context. This thesis attempts to better understand Shamelism, from its inception to today. The first part briefly parses the phenomenon, contextualizes the hermeneutic of suspicion at its philosophical core, and introduces the key texts: Richardson’s Pamela (1740–1741) and Clarissa (1747), Henry Fielding’s Shamela (1741), and Eliza Haywood’s Anti-Pamela (1741). Textual elements and meta-aspects comprising Shamelism are then explored beginning with an overview of Pamela’s epistolarity, a form in which unreliability becomes embedded. Temporality is then briefly considered: Shamelists take issue with a temporal rift found in Pamela not for its ontological impossibility but because the narrator must be faking the mental states she writes about. The third section discusses Clarissa and the complicated epistemology of desire that arises within the phenomenon: briefly, that a female can never be conscious of her desire. Finally, the fourth section details the active reader. Though Shamelists begin with the intent of reparative, activist readings—bringing truth to the public via their responses—this proves impossible and transforms into violent responses. The conclusion contemplates Shamelism through discussion of Lena Dunham’s Not That Kind of Girl (2014) and the criticism her essay on rape received. Shamelism, though not explicitly called such, rears its ugly head with Dunham as the target. Though Shamelism has evolved, the definition this thesis works to understand remains: Shamelism is a gendered hermeneutic of suspicion mobilized by specific textual elements that results in violent responses from an active reader.

Captive Conquerors: Language Attitudes and Greek Linguistic Prestige in the Roman Empire
Tasha Ing, Classics
Sponsor: Professor Raffaella Cribiore, Classics

Bilingualism and multilingualism were not minority traits in the ancient world. Though the Romans ruled over a vast area of land containing a wide and likely innumerable variety of languages, they never truly had a governing policy that named Latin the official language of the empire. This project explores the general Roman attitude towards other vernaculars of the time, concentrating on the exceptional enduring prestige of Greek language and literature. The relationship between Greek and Latin literature is also a focus, specifically discussing the rise of original Latin works and their comparability to their Greek influences and counterparts. The primary sources discussed in this research date from Ovid in the first century CE to Gellius at the end of the second century CE, with some further discussion of later antiquity.

A Model of Manhood: Body and Race in John Singer Sargent’s Nude Studies for Boston’s MFA Murals
Emily Jensen, Art History
Sponsor: Professor Pepe Karmel, Art History

In the later years of his career, the artist John Singer Sargent took increasingly fewer commissions for the society portraits he was known for, instead turning to several major mural projects in Boston, one of which was the rotunda of the Museum of Fine Arts (MFA). In 1917, Sargent asked a local hotel bellhop, Thomas McKeller, to model for many of the allegorical figures depicted in the murals, male and female. The drawings of McKeller are some of the few works Sargent
made representing black men, all of which remained in Sargent’s private collection, un-shown and unsold. Sargent’s use of a black man to model allegorical figures that were eventually painted as white is little studied. This thesis explores Sargent’s entire oeuvre of nude male drawings, watercolors, and paintings to contrast how the artist constructs race, masculinity, and the masculine body across his career. How does the crisis of masculinity at the fin-de-siècle through to WWI necessitate a new kind of nude form? How do these unique nudes influence the final murals in the MFA?

Rising Prominence of Artists’ Housing in Manhattan and Its Impact upon Neighborhood Gentrification since the Mid-Twentieth Century
Jiyoung Jo, Environmental Studies, Metropolitan Studies
Sponsor: Professor Jonathan Ritter, Urban Design and Architecture Studies

This project defines a new form of residence, artists’ housing, which is a privately owned, privately and publicly subsidized affordable housing which limits residents’ occupation to artists. Around the time of Artist-In-Residence Law’s passage (1971), the availability of cheap lofts inhabited by artists helped to rejuvenate Manhattan’s obsolete manufacturing neighborhoods and financially aided the city through turning these neighborhoods into profitable tax base. Nevertheless, the original low-income artists and residents were displaced after the neighborhoods began to gain fame for their unique artistic character. Concurrent with the rise of loft housing stock was the emergence of artists’ housing. It features a unique voluntary cultural committee made up of artist residents. Although artists’ housing theoretically presents a solution to tie artist communities into existing neighborhoods, not much is known about the actual consequences such locally grounded artist communities bring to the neighborhood. This project examines the neighborhood transformation around artists’ housing through ethnographic observation, interviews, research, and QGIS spatial mapping of three indicators of gentrification: change in gross rent, median household income, and distribution of art galleries. The close case study of three artists’ housings in Manhattan—Westbeth Artists’ Housing, Manhattan Plaza, and El Barrio’s Artspace PS109—proves that the presence of artists’ housing results in a complex state of coexistence between subsidized artists and upper-income neighbors as compared to the case of SoHo loft district due to the nature of organizations involved, restrictions upon potential applicants and the existence of cultural committee.

Chinese Export Silver (1757–1949)
Kailin Jones, Art History
Sponsor: Professor Michele Matteini, Art History

The first definition of Chinese Export Silver (CES) found in the mid-1970s work of Forbes, Kernan and Wilkins in the book *Chinese Export Silver* is, “metal work made in China by native craftsmen, of silver and silver gilt, using traditional Chinese techniques, but chiefly following Western forms, for export to the West during the period of trading voyages chiefly by sail.” This thesis challenges that definition by examining CES at the intersection between silver as a commodity and the social context within which it was crafted and subsequently traded. In doing so, the intention is to fill in some of the gaps in the cultural and historical context of the places and people that were involved in the transactions that led to the creation of these silver objects and their movement to the “West” as well as within China. In addition, this thesis analyzes the formal and visual qualities of silver objects that derive from the interaction of multiple cultures, deciphering the choice of symbols and artistic decisions that were made that make CES a unique silver genus. The perception and understanding of this silver category will be examined in the context of three phrases: (1) pre-production (silver as a raw material and its movement and use in the context of global trade), (2) production (the places, people and ideas that were behind the creation of CES objects), and (3) post-production/reception (the perception of these objects in the contemporary art history and museum setting) and why CES deserves more significant recognition than it currently receives.

Urban Design as a Vehicle of Repression: Lessons from Naypyidaw
Alexander Kario, Urban Design and Architecture Studies
Sponsor: Professor Jonathan Ritter, Urban Design and Architecture Studies

The rationale behind Myanmar’s military government’s 2006 decision to move the country’s capital from its economic and cultural center in Yangon to an isolated greenfield site in the country’s remote interior remains unclear. Touted by the international media as a desolate ghost city and frivolous vanity project, the new capital Naypyidaw is a unique case study in that it represents a pure, dated form of absolutist vanity project, the new capital Naypyidaw is a unique case study in that it represents a pure, dated form of absolutist central planning that has nearly disappeared from the world since the demise of the former Soviet Union. Lacking the layered, multi-vocal complexity of organic old-growth cities, Naypyidaw reflect a legible, univocal agenda perpetuated by a violently repressive authoritarian state. This past winter the author traveled to the newly open and democratic Myanmar to investigate the ways in which this agenda manifested in the planning and design of Naypyidaw. The author encountered a city where basic considerations, such as public amenities and quality of life, were largely ignored while paranoid fears of regime change determined even the most minute details. Through dozens of interviews with government personnel, civil society leaders, international organizations, and scholars as well as innumerable readings, a chilling narrative was
pieced together about how Myanmar’s unpopular and notoriously corrupt old military guard used urban design to ensure its entrenched influence would remain perpetually intact and irremovable even after substantive democratic reform.

**Alternative Notions of Identity in Mizrahi Literature**

*Em King, Middle Eastern and Islamic Studies*

**Sponsor: Professor Nader Uthman, Middle Eastern and Islamic Studies**

Mizrahi is a term describing Arab Jews, and more generally, Jews from the Middle East, Asia, and North Africa. How have Mizrahim used literature as a mode to give voice to the Mizrahi experience in Israel? Since the creation of the state of Israel, Israeli literature has entered a new era, coinciding with the gathering of the Jewish Diasporas into a single nation. However, the dominant narrative is primarily representative of the Ashkenazim, i.e., Jews of European decent, rather than other communities including the Mizrahim, the majority population in Israel. This narrative generalizes the Israeli experience into one history and identity. Though a demographic majority, the Mizrahim have been discriminated against in politics and society, and their experiences have been suppressed in historical narratives. Rather than remain passive, the Mizrahim have used other avenues to navigate this forced silence. The aim of this paper is to analyze two Mizrahi novels, *Outcast* by Shimon Ballas and *Refuge* by Sami Michael. These authors use literature as a method to explore and challenge the dominant narratives of identity by providing alternative notions to systematized categories of identity. Academic analyses of Mizrahim in Israeli are only a few decades old and largely anthological in practice. Therefore, by delving into key themes of these two major Mizrahi authors, this paper aims to achieve a deeper understanding of underrepresented perspectives, which resist single narratives idealizing Israel as a home for all Jews without encompassing the diversity of identities.

**1229 after 1968: Intellectual Labor and the Reimagining of the Medieval University**

*Lauren Kirk, Comparative Literature, History*

**Sponsor: Professor Stefanos Geroulanos, History**

After several students were killed during a violent riot in 1229, scholars at the University of Paris closed the university for two years in protest. This mostly forgotten incident, previously known only to a few historians, gained a new significance after the events of May 1968 in Paris when students rose up again and occupied the University. By examining the new ways in which the medieval university was studied and discussed in the immediate aftermath of 1968, this project seeks to better understand the motivations of its participants. It posits that historians who were then only students carried their personal experiences into their academic research. As a result one can identify, between the lines of their seemingly esoteric work, deeper philosophical arguments about violence and the nature of learning. To that end, it treats secondary sources about the medieval university written after 1968 as primary sources on the movement of 1968 itself and challenges the supposed distance between historians and their subjects. Interwoven with this analysis is a new narration of the events of 1229 themselves, which clarifies important differences between the two conflicts, absent from history books, which overemphasized their similarities in order to legitimate the actions taken by twentieth century students after the fact.

**Duane Park and Its Environs: A Contemporary Identity Crisis**

*Tilemahos Koutsogeorgas, Hellenic Studies, Urban Design and Architecture Studies*

**Sponsor: Professor Jonathan Ritter, Urban Design and Architecture Studies**

The thesis examines the open space, architectural history, and contemporary development of one irregularly shaped block of Duane Street in the Tribeca neighborhood. Currently, the site assumes a triangular shape. The dimensions and relationships between its three main architectural components—the buildings, the sidewalk, and the streetscape—are strange and complicated. The imbalance between these three architectural entities is clearly understood upon entering the space. There is a lack of clear spatial progression and harmony between the three elements. This design complication derives directly from the site’s change in function and character over time. In order to understand the dichotomy that currently exists in the site’s identity between the food warehouse role of its past and the luxury lifestyle of its present, the site’s historic and architectural evolution must be assessed. Therefore, the end goal is to reveal and bring awareness to the complex relationship between space and architecture created throughout time, how it occurs, and its possible social impacts.

**Visual Culture as Royal Propaganda in Post-'Abbasid West Asia, 900–1500**

*Krishna Kulkarni, History, Middle Eastern and Islamic Studies*

**Sponsor: Professor David Ludden, History**

This thesis seeks to analyze the modes by which cultural production functioned as courtly propaganda for non-Arab rulers in the post-'Abbasid Middle East and Central Asia. By examining West Asian visual media from 900–1500, this thesis argues that cultural products served a crucial function in representing, legitimizing, and eternizing royal authority. By repurposing historical emblems of royal authority to suit contemporary political themes, visual media, such as textiles, illustrated manuscripts, ceramics, and architectural
monuments, validated royal authority with a diverse repertoire of symbolism. Intellectual concepts about kingship were expressed through literary culture, which provided an ideological backbone to visual propaganda. The relationship between military conquest, commerce, and artistic innovation constituted a fundamental process to the fomentation of effective ruling authority in a highly diverse region witnessing historic political, religious, and demographic shifts. This argument relies on the notion that militarism and cultural efflorescence are not mutually exclusive. It seeks to unravel the mystery of how and why brutal conquerors presided over such artistically and scientifically fruitful periods in West Asian history.

**Defining Zananegi: How Zanan Magazine Influenced Feminist Discourse in Post-Revolutionary Iran**

Leila Lajevardi, Middle Eastern and Islamic Studies

**Sponsor:** Professor Mikiya Koyagi, Middle Eastern and Islamic Studies

The purpose of this research is to understand how femininity and womanhood were defined in Iran during the years following the 1979 revolution. The project involves looking at Zanan magazine, a popular women’s magazine established in Iran in 1992. The magazine defines itself as an “Islamic feminist” work and is seen as the intellectual heir of sociologist and revolutionary figure Ali Shariati. However, the articles of the magazine reveal a much more complex discussion of womanhood. The author here translates the magazine’s Persian articles to get an understanding of the topics and discussions that were circulating at the time of publication. Upon examination of the magazine, it is clear that through its use of translated American and European works, the magazine views the obstacles of womanhood as a transnational issue. This research is important to understand the strategy the magazine employed to circulate feminist discussion under a patriarchal legal system and social structure.

**“You Have to Go to...”: Post-Socialist Contemporary Art Scenes in China vs. Eastern Europe**

Lindsay LeBoyer, Art History

**Sponsor:** Professor Michele Matteini, Art History

This thesis considers the recent emergence of post-socialist and “post-censorship” art scenes in China and Eastern Europe. Examining art zones in Beijing, Shanghai, Prague, and Budapest, the author raises the question: What do these post-socialist and “post-censorship” art scenes represent for those who work in and visit them? Do they exist as outlets for creative expression? As tourist centers? As political assets? To address these concerns, the author combined personal observations in each region with art historical analysis and expert interviews to evaluate a range of critical arguments regarding the function of art as dissonance/resistance, the efficacy of art censorship, and the commodification of “political” art (especially in China) by audiences in the Global North. It is argued that—depending on the context—artists, institutions, and governments understand art as different forms of fiscal, political, and cultural capital that can be exchanged for desired outcomes. From an art tourism perspective, it well may be more productive to understand these regions not just through their national geographies but also as allied centers of particular forms of art tourist practice that cater to the countercultural consumer.

**The Representation of Violence against Women in Claudia Salazar’s La sangre de la aurora**

Dayana Ledezma, English and American Literature, Romance Languages

**Sponsor:** Professor Maria de Lourdes Dávila, Spanish and Portuguese

In 1970, The Shining Path, (Sendero Luminoso), emerged as a Peruvian revolutionary organization that followed a Marxist-Maoist-Leninist ideology and perpetrated violent terrorist attacks. In 2003, the Truth and Reconciliation Commission issued a report stating that both the Peruvian government and the senderistas (members of the Shining Path) were responsible for approximately 69,000 deaths during the conflict. It is a common trope to state that there are no words to describe horrendous acts of violence. For example, Elaine Scarry (1985) writes, “Physical pain...is language-destroying.” This thesis argues against the idea that violence is unrepresentable. The author examines Claudia Salazar Jimenez’s novel, The Blood of the Dawn (La sangre de la aurora), and its representation of violence against women during the internal conflict in Peru. In her short and fragmented novel, Salazar Jimenez uses the voice of three different women to capture the brutalities of the armed conflict. The author argues, using Maurice Blanchot, that the fragments are necessary in the representation of disaster, and explores how Salazar incorporates elements of both photography and theatre into these fragments to question the representation of the violence. Some of the central questions in this project are: How do photographic discourse, specifically framing and the subject of the photographer, and theatre, specifically the notions of repetition, singularity and the “present,” as theorist Alan Badiou explains in his essay Rhapsody for Theatre, help the audience understand the fragments of violence in the novel? What are the limitations and theoretical implications of utilizing these media? In what ways do these elements bring the audience closer to the acts of violence and allow the audience to comprehend and understand the events of this tumultuous time in Peruvian history?
Evolution of the Bra
Rachel Lipka, Art History
Sponsor: Professor Jeffrey Carr, Stern School of Business

Undergarments have experienced reinvention steadily since the sixteenth century. Shifting dramatically from restricting corsetry to buttressing bras, there is no question that lingerie has a rich history. Why, though, have undergarments changed? What was the driving force causing shifts in design? Even broader and more poignant a question: do these garments serve the purpose of function or fashion? Generally, when people consider the role of corsetry, they assume the pieces were purely for aesthetic purposes, sculpting the female body to meet idealized beauty standards. Often women complained about the discomfort of corsetry and reveled in the relief of shedding the girdle. However, when asked about the modern day bra, the garment is assumed to serve as a necessary literal support for everyday living. Many women take for granted the necessity of a bra, noting the pain associated with going without one. Yet, it is common knowledge that the vast majority of females are wearing severely ill fitting, and thus, uncomfortable bras. This presentation will identify exactly when and why perception variance occurred, and will explore the reasons for said shift. Pinpointing climactic shifts in the design of lingerie and identifying coinciding social and cultural changes is proven to inform a deeper understanding of the often-overlooked garment.

Losing Out: Perception and Fact in the Relative Impact of Immigration and Technology on Unemployment in the United States
Sabine Ludwig, Global Liberal Studies, Spanish
Sponsor: Professor Jordana Mendelson, Spanish and Portuguese

The purpose of this project is to shed light on misinformation received from the media, especially regarding the causes of unemployment. In order to adequately present this problem, an analysis of popular media outlets is juxtaposed with a case study of public perceptions of the causes of unemployment in Orange County, California. Orange County was chosen because it has a high volume of immigrants (immigration being one of the key fallacies here discussed regarding perceived causes of unemployment). It is also a historically conservative county but voted blue in the latest presidential election. The author then analyzes the impacts of both technology and immigration on the American workforce in order to demonstrate that automation, though discussed rarely relative to immigration by the media, in fact, is the largest threat to American workers. Finally, the author closes with a chapter on how we ended up here, with a president whose sole focus appears to be mitigating the effects of immigration and globalization, with no mention of the impact of automation, and follow that with suggestions from various experts on how this obstacle can be overcome.

An Artist’s Love Affair: Benvenuto Cellini and Rendering Male Beauty
Sarah Mackay, Art History
Advisor: Professor Dennis Geronimus, Art History

For the renaissance artist depicting beauty proved deeply challenging. Beauty was elusive, and in crafting it artists were forced to grapple with numerous factors, namely, patronage demands, nuanced theory, artistic rivalries, and a shifting dynamic between the social and religious spheres. Benvenuto Cellini has acquired widespread recognition for both his artistic works and his colorful autobiography, La Vita. More than a recounting of his life, La Vita is hyperbolic and reads like a slew of street brawls, run-ins with the law, assertions of male bravado, inexplicable miracles, and homoerotic love affairs. Yet Cellini was, beyond his famed autobiography, perhaps the doyen of renaissance metal workers and a skilled marble sculptor. His works are idiosyncratic, complex, and undeniably beautiful. By using first hand formal and literary analysis, this study places his autobiography and three marble works—Ganymede, Apollo and Hyacinth, and Narcissus—in dialogue in an effort to elucidate which formal and stylistic characteristics he believed were intrinsic to male beauty. Because these three works were not formally commissioned, the artist was allowed to work relatively unhindered by patronage specifications, and so it can be argued that they present a more intimate reflection of his personal artistic preferences. Though the topic of renaissance beauty has been widely discussed amongst art historians, this research is significant in that it capitalizes on the artist’s crafted identity as a means of further understanding his aesthetic values.

¿Firme y Duradera? The Peace Process and the Transitional Justice System in Guatemala
Vaclav Masek, Global Liberal Studies, Sociology, Spanish
Sponsors: Professor Sibylle Fischer, Spanish and Portuguese; Professor Christian Parenti, Liberal Studies; Professor Patricia Navia, Liberal Studies

This project is focused on historical memory in post-conflict Guatemala, a country that suffered a ravaging civil war between 1954 and 1996. The research question is the following: How do the practices that surround citizenship and nationhood influence post-conflict transitional justice and collective memory in Guatemala? First, the investigation is interested in exploring how collective memory is manifested in Guatemala’s legal framework throughout its history. The first chapter is a review of the relationship between the State and its citizens from a historical perspective. The construction of a national identity through the seminal documents of modern
The liberated female subjectivities. The texts exemplify a performative adoption of the practice self-insertion than has existed in the male-dominated canon. I Love Dick This project concludes that to, in turn, expose the conditions of their oppression by men. How Heti and Kraus' fictional personas perform self-exposure readings of scenes of shame in both texts, it is demonstrated employ the practice to a particular feminist end. By close produced by authorial self-insertion and that Heti and Kraus personas. Drawing on feminist discourse, it is argued that construct layered authorial personas to obscure a clear sense of authorial intent. This confounding technique allows the reader to project conclusions about the authors' motivations and to critique the provocative gestures of their fictional personas. Drawing on feminist discourse, it is argued that an author's expression of gender dictates the narrative effects produced by authorial self-insertion and that Heti and Kraus employ the practice to a particular feminist end. By close readings of scenes of shame in both texts, it is demonstrated how Heti and Kraus' fictional personas perform self-exposure to, in turn, expose the conditions of their oppression by men. This project concludes that How Should a Person Be? and I Love Dick offer a radically different vision for authorial self-insertion than has existed in the male-dominated canon. The texts exemplify a performative adoption of the practice that provactively uses shame and self-exposure to represent liberated female subjectivities.


The use of authorial self-insertion, a literary technique in which the author materializes as a character within the text's fictional world, has been dominated, at least in an American context, and defined by male writers: e.g., Philip Roth, Paul Auster, Ben Lerner, Karl Ove Knausgaard. This study investigates two contemporary works by female authors who utilize the practice: Sheila Heti's How Should a Person Be? (2010) and Chris Kraus' I Love Dick (1997). Unpacking concepts from genre and authorship studies, the study observes how Heti and Kraus' texts evade classification and construct layered authorial personas to obscure a clear sense of authorial intent. This confounding technique allows the reader to project conclusions about the authors' motivations and to critique the provocative gestures of their fictional personas. Drawing on feminist discourse, it is argued that an author's expression of gender dictates the narrative effects produced by authorial self-insertion and that Heti and Kraus employ the practice to a particular feminist end. By close readings of scenes of shame in both texts, it is demonstrated how Heti and Kraus' fictional personas perform self-exposure to, in turn, expose the conditions of their oppression by men. This project concludes that How Should a Person Be? and I Love Dick offer a radically different vision for authorial self-insertion than has existed in the male-dominated canon. The texts exemplify a performative adoption of the practice that provactively uses shame and self-exposure to represent liberated female subjectivities.

The Laissez-faire Twentieth Century: A Legal Examination of Neoliberalism's Democratic Installment into the American Economy Ryann McQuaid, History, Politics Sponsor: Professor Manu Goswami, History

It has been argued since the eighteenth century what the role of the state is within economic markets. Radical free-market capitalist theories argue that the state should have no role in the direction of the economy. But whether the state plays an active role in economic planning, there are other means by which they can control the economy. It is through social regulation, namely law, that the government can direct policy trends. In the case of the United States, the Supreme Court is the highest body in which laws, and thus social norms, are affirmed. Furthermore, the issues that the court hears have a cultural significance and reflect issues of contention during a certain historical period. In the following paper, the rise of individualism in society is connected with the U.S neoliberal economic policies of President Reagan and President Clinton. This confluence of the social and the political cumulated in the affirmation of these policies in the Supreme Court's Citizens United vs. The Federal Election Commission (2010).

Sacrificed Wife, Obedient Mare, Divine Mother: Performing Gender and Ritual in Ramākānt's Rānī Saṭī Carit Manas Gaurika Mehta, Religious Studies, South Asian Studies Sponsor: Professor Gabriela Nik. Ilieva, Middle Eastern and Islamic Studies

Composed in the Avadhī dialect of Hindi, Ramākānt's Rānī Saṭī Carit Manas is a Hindu devotional text used by the Mārwārī community. The Mārwārīs reside largely in the eastern Indian state of West Bengal and the western Indian state of Rajasthan. Rānī Saṭī Carit Manas narrates and celebrates the performance of ritual self-immolation (satī) undertaken by the regional goddess Rānī Saṭī. As no other English language translation or study of this text exists, the author here relied on her own translation of the text for this research. Additionally, the author draws on interviews with Mārwārī women conducted in the city of Kolkata between 2015 and 2017. This research project investigates the religious and literary mechanisms that direct Rānī Saṭī's performance of womanhood, sacrifice and goddesshood in the text. Examining Rānī Saṭī's journey from womanhood to goddesshood via sacrifice, the research analyzes the replacement of biological aspects of motherhood with alternative and idealized divine modes of maternal performance. By conceptualizing ritual in terms of three identifiable agents of mortal, semi-immortal and immortal status, the research proposes a new model for the analysis of Hindu ritual adaptation. The model accounts for ritual adaptation by contextualizing ritual performance in spatial terms and tracing ritual locomotion across a tripartite world comprising the mortal, sacrificial and immortal realms.

The Corporate Guild Order Control of the Florentine Republic in the Thirteenth and Fourteenth Century Milad Mohammadi, History, Political Science Sponsors: Giovanni Braico, Italian Studies; Professor Matteo Duni, NYU Florence
This paper discusses how professional guilds in the thirteenth and fourteenth century Florentine Republic rose to power and how they maintained the structure and mechanisms of their power. Furthermore, this paper demonstrates how the Florentine Republic during this period was dominated by these guilds through their cultural, economic, and political influence. Also discussed is the rise of aristocratic families, such as the Medici, which functioned as the new power structure that ended this guild-based society in the late fourteenth century.

Mirrors in Movement: Thomas De Quincey in the Literature of Jorge Luis Borges
Samuel Simon Moore, Comparative Literature
Sponsor: Professor Maria de Lourdes Dávila, Spanish and Portuguese

This comparative study examines the literary operations of Jorge Luis Borges and Thomas De Quincey, the former heavily present in the latter work. The author turns to Michael Bloom’s Anxiety of Influence and Foucault’s The Order of Things to contend that Borges is not influenced by De Quincey. Rather, the literature of the former can largely be seen as a mirror operation of the latter’s. The author considers the intersection or pli of these operations first in language, examining syntactical congeneres in the visions of the protagonists in Borges and De Quincey. Crucially, the verb tenses of these visions suggest that the difference of the authors lies in their constructions of time and space. Next, the author employs Bakhtin’s seminal study of the chronotope (viz. kronos and topos, “time” and “space”) in relation to the protagonists in Borges and De Quincey’s “The Other Death” and “The Glory of Motion,” respectively. By delineating the trajectory of movement the authors finds that Borges’ and De Quincey’s protagonists motion from the imago of man of letters to that of man of action, a binary often employed in Borgesian criticism. There is an atavistic desire to enter fiction when confronted with death, to choose a literary rather than mundane end. In order to facilitate the possibility of two histories (one in fiction, one in real time), movement is required. This study suggests that the manifestations of movement in the mirror opera of Borges and De Quincey are the foundation of the authors’ intertextual relationship.

A Paper Model World: Constructing Reality in Contemporary Photography
Sarah Myers, Art History
Sponsor: Professor Shelley Rice, Art History

Thomas Demand photographs small-scale paper models of environments associated with political and social histories, specifically those of Nazism and World War II. When he constructs the models, he strips the historical scenes of specific content (e.g. a murder scene without the blood or body) and, in the process, creates a whitewashed version of history. Demand is art historically grouped with his predecessors and contemporaries at the Kunstakademie Düsseldorf. Each artist from this school approaches themes of reconstruction and truth through their phenomenological representation of space. This project aims to decipher the symbolism behind Demand’s removal of indexical prints from documentary photographs and to theorize what the increasing use of modeling in contemporary photography might indicate about the visual literacy of the twenty-first-century viewer.

Japonismus and Jugendstil: Japanese Influence on the German Art Nouveau
Mary-Brett O’Bryan, Art History
Sponsors: Professor Christopher Wood, German; Dominik Zechner, German

Because German individuals were largely responsible for the first artistic contact with Japanese culture in the modern era, it would seem plausible to assume that Germanic art would exhibit the earliest and most significant influence of Japanese art (Watanabe, 1984; Mervart, 2009); this was not the case, however. The influence of Japanese art, though it could be clearly seen in the art of countries such as France and England in the 1860s and 1870s, did not fully arrive in German art until the beginning of the Art Nouveau, or Jugendstil, era in the late 1880s and 1890s. Why was there this delay? When the Japanese influence finally arrived in the German-speaking world, who or what was responsible for this belated appearance? And, what visual form did this influence take? The focalization of the art market in Paris during this period explains the corresponding focalization of the European interest in Japanese art in France (Lenman, 1989). When the art of Japan did arrive in Germany and Austria, this transfer of influence was due to the work of German-born art dealers and art historians such as Siegfried Bing and Justus Brinckmann (Weisberg, 2005). The Japanese influence on German art can best be seen in the German and Austrian Art Nouveau styles, which are investigated in
this project through the work of three particular artists: Otto Eckmann, Gustav Klimt and Emil Orlik (Hiesinger, 1988; Berger, 1993; Salm, 1972).

Analyzing the Disparity between African American Artist’s Musical Success and Mainstream Award Recognition
Chinekwu Osakwe, Chemistry, Music
Sponsor: Professor Christine Dang, Music

Over the past few years there has been an increasing awareness about the lack of recognition of African-American musicians during mainstream award shows, especially considering the cultural relevance and impact of said artists. This hypothesized disparity would not only show society’s hierarchical flaws, but it could lead to certain artists gaining advantages like sponsorships and continued record deals, while leading to the professional hindrance of others. The Billboard charts are the industry standard for determining the success of popular music across the country and the GRAMMY Awards is one of the biggest and most prestigious award shows for artists around the country—especially popular music artists. By looking at the Billboard’s Hot 100 archives after the passing of the Civil Rights Act of 1964, starting from 1965 to 2015, it was possible to see the ratio between African-American artists and those who do not identify that way. When analyzing the GRAMMY award archives over the same period, the ratio of representation of the nominees within the Record of the Year category showed a structural disparity based on race.

Medieval Pietàs, 1340–1480: From Compassion to Remission
Xiaoli Pan, Art History
Sponsor: Professor Kathryn Smith, Art History

Art history favors the art of the elite, and while costly ecclesiastical and royal patronage can help explain the political and social systems of the middle ages, it falls short in accounting for the habits and beliefs of most lay people. This paper hopes to address this gap by examining audience response towards devotional sculptures through a case study of the quintessential medieval devotional sculpture: the Pietà. By using a combination of visual, literary, and cultural analysis in comparing four paradigmatic Pietà sculptures against contemporary devotional texts, this paper presents two distinct Pietà traditions: a fourteenth century tradition intended for a clerical/monastic audience, and a fifteenth century mass-exported tradition intended for lay audiences. These two Pietà “types” offered different narratives of the Passion, prompting distinct devotional responses. While monastic Pietàs encouraged a mystical affective piety, lay Pietàs addressed temporal concerns over Purgatory and remission of sins. This paper shows how active, complex, and imaginative the process of viewing was in the Middle Ages, and how faith and superstition wove together to form the basis for medieval piety.

Redefining National Security: Assessing South Korean Democracy in a Division System through Memoirs of the Kwangju Uprising in May 1980
YoonJean Park, History
Sponsor: Professor Monica Kim, History

How is state violence justified? When a state declares a state of emergency, law and politics bend in favor of the security of the state, allowing exceptions for certain practices such as state violence. The Kwangju Uprising of May 1980, one of Korea’s ongoing democracy movements, captures a moment when proclamation of martial law ignited unprecedented state violence. When people in the city of Kwangju run out to the streets to demand a democratic government, General Chun Doo-hwan, sent military troops to suppress the demonstrations by declaring martial law. As a result, the Kwangju Uprising involved a major clash between troops and student activists. During the ten-day uprising, what was at stake when soldiers pointed guns toward pro-democracy civilians and how did these civilians perceive soldiers enacting violence against them? By analyzing primary sources such as state documents and memoirs from civilians, student activists, police, and soldiers, this thesis examines how soldiers and civilians perceived each other during the Kwangju Uprising vis-à-vis the state’s justification for taking national security precautions. While acknowledging soldiers are commonly perceived as state agents, this thesis disaggregates the state into a less monolithic entity to reveal state violence during the Kwangju Uprising victimized not only civilians but also state agents executing mandated acts of violence. By shedding light on the agency of soldiers, the thesis will reveal the implications of Korean mandatory military system and discuss how South Korea being in a “division system” with North Korea imposes limits on Korean democracy by putting unnecessary emphasis on national security, which provides justifications for violating fundamental values of democracy.

Intermarriage between Mormon Missionaries and Indigenous Women
Priya Pasricha, History
Sponsor: Professor Rebecca Goetz, History

This project explores race and reputation through three instances of intermarriage between Mormon missionaries and Native women during the mid-nineteenth century in the Great Basin Region. The persistent and strong othering of Mormons due to polygamy left them outcasts from mainstream American society. Native groups were also persecuted through violence and stereotypes. Intermarriage allowed both groups to bridge this gap of strangeness and join for a moment in history. However, the intermarriages were rare

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and eventually stopped being accepted almost altogether. It is argued that despite their shared persecution, the desire for Mormons to reclaim their American identity wedged the groups further apart. This past winter the author went to Utah to study the excellent records at Brigham Young University and the University of Utah. The author utilized diaries, letters, and descendants’ stories for the three couples to analyze the perceptions Native people and Mormons had of each other. This project includes theological support for intermarriage, reactions to the couples, and the aftermath of these marriages in order to delve into the deeper issue of race, which ultimately divided these groups.

Utopia, Interrupted: The Use of Ebenezer Howard’s, Le Corbusier’s and Jane Jacobs’ Planning Principles at Battery Park City
Zoe Priest, Urban Design and Architecture Studies
Sponsor: Professor Jonathan Ritter, Urban Design and Architecture

Battery Park City in Lower Manhattan was built from scratch on landfill after twenty arduous years of planning between the 1960s and 1980s. It was built to be a “new-town-in-town,” a brand new neighbourhood that would integrate seamlessly into the New York City vernacular. The master plan was one of many that came and failed before it, and it was the only one that incorporated both the history of its surroundings and more than one approach to planning. Utopian notions about modularity and the superblock approach of the 1960s and 1970s characterized the earlier plans, which failed like many of the ideas pioneered by thinkers Ebenezer Howard and Le Corbusier. Instead, Battery Park City as built is an amalgamation of utopian approaches to planning and the more diverse and organic theories of Jane Jacobs, who based her ideas on the community patterns, history, and diversity of Greenwich Village. While the planners of Battery Park City intended it to be neither utopian nor Jacobsian, its extension of the Manhattan vernacular can be understood as a combination of the ideas of Howard, Corbusier and Jacobs. Through analysis of these ideas and the various plans for what became Battery Park City, along with close formal analysis of the site itself, this project identifies the ways in which Battery Park City creates a new synthesis of vernacular and utopian planning.

“A Oneness You Strive For”: The Ooloi as Necessary Queer Presence in Octavia Butler’s Dawn
Weston Richey, English, Philosophy
Sponsor: Professor Carla Thomas, English

Octavia Butler’s science fiction novel, Dawn (1987), the first in the Xenogenesis trilogy, features an alien species, the Oankali, with three sexes: male, female, and ooloi. Existing feminist and queer scholarship has suggested that Butler reinforces heterosexism and traditional figurations of gender. This paper contends, as its point of departure, that such criticisms do not focus enough on the presence of the alien in Butler’s work. By performing a queer reading of how Butler portrays the ooloi, this paper argues that, in fact, they may be read as queer figures and that their queerness is figured as necessary for the creation of intimacy among humans. This paper then explores criticisms of Butler in existing scholarship, both direct readings of Dawn and other works by her as well as indirect criticism extrapolated from queer theory. In exploring these, the paper concludes that such criticisms, in this context, actually serve to support and deepen the primary thesis of the paper: that aliens, the ooloi, are a necessary queer presence for Butler in that they correct for psychological and biological deficiencies on the part of the otherwise heterosexually figured human characters.

The “Proceso’s” Public: How Argentina’s Last Military Dictatorship Shaped the Urban Landscape of Buenos Aires
Molly Rockhold, Spanish, Urban Design and Architecture Studies
Sponsors: Professor Gabriel Giorgi, Spanish and Portuguese; Professor Jonathan Ritter, Urban Design and Architecture

This project sets out to analyze the involvement of the last Argentine dictatorship (1976–1983) in the sphere of public space, taking the city of Buenos Aires and its urban infrastructure as a case study. Throughout its seven-year reign, the dictatorship violently implemented the “Proceso de reorganización nacional” (The “National Reorganization Process”) that simultaneously repressed democratic government opposition and sought to “clean up” Argentine society. This project analyzes two major projects of this “Proceso,” the creation and renovation of neighborhood parks and plazas for domestic appeal and the planning of a multi-faceted zoo-garden-amusement park complex to fashion an international image. While it can be said that both of these projects benefitted city residents, they prioritized certain demographic groups over others and served the corrupt government’s overarching goal to legitimize itself and appease critics at home and abroad. This research investigates case studies through the study of primary documents, secondary interpretations, personal interviews and formal site analysis. These sources help to answer questions about how urban planning played a central but hidden role during the “Proceso” to create proper public spaces to serve particular conceptions of citizenship and the role of authoritarian modernization throughout this process.
Manuel de Araújo Porto-Alegre: Nation Building Through Landscapes
Isabella Schumann, Art History, International Relations
Sponsor: Professor Edward Sullivan, Art History

Manuel de Araújo Porto-Alegre was a Brazilian artist, architect, playwright, author, historian, and diplomat in nineteenth century Brazil. He was one of the central figures in Brazilian cultural society at the time and was often caught in debates regarding Brazilian politics and culture. While he is often present in Brazilian history, his own oeuvre and impact on art is generally overlooked as being mediocre and insignificant in the long run. This paper offers a new critical approach to Porto-Alegre’s work as an essential part of the creation of a Brazilian identity and as an influence on generations of artists that followed him. Porto-Alegre used his European influences as the vocabulary from which to begin to build a Brazilian narrative and empire.

Vigor Mortis: The Performance of Gendered Death in Der Untergang
Jaclyn Shultz, Comparative Literature, Media, Culture, and Communication
Sponsor: Professor Alys George, German

The connection between cinema and culture is one critically examined from many angles of academia and has been done so since cinema’s birth. Upon the release of the German-Italian-Austrian film Der Untergang (2004), or Downfall, fictionally depicting Hitler’s final days in the Berlin bunker, it received heavy criticism, but one neglected aspect of the film was its embedded commentary on gender. Thus, this project takes a specified lens of considering film in relation to gender and death with the support of a psychoanalytic framework. After close readings of a series of scenes, the film’s two overlooked motifs of couple suicides and the presence of children are analyzed from the context of scholar Elisabeth Bronfen’s (1992) work on the feminine corpse and cultural representations of death. This analysis proves why and how these themes reveal culture’s predisposition to repress the reality of death, cloaking one’s awareness of it through the hierarchical dimensions of gender. As Bronfen considers it, woman and death are two unrepresentable things, yet their abundant allegorical presence through Western culture makes them inextricably bound to one another. While they are infrequently considered together in the cinematic context, this project interprets a single film in order to locate their repressed existence in all of culture and demonstrate how prevalent they truly are.

British Military Escape and Evasion Efforts during World War II
Margaret Shuttleworth, History
Sponsor: Professor Edward Berenson, History

In December 1939, at the start of Britain’s entry into what would become the Second World War, the War Office created a new department: MI9, a division of Military Intelligence tasked with facilitating escapes and evasions of service personnel from prisoner of war camps and enemy-occupied territory. Though the Director of Military Intelligence did not originally view escape and evasion work as an urgent matter, and the department only had 13 staff members until expanding in 1943, MI9 was able to impress the War Office and the Air Ministry with its evident successes on behalf of the war effort. This thesis attributes much of MI9’s success to the hard work of intelligence officer Clayton Hutton, who designed the escape aids that were issued to aircrew and smuggled into prisoner of war camps. Through examinations of debriefings, questionnaires, and memoirs by escapers and evaders, as well as archival material in the Imperial War Museum and National Archives of the United Kingdom—much of which was not available until after M.R.D. Foot and J.M. Langley’s definitive history of MI9 was published in 1980—new evidence is uncovered that reveals the true breadth of the contributions that MI9 made to the Allied war effort. Furthermore, correspondence in the War Office and Air Ministry after the war makes known that these results did not go unnoticed, and that the effective escape and evasion tools and training—which were given no apparent priority at the start of the war—were ultimately guaranteed a continued focus in the years that followed.

Unyielding Earth: The Climate of Racism and the Corporeal Effects of Violence in the Fiction of Toni Morrison
Maya Singhal, Social and Cultural Analysis
Sponsor: Professor Michael Ralph, Social and Cultural Analysis

Using the fiction of Toni Morrison this thesis explores the ways in which racial trauma is corporeally inherited. Most of Morrison’s work is set in all-Black towns, in which Black children might not have such visceral contact with white people. Therefore, while many of the older characters in Morrison’s novels have had traumatic experiences with white people, their children often have not. Still, the children internalize the logics of white supremacy, anti-blackness, and even slavery, without experiences with white people to enforce them. This paper explores the ways in which Black parents in Morrison’s work violently pass down their racial trauma to their children, shaping their children’s bodies through the lens of white supremacy. However, rather than understanding this parental abuse as an example of specifically Black racial violence being passed down, this paper reads Morrison’s work as suggesting that racial violence is an historical, environmental trauma that has shaped the corporeality and mentality of every person in American society. Not only are Black parents culpable for the ways in which they reproduce racism and violence on the bodies of their
children but also violence in American society more broadly must be understood as stemming from the unhealthy and unnatural climate that white people created when they shaped the United States through genocide and slavery. By putting several of Morrison’s novels in conversation with each other, this thesis attempts to create a broader understanding of love, abuse, and racial trauma in the world of Morrison’s fiction.

Y yo seré mi mundo: Ángeles Santos, Surrealism, and the Spanish Avant-Garde
Emma Thomas, Art History, Comparative Literature
Sponsor: Professor Miriam M. Basilio Gaztambide, Art History

Un mundo, painted by Ángeles Santos in 1929 at the age of only eighteen, is considered a masterpiece of Spanish Surrealism by scholars. It was exceptional for its complicated subject matter and the youth and inexperience of its creator, who experimented with the intellectual priorities of 1920s avant-garde artists without their direct influence. When the painting was exhibited, Santos stunned the intellectual circles in Valladolid and Madrid: she had an innate freedom of expression that made even her most metaphorical subjects seem like a natural line of thought. Un mundo engages with a popular element essential to Spanish Surrealism, imbuing avant-garde Surrealist practice with a recognizable visual language that connects to a wider audience. Quotidian experience is at the core of this painting, represented by the societies populating the cubic globe, situated within an existential, cosmic experiment. The terrestrial aspects of Un mondo relate the most to Santos’ Spanish Surrealist practice, but the other worldly elements do not stem from Breton’s brand of Orthodox Surrealism. The strongest of Santos’ influences can be seen in contemporary literary and artistic movements, such as the Generation of ’27, Las sinsombrero, Magical Realism, and the New Figuration and stimulated her own deep capacity for creative experimentation and metaphysical inquiry. Classifying Un mundo as a specifically Surrealist work prioritizes the Orthodox Surrealist movement over avant-garde movements flourishing in Spain, which had a much more immediate impact on Santos’ work. Considering the shifting sociopolitical currents in Spain before the civil war, these local movements gain relevance in Santos’ work that the international, less politically involved Orthodox Surrealist movement cannot have.

Books as Mental Models: Dream Models and Networks in Chaucer’s The Parliament of Fowls
Kevin Tjokro, English and American Literature, Language and Mind
Sponsor: Professor Martha Dana Rust, English

Medieval authors are notorious for lifting lines, borrowing ideas, switching writers, and spotty authorship acknowledgement. So what happens, exactly, when a reader encounters a jam-packed medieval text and begins to process its multiple sources? Does the reader act as a receptor to invasive emissions from the text as in the medieval theory of visual intromission? What kind of interaction among texts occurs? A cooperative reader certainly receives orthographic guidance to navigate through a mass of ideas and imagery. In addition, it can be said that a book is the mediator that moves the reader through the network of overt and hidden references and connections. Here, books will be proposed as mental models as explained in Dual Coding Theory (DCT) through the use of a combination of interdisciplinary analyses on Geoffrey Chaucer’s The Parliament of Fowls. It will be argued that Chaucer creates a network that utilizes the images and ideas of predecessor texts to produce newly formed connections and arguments that build up to a “primed” conclusion. Through this network, a read text interacts not only with itself but also with its sources and its readers. To accomplish this analysis, statistical visualization tools provided from authorship attribution studies as well as information from DCT, cognitive studies and linguistics will be used to better understand the text as an interactive network. Literary and communicative techniques such as priming and ekphrasis will also be discussed as parallel functions that express evidence in favor of books and other forms of text as mental models.

Saudade in 9 Voices: Recursive Processes in Electro-acoustic Music
Keyvan Vafai, Computer Science, Music
Sponsor: Professor Jaime Oliver, Music

Created with the visual programming language Pure Data (Pd), Saudade in 9 Voices uses recursive procedures to communicate between separate manifestations of ubiquitous electroacoustic and computer music methodologies. Embedded within recorded audio is a quantitative aural memory measuring by some error what has sonically, physically occurred. The human listeners, on the other hand, tend to build for themselves an architecture of allotted meaning and association around audio, one that inherently filters the physicality of sound waves into semiotic and source-identifying descriptions. Saudade seeks to use nine sources for audio material of which the performer dissects and expands its individual components, acoustically abstracting them from their origins into meditations on the glossed-over memory of each recorded sound. The performer’s sounds move in a cycle of audio beginning with granular synthesis and granulation, extending to the additive synthesis of harmonized sinusoidal peaks, and culminating in the manipulation and resynthesis of component timbres through the use of Fourier analysis, which are captured and again granularly synthesized, starting the next iteration of recursion. By way of recursion, analyzed
audio exposes itself as an irreducibly generative energy—yielding the ever-hidden memories of sound.

**Figures of Ophelia in Japanese Narratives: Re-Signification through Immateriality**
*Teresa Vu, English and American Literature*
*Sponsor: Professor Katherine Schaap Williams, English*

Since the beginning of the Meiji era, Japan has had a long history with Shakespeare. During this period, an influx of Western influence entered Japan in the guise of language, industrialization, and most importantly literature. Shakespeare, already a national figure of British literature, was quickly assimilated into Japanese culture and was considered a prime source for academic study among Japanese scholars. This thesis seeks to provide a narrowed focus on the figure of Ophelia in Japanese narratives through the following questions: In what ways does Ophelia manage to regain significance and become a dynamic, nuanced character? How do the new works in question re-frame Shakespeare’s Ophelia and reveal the nature of the Ophelian figure as it is repeatedly reused and reformed in various narratives? The study makes use of three different narrative modes in three drastically different genres to pursue these questions: *Ophelia’s Testament*, a short story by Kobayashi Hideo; *The Bad Sleep Well*, a film by Kurosawa Akira; and *Blast of Tempest*, a manga series written by Shirodaira Kyou and illustrated by Sano Aishide and Saizaki Ren. This project finds that even with the cultural and linguistic divide that separates Western scholarship on *Hamlet* and a more global scholarship of *Hamlet*, the value of Ophelia’s character and agency is not lost in translation, at least in regards to Japanese narrative interpretations of the play.

**Participation in Plato and Augustine**
*Anderson Westerman, Philosophy*
*Sponsor: Professor Jessica Moss, Philosophy*

Augustine of Hippo, in a section of *The Confessions* called “Time and Eternity,” writes about the relation of things in the universe to their creator. He makes some claims in this section that seem similar to Plato’s theory of Forms, the view that, for every characteristic such as beauty, goodness, or justice, there is a Form or idea that is Beauty, Goodness, or Justice itself. The things in the world that possess those properties do so by participation or sharing in these Forms and only possess these properties in a deficient way in comparison to the Forms. The Forms also are a higher level of “Being” or reality than the objects of human experience. Augustine repeatedly identifies Christ and God with Truth, Goodness, and Wisdom and describes the persons of the Trinity as eternal, constant, and more real than humans. Augustine, as a former pagan living in the Roman Empire in the fourth century, would have been familiar with Platonic thought and would have known and argued with people who saw themselves as followers of Plato. This paper investigates the extent of the similarities between these two thinkers and uses their differences to shed light on some of the more unclear points in Plato’s theory.

**Living in Each Other’s Eyes: The Normative Implications of Valuing an Interpersonal Self**
*Katie Wong, Philosophy, Psychology*
*Sponsor: Professor Sharon Street, Philosophy*

Is the egoist—someone who never takes other people’s interests into account—irrational in some way? So Christine Korsgaard argues in Lecture 4 of *The Sources of Normativity* and in the final chapters of her book *Self-Constitution: Agency, Identity, and Integrity*. She claims the egoist, like everybody else, is committed to valuing rational agency in others because social nature requires all practical reasons be inherently shareable or what she calls public. This paper attempts to elucidate and evaluate this argument, which has been widely regarded as both puzzling and unsuccessful. It is argued here that while her project ultimately fails, interesting lessons can be drawn from it. Using an idea she extracts from Hume—that we see ourselves in each other’s eyes—as a starting point, the author re-examines the relevance of social nature from a psychological standpoint. Drawing on social psychology and object relations theory, a modern psychoanalytic approach, it is proposed that facts about psychology are robust enough to serve as a promising basis for diagnosing the egoist’s mistake also in the philosophical context.

**Chinatown Memories: The Diasporic Subject in the Mexican Contemporary Novel**
*Lee Xie, Journalism, Spanish*
*Sponsor: Professor Laura Torres-Rodriguez, Spanish and Portuguese*

This project explores how the figure of “the Other,” specifically the Chinese diasporic subject, and the spaces associated with this subject, such as the site of Chinatown, serve as catalysts in the Mexican national imagination for remembering traumatic histories in the country, histories that revolve around a post-revolutionary state that engaged in exclusionary, nationalist nation building strategies. The repressed yet persistent memory of Chinese immigration in the country, a tumultuous experience marked by an exclusionary “racial logic of nation building” (Chang, 2011), looms in texts from contemporary Mexican writers from Rafael Bernal to Cristina Rivera Garza and deserves to be explored given the relative silence surrounding this traumatic piece of Mexico’s history. This project combines a literary analysis of three works—*The Mongolian Conspiracy* (1969) by Bernal, *Simple Pleasure. Pure Pleasure* (2008), and *Green Shanghai* (2013) both by Rivera Garza—with historical contextualization to establish a connection between Orientalism and memory. This project...
tries to understand how Orientalism, as postcolonial theorists such as Rey Chow have attributed to the creation of a subject, becomes a productive force for contemporary Mexican writers. If, as Chow says, the gaze upon “the Other” produces the subject via self-reflection (1993), then following this line of thought, Orientalism becomes a disruptive force in the nationalist post-revolutionary narrative as a point of production for other ways of thinking about oneself and one’s nation.

**Should We Call People Evil?**
Youngbin Yoon, Mathematics, Philosophy
Sponsor: Professor David Velleman, Philosophy

The purpose of this project is to answer the question, “Should we call people evil?” This is done in three sections. In the first section, the author discusses what we mean when we call people evil. It is determined what we mean is that they have a disposition to allow intolerable harm. The second section asks the question why we call people evil and postulates three reasons that evil is used to this end: to explain, to classify, and to condemn. The last section returns to the question of whether evil should be used to describe people. This is done by examining both the execution and the effects of calling people evil for each noted reason, and coming to an independent judgment about each usage.

**Algorithmic Modeling and Generation of Music**
Halley Young, Computer Science
Sponsor: Professor Bud Mishra, Computer Science

Two thousand years ago, Pythagoras discovered the role of small proportions in determining musical intervals and taught the Western World that math is essential to the understanding of music. While the meaning of art and the specific techniques that artists have used have changed dramatically since then and across cultures, the relevance of formal methods in analyzing music has remained constant. Furthermore, while previously formal modeling of music was useful principally for the insight it afforded to composers, discoveries about the formal nature of music can now be used to produce music algorithmically. This paper presents an overview of the goals of formalization by different musical communities. It then presents some of the mathematical discoveries that have been made or that the author believes should be made in relationship to music. Finally, a framework is presented that allows for using as many such insights as possible through program synthesis, or automatic generation of programs that in turn generate music.

**Sino-Japanese Cooperation in Post-World War II China**
Christopher H. Zhao, East Asian Studies, History
Sponsor: Professor Rebecca Karl, History

This thesis examines the cooperation between former Imperial Japanese and Chinese Nationalist leaders in the post-World War II period with a focus on the motivations of the Japanese. The thesis argues that the motivations of Japanese military men should be examined in terms of their rank in the former Imperial Army. By examining the cooperation between Nationalist leader Chiang Kai Shek and former Japanese general Okamura Yasuji along with the ideology of Japanese official Jono Hiroshi and military commander Lt. General Imamura Hosaku, the first section argues high-ranking Japanese officials believed their efforts in China would influence events in Japan and contribute to postwar Japanese reconstruction. The second section examines the memoirs of the Japanese soldier Okumura Waichi to argue that Japanese common soldiers in Shanxi Province did not frame their experiences and their motivations in terms of ideology and nationalism and generally wished to return home. The conclusion restates how higher ranking Japanese chose to cooperate based on beliefs that their actions in China could help Japan whereas the lower ranking Japanese stayed behind either because they did not have a choice or in return for good treatment in hostile surroundings. The conclusion discusses potential future paths of research and how examination of left-behind civilians and the Nationalist Chinese-Japanese “White Group” would help in painting a more complete picture of the Japanese in China after World War II.
The central concern of the social sciences is people. Social scientists try to understand what motivates people’s behavior, how people interact and communicate in society, how they produce and distribute goods and services, how they govern themselves, how they create norms, institutions, cultures, and languages, and, in turn, how these institutions and cultures shape their thoughts and their actions. The vast scope of this inquiry, aimed at understanding human behavior and the functioning of our societies, requires a variety of diverse perspectives and approaches. The methodologies of the social sciences range widely from ethnographic studies to historical investigation, formal and mathematical modeling, survey techniques, and statistical analyses of data.

—Jess Benhabib, Paulette Goddard Professor of Political Economy

SOCIAL SCIENCES

Falling in Infant Walking: How Does Practice Make Perfect?
Zahin Ahmed, Neuroscience; Hannah Borenstein, Psychology; Lorraine de Velez, Psychology; Danyang Han, Psychology
Sponsor: Professor Karen Adolph, Psychology

Infants fall an average of 17 times per hour—at home, in a playroom, and even holding a caregiver’s hand. Previous work reported only the frequency of infant falls. Here, severity of falls was examined. The author scored videos of 223 falls on flat ground in 136 infants (test age = 12.69–19.99 months; walking experience = 0.07–10.26 months) during free play in a laboratory playroom. Infants fell $M = 7.16$ times per hour. Most falls were inconsequential: only 1.8% of falls induced crying and caregivers expressed concern on only 11.2%. Most falls were forward onto the knees (51%) or backward onto the buttocks (26%), fat-padded areas on infants’ bodies, whereas the head impacted the ground on only 4% of falls. Infants caught themselves with their hands when falling forward within $M = 0.1$ seconds of impact. This study describes how long it takes infants to recover after a fall and looks at correlation between walk experience and prevalence of falls. It was concluded that falls are common, but most falls are not severe or particularly salient for infants or caregivers. It is proposed that skills requiring vast amounts of experience, such as walking and talking, incur low penalty for errors, so as not to deter infants from practicing to the point of mastery.

Inequality: A Youth Narrative
Maria Arievitch, Sociology
Sponsor: Professor Ruth Horowitz, Sociology

Recent growth in scholarship surrounding levels of economic inequality in the United States has prompted a renewed public interest in its discussion at large. This is most visible with the inclusion of income and wealth inequality into political platforms. More often than not, this mobilization has been propelled by young people—a new generation of voters frustrated with “politics as usual.” This trend can be observed on both ends of the political spectrum and has manifested itself in reactions ranging from rejection of the Democratic establishment on the left (most notably with the popularity of Bernie Sanders among young progressives) to voting for business-oriented and hyper-nationalistic Donald Trump on the right, as well as choosing not to vote at all. By conducting a series of in-depth interviews with students of various backgrounds and political identities, this study aims to delineate the differences and similarities underlying how young people perceive and make sense of various economic and political issues, particularly that of inequality. The project speculates
which factors influence different ways of understanding these issues, such as socioeconomic background, personal exposure to inequality, and field of study. Above all, it poses the question of whether there may be a common thread of concern among youth that could lead them to unite in the interest of a shared political future.

**Can Wage Legislation Lead to Women’s Social Empowerment?**
*Ankita Banerjea, Economics, International Relations*
*Sponsor: Professor Michael Gilligan, Politics*

This paper investigates the impact of the establishment of a minimum wage for domestic workers in the state of Karnataka, India, on the subsequent rates of domestic violence faced by women in said state. Given that domestic work is a largely female-dominated industry within India, this minimum wage establishment makes it possible to explore whether legislative changes of this form could have an effect on the social empowerment of women in terms of their bargaining power within the household. Using a difference-in-difference approach, the study uses the establishment of the minimum wage law for domestic workers as an exogenous source of variation and isolates its effect on the rates of domestic violence. The results indicate the treatment effect is negative and significant on the entirety of the population surveyed within the state, indicating that the minimum wage establishment led to a reduction in the rates of domestic violence experienced post-treatment. These results contribute to policy debates that are often divided between sides that believe economic and legislative reform can have a positive effect on women’s empowerment and others that believe such measures make women’s bargaining position worse.

**Shifting Demographics and Democratic Presidential Primaries**
*Gillian Barna, Economics, Politics; Ryan Thomas, Politics*
*Sponsor: Professor Patrick Egan, Politics*

As the influence of particular demographic groups within the Democratic Party increases, candidates and operatives are retooling political engagement and communications strategy to garner support from critical voting groups. This project uses qualitative and quantitative analysis to understand the shifting demographics within the 2016 Democratic Presidential primaries considering the surprising yet fascinating competition between Secretary of State Hillary Clinton and Senator Bernie Sanders. Using this analysis will allow Democratic candidates and operatives to use demographic information to create successful campaigns in primary elections, specifically focusing on resource allocation and messaging. Given the two candidates’ support among distinct voting blocs with differing socio-economic backgrounds, which was more apparent in this election cycle than the 2008 primary contests, this research will allow a better understanding of the factors that influence electoral outcomes. This project distinguishes which attributes of the primary candidates appeal to Democratic voters by using aggregated data for all states and territories during the 2016 Democratic primary competitions through exit polls, public opinion polls, and demographic information. The findings ultimately conclude Secretary Clinton’s success securing the nomination was due to the strong electoral support she had among voters 65 and older and those with higher levels of education, within urban communities, and, most importantly, the overwhelming support she had among African Americans in Southern states.

**Don’t Judge a C.V. by Its Name: Labor Market Bias in the United Kingdom**
*Katharine Besheer, International Relations*
*Sponsor: Professor Michael Gilligan, Politics*

Bias in the labor market has been a salient issue in the United Kingdom for the past forty-five years and has been proven especially definitive amongst Muslim groups. Evidence of such biases have been discovered in field experiments executed in the marketplace using independent variables spanning from an applicant’s race, gender, age and even the presence of a disability. Building on the expansive literature on the topic as well as taking into account the change in the United Kingdom’s political landscape after the 2016 Referendum, the author conducted a survey experiment to showcase such hiring biases still seemingly exist against Muslims based solely on the name of an applicant’s C.V., and thus in the very initial stage of the hiring pipeline. This thesis, and its concurrent quantitative study, aid in supporting the theory that the bias against Muslim applicants, regardless of their level of qualification, in the professional labor markets of the United Kingdom, may exist even more forcefully in the present socio-economic landscape than had been proven prior to the “Brexit” of 2016.

**The Jewish State of Prisoner Exchanges**
*Omri Bezalel, Dramatic Writing, Journalism*
*Sponsor: Professor Robert S. Boynton, Journalism*

In October 2011, the Israeli government released 1,027 Palestinian prisoners, including terrorists, in exchange for one Israeli soldier, Gilad Shalit, who was held captive by Hamas for five years. Despite the lopsidedness, 80% of Israelis supported the deal and only 14% opposed. This project explores the dynamic in the Israeli psyche that not only allows but also demands such deals. The Shalit incident touches on many different dimensions of Israeli society. How does the country weigh one life versus national...
security? How have civilians’ views of the soldiers who defend them shifted? How has the “price” Israelis are willing to pay to live on their land changed? The project examines different elements for answers: Shalit’s PR campaign to gain public support; the history of prisoner exchange deals and how the Israeli government has handled such situations, from the heroic Entebbe raid until the 2014 Gaza War; and the psychological makeup of a country suffering from national trauma. The author considers why Israel considers the death of its soldiers worse than of civilians, and why Israelis still prefer soldiers dead rather than captured. The project considers the evolving conflicts, from the wars of 1948 until 2014, and shows how Israeli society has become more sensitive to its soldiers. The author also studies the role Israel’s culture of remembrance plays in such deals. Every prisoner exchange deal in Israel’s history has led to another captured soldier. Currently, a dead Israeli soldier’s body is in possession of Hamas. If Israelis can understand why they support deals that, to most outsiders seem illogical, it could be a necessary first step to changing Israel’s decision-making process from emotional to logical.

Céspedes es Nuestro
Phoebe Boatwright, History, Photography
Sponsor: Professor Ada Ferrer, History

In Major League Baseball (MLB), Dominican players make up around 20% of rosters and three times that of minor league rosters. In addition, the Dominican Republic has its own baseball league. If one third of the major and minor baseball leagues in the United States are Dominican, imagine how strong the Dominican League would be with those players. The same scenario can be considered for Cuba, a country that has lost a fifth of their top players through defection to America over the past 2 years. How can the quality of a baseball league be judged? Economic theory would argue that we simply count the number of fans or the gate totals. But these metrics are unusable in a communist economy. Instead, player statistics will be used to measure the overall quality of a league and to compare it against other leagues. Baseball currently consists of two systems: the major league and the developmental minor leagues in the United States, on the one hand and the various national leagues outside the United States, e.g., the Dominican, Cuban, Korean, and Japanese leagues. The best players in those national leagues go into MLB. The question here is how to make a subsidiary league independent. Even with the best managers the subsidiary leagues would need a way to protect players and talent in order to succeed. In order to address this question, this study focuses on Cuba, whose player statistics were acquired on site last spring.

The Role of Observational Learning in Understanding Long-Term Effects of Actions
Serena Bonomo, Psychology
Sponsor: Professor Yaacov Trope, Psychology

With each action and decision made, there comes along short- and long-term consequences. We could either experience these consequences ourselves or observe them happen to someone else. The current study investigated whether we learn the downstream effects of an action differently when it is performed by another person compared to when it is experienced directly. The author used a melioration paradigm (Pick-Alony et al., 2014), which involved making choices between two coin jars that each gave out different algorithmic rewards where one jar had a greater immediate reward and the other had a greater future reward. Learning through observation has been shown to elicit a “bigger picture perspective,” (Kalkstein, 2016), thus, it was predicted that those in the social/observational condition would be more likely to see the long-term effects of the reward pay-off and therefore maximize the jar choice that provides the largest reward overall than those who experienced the reward pay-off themselves. There were two conditions: direct learning, in which they played the whole game themselves, and social/observational learning in which they watched someone else play for 150 trials and then themselves for 40. The anticipated results show participants in the social/observational condition choose the long-term reward significantly more often than those in the direct learning condition.

Creating More Inclusive College-Level Prison Education Programs
Barbara Bontempo, Public Policy; Faiza Haq, Economics, Public Policy; Monica Millay, Public Policy
Sponsor: Professor Neal Beck, Politics

While college-level prison education programs (PEPs) seem to benefit those who are able to participate, the classes are not accessible for all segments of the incarcerated population. This study identifies a racial disparity in the rates of attendance of college classes in prisons nationally: holding all else equal, incarcerated people who self-identify as Latinx are less likely than their peers to attend college-level courses. It is recommended that the New York State Department of Corrections and Community Supervision, in order to address this racial disparity, create bridge programs that focus on preparing incarcerated individuals for post-secondary education programs. The bridge programs will make college-level PEPs more accessible and equitable, by supporting students as they obtain their high school diploma equivalent, write their admissions essays, conduct interviews, and study for entrance exams.
Effects of Professional Athlete Food Endorsements on Adolescents’ Perceptions and Preferences
DiAnna Brice, Global Public Health/Sociology
Sponsor: Professor Marie Bragg, Population Health, NYU School of Medicine

Food and beverage marketing has been identified as a major driver of obesity and diabetes, with most advertisements promoting sugary beverages and energy-dense, nutrient-poor food products. The food industry strategically uses professional athlete endorsements or promotions to entice consumers to buy their products. Among youth, a professional athlete’s endorsement of a food item may influence their perception of the product; leading them to associate the product as healthy, even when it is not. It is clear that food companies increase the risk of poor dietary habits through their ads among adolescents. Additionally, obesity prevalence is reportedly higher among African American youth compared to non-Hispanic white youth, making the impact of food and beverage ads on African American youth an important area of study. The purpose of this study is to assess how exposure to athlete-endorsed food and beverage ads affects food preferences, perceptions of products, and food choices among African American and non-Hispanic white adolescents. Using a sample of 100 ads from 13 of the most highly paid and most influential athletes currently in professional sports, this survey examined adolescents’ (a) perception of nutrition content of products shown in the ad (both nutrient and energy levels); (b) health perception of the products shown in the ad; (c) response to the ad, brand and product; (d) engagement with the brand; and (e) future purchasing intentions and behavior as a result of the ads.

Perception of Women in Leadership
Budd Brown, Psychology
Sponsors: Professor Emily Balcetis, Psychology; Abby Bisi, Psychology

In the United States, women are severely underrepresented in all forms of leadership, from business to politics. One explanation could be the discrepant values individuals hold regarding female leaders. While an organization, for instance, might endorse gender diversity at the abstract level, these values might not be adopted in the concrete decision making of employees. This research calls upon Construal Level Theory to suggest that distance should shift when individuals might rely more heavily on group opinions, which would impact decision-making. Construal Level Theory is an account of how psychological distance influences people’s thoughts and behaviors, psychologically distant objects and events being ones that are not present in the direct experience of reality. Study 1 manipulated group opinions towards an affirmative action policy and distance. Study 2 extended this work, manipulating group opinion, contextual information, and distance. Study 1 revealed a main effect of conformity to the group opinion, and Study 2 demonstrated that people are more favorable to the proposed policy if enacted in the distant compared to the proximate condition. Each finding offers partial support for the initial hypotheses. Implications for these findings are discussed.

The Social Influence on Moral Activation: Enhanced Perceptual Awareness of Morally Relevant Stimuli in the Presence of Others
Emily Buddeke, Psychology
Sponsor: Professor Jay Van Bavel, Psychology

Morality has long been assumed by philosophers to be a socially based function. However, this remains scientifically unproven. Previous research has noted a moral pop-out effect wherein individuals are better able to perceive and react to morally based words in lexical decision tasks. This study examined whether this effect is exacerbated when completing the task with another person in the room. It was hypothesized that the mere presence of others is enough to activate moral processing. In this randomized experiment a 2 (alone or one other person present) x 3 (moral-based word type) mixed factorial design was used in which the presence of others was manipulated between-subjects and the stimulus type was manipulated within-subjects. Backwards-masked moral and non-moral words were presented in a lexical decision task. Half the participants completed this task alone and the other half completed this task concurrently with one other participant in the room. It was hypothesized that the paired individuals will be faster in recognizing the moral words. Findings can be used for further research to better determine how moral processing functions within the brain and gain an understanding of how morals are evaluated in social situations.

Women and the Formal and Informal Economies of Entrepreneurship in Cuba
Ashley Cardounel, Finance, Spanish
Sponsor: Professor Ana Dopico, Comparative Literature, Spanish and Portuguese

Cuba, a socialist country, has a mixed economy comprised of both state-run industries and private businesses. Cubans working in state-run industries tend have lower paying salaries than employees working in the private sphere. Men make up the majority of the workforce in the more lucrative private sphere, but this paper focuses on women working within the non-state run economy. This paper seeks to distinguish women’s role in the Cuban economy through two types of private businesses, one being the formal state-licensed type of business and the other being the informal unlicensed type of business. The paper seeks to address whether these private entrepreneurs can
financially empower themselves through their enterprises. The term empowerment refers to the ability a person has to act to change his or her reality. Financial empowerment refers to a person’s ability to act to change his or her current fiscal reality. This project focuses on case studies of women entrepreneurs in paladares, privately owned restaurants, as well as in other industries such as the nail care and lodging industries, to study the impact of private entrepreneurship on the financial empowerment of these women.

Effects of Conflict Intensification on Bias Expression in Political and Racial Contexts
Karen Castro, Psychology
Sponsors: Professor David Amodio, Psychology; Anne Hill, Psychology

American society is largely divided by ideology. This political animosity is frequently expressed in non-political contexts where such bias is inappropriate. It is unclear, though, whether people perceive bias on the basis of political identity as wrong. In order to examine how people perceive and respond to political bias, the present study investigated (1) whether people are more sensitive to expressions of political bias than other forms of intergroup bias (i.e., racism), and (2) whether perceptions of political threat increase expressions of bias toward political out-group members. Participants completed a modified Third Party Punishment task (TPP), where they were shown 2 players and a description of the players’ racial or political affiliation. Results revealed that participants were less sensitive to bias on the basis of political than racial identity. Furthermore, greater perceptions of threat toward political out-group members predicted more severe punishment of political out-group members.

Income Inequality’s Impact on the Likelihood of Coup D’état Occurrences
Suheyla Cavdar, International Relations
Sponsor: Professor Alastair Smith, Politics

The elite or military of a state overtly and illegally overthrowing its government is not an uncommon occurrence throughout history and the world. Although the number of attempts has decreased since the 1960s, recent coups in the developing world prove they are still possible. Recent literature on coups generally focuses on a specific time period or region of the world. This paper is on global occurrences of successful and attempted coups since the 1960s and whether a country’s income inequality impacts the likelihood of coup occurrences. The data and results empirically support the author’s theory that inequality, during civil unrest and economic decline, creates an incentive and opportunity for the state’s elites to attempt to overthrow the current government to protect their own interests and resources. Due to the systematic coup proofing and risks involved, democratic countries are less likely to experience both attempted and successful coups compared to non-democratic ones. Thus, non-democratic countries with high levels of income inequality, civil unrest, and economic stagnation are more vulnerable to coups than countries that are more democratic with lower levels of inequality, less unrest, and economic growth. Coups are not a new phenomenon. Yet, they still remain unpredictable and difficult to explain. Income inequality is one factor that clarifies the situations and circumstances that can lead to their occurrences. Further equality might be able to decrease instability in nations domestically and, in terms of foreign policies and international affairs, global uncertainty.

The Effects of Contextual Factors and Dating App Usage on Sexual Decision-Making
Chloe Chan, Psychology
Sponsor: Professor Jennifer Jennings, Sociology

Millennials increasingly report meeting romantic partners through dating apps. Yet there is concern this may be the reason behind increases in sexually transmitted infection (STI) rates among young adults. This study examines whether contextual factors affect young adults’ sexual decision-making. Sexual histories and behaviors among app users and non-users are also compared. Participants were recruited from college Facebook groups. Depending on their sexual orientation, participants were presented with 1 of 32 scenarios varying in levels of perceived risk. They answered questions pertaining to their sexual decision-making. 4,429 participants between the ages of 18–24 completed the survey. Participants were more likely to choose a higher number of sexual partners and engaged in casual sex if the scenario involved a male partner, perceived high-risk location, or one-night stand. They were more likely to enforce condom usage if their partner was male. Lastly, they were more likely to ask about their partner’s STI status if the scenario involved a male partner or one-month dating. Dating app usage was associated with sexual experience and having casual relationships, more sexual partners, higher perceived STI risk, and STI testing. While many participants demonstrated risky sexual behaviors, they generally reported low perceived STI risk. Dating app users are more likely to engage in sexual risk behaviors and to have had STI testing. Thus, dating apps can be a useful platform for increasing STI knowledge and reducing the incidence of STIs among their users.
The Creation and Presentation of Personal Identity through Food Photography
Emily Chan, Sociology
Sponsor: Professor Ruth Horowitz, Sociology

When Erving Goffman first discussed personal identity in his book entitled *The Presentation of Self in Everyday Life* in 1956, he discussed the importance of face-to-face interactions. As important as this book is to sociological literature, the nature of human interactions has changed. Although in-person interactions still occur daily, people today oftentimes interact with each other through other mediums, such as social media. As a result, it is necessary to look into how people interact with one another through social media platforms and see if this new form of interaction expands upon or possibly even confounds the ideas discussed by Goffman. The study utilizes in-depth interviews to understand food-related Instagram habits as well as personal and social identity of current NYU students. Data collected suggests that despite the shift from face-to-face interactions to online interactions, the creation and presentation of identity has not changed significantly from the offline interactions discussed by Goffman. Instead, online identities are oftentimes masks that reflect certain facets of one’s personality in a way that is very similar to how we play different roles based on who we interact with offline.

Building with Law: Zoning Changes to Promote the Development of Accessory Dwelling Units
Jeremy Cheung, Economics, Public Policy; Aaron Reuben, Public Policy; William Wang, Politics, Public Policy; Tiffany Wong, Business, Public Policy
Sponsor: Professor Nathaniel Beck, Politics

An undersupply of affordable rental units has exacerbated the rent burden of New Yorkers: with the median rent to income ratio at 65.2% in 2016 (StreetEasy, 2016). Modifications to New York City’s Zoning Resolution will spur the development of Accessory Dwelling Units (ADUs), i.e., residential units added to an existing building or property in backyards, basements, or garages. ADUs can serve as a cheaper housing option for young professionals and lower-income groups because they are relatively smaller in size and require less infrastructure investment (California Department of Housing and Community Development, 2016). Specific zoning modifications include decreasing the minimum distance required between residential buildings, classifying ADUs as permitted obstructions, waiving new residential unit parking requirements, and re-calculating the required open space and floor area mandates for participating lots. The majority of the properties in R1-R5 areas (low-to mid-density residential areas) already contain open space in their backyards, providing ample opportunity for ADU development (Department of City Planning, 2017). Based on a 15% take-up rate of potential ADUs, these zoning changes will provide approximately 75,000 units throughout the five boroughs. This research proposal determined that if the Mayor can implement these modifications within the next three years, he would establish nearly 40% of the 200,000 affordable housing units he pledged to be preserved and created by 2024 through ADUs (de Blasio, 2014).

Effects of Quantifiable Social Endorsement on Perceived Attractiveness
John Andrew Chwe, Computer Science, Psychology
Sponsor: Dr. David J. Lick, Psychology

In today’s digital culture, followers and likes represent important forms of social currency. Indeed, such quantifiable social endorsement (QSE) has been linked to changes in self-esteem and to neural activity in brain regions associated with reward processing (Burrow and Rainone, 2016; Sherman et al., 2016). Despite some recent interest, however, QSE has received relatively little empirical attention. This study will test whether and how QSE acts as an index of social consensus that guides, modifies, and constrains social evaluative judgments. In pretesting, separate samples of attractive and unattractive faces will be identified. Then, using Instagram typography, two versions of each face will be created—one with a low like count and one with a high like count. Participants will rate these faces as either attractive or unattractive using MouseTracker methodology. It is hypothesized that participants will rate congruent stimuli (unattractive face/low like, attractive face/high like) more efficiently than incongruent stimuli (unattractive face/high like, attractive face/low like). It is also predicted that attractiveness ratings will conform to the information conveyed by like count, with participants rating unattractive faces with many likes as more attractive than unattractive faces with few likes. Results consistent with these hypotheses would suggest that popularity can redefine standards of beauty. The current study uses Instagram as an ecologically valid tool and QSE as a common indicator of social consensus to understand how popularity biases attractiveness ratings in digital culture.

Fund My Recovery: A Mixed-Methods Analysis of Medical Crowdfunding Campaigns in United States and Canada
Samantha Cunningham, Sociology
Sponsor: Professor Sarah K. Cowan, Sociology

The costs associated with falling ill can be immense. Using crowdfunding sites, patients and loved ones can appeal to friends, family, and strangers alike for financial donations. The site Fundrazr.com is a moderately popular crowdfunding site used both in the United States and Canada. This study compares the content of a random sample
of medical campaigns based in the United States with those based in Canada. Aspects such as disease type, proposed use for funds, amount requested, and cause of need were evaluated and analyzed. In both countries, campaigns most often requested assistance for medical expenses, medical equipment, or living expenses. US campaigns, however, were significantly more likely to request funds for medical expenses than those in Canada. Canadian campaigns were significantly more likely to request funds for travel within or outside of Canada or for alternative medical treatments than American campaigns. These results are fairly consistent with the organization of each country’s healthcare systems, whereby the United States system rations care by ability to pay and the Canadian system rations care based on the prevalence of the condition within the Canadian population.

The Sincerest Form of Forgery: The Effects of Copyright Law on Creativity in the Furniture Design World
Dominic Curran, English and American Literature, Journalism
Sponsor: Professor Robert S. Boynton, Journalism

As furniture design has flourished from a once niche area of knowledge to an everyday household discussion, the market has been forced to begin enacting protective measures to prevent the reproduction of more popular designs. These trademarks are intended to provide legal precedent for original designers and design houses to defend themselves against copy makers through punitive fines and cease and desist orders. Today there is debate amongst the industry itself as to how these trademarks protect designs. Furniture houses like Herman Miller are engaged in a constant struggle with counterfeiters. In the past 4 years, the company has been involved in at least five public lawsuits with companies both foreign and domestic. Some consider the law intentionally vague; clauses surrounding form and function as well as a key piece involving confusion at the point of sale have created a precedent that makes litigation too easy. Counterfeiting, however, is still rampant. This article collected the viewpoints and arguments for and against these laws. From large scale manufacturers to individual designers here in New York; from furniture stockists to customers; as well as some of the legal experts working with cases ensuing from the current copyright environment in the United States and Europe. With these voices, the author explores how copyright laws have shaped the current situation of furniture design and what the future could hold for both designers and consumers as such laws progress.

Narratives of a Movement: Media Portrayals of the Dakota Access Pipeline Protests as Environmental and Indigenous Resistance
Alexandra Dahlberg, Environmental Studies
Sponsor: Professor Jennifer Jacquet, Environmental Studies

The 2016–2017 conflict between the Standing Rock Sioux and the Dakota Access Pipeline in Standing Rock, North Dakota, involved thousands of Native Americans and allies gathering to protest construction of the oil pipeline under Lake Oahe. The size of the protest and the law enforcement presence resulted in nationwide media coverage. The protesters’ arguments against the pipeline included environmental concerns as well as concerns for treaty violations and other Indigenous rights issues. This study examines the prevalence in the media of both environmental and Indigenous rights arguments against the Dakota Access Pipeline. The author examines news articles written throughout the course of the protests and performs a content analysis by manually coding 100 articles published from August 2016–March 2017 to determine the presence or absence of environmental or Indigenous rights issues. Results indicate that most articles mentioned both issues but emphasized Indigenous rights over environmental issues. The resonance of social justice concerns with journalists has implications for the Indigenous rights and environmental movements.

Sovereign Bonds: Political Events and Cost of Credit in Emerging Markets
Abhishek Dalal, Economics, International Relations
Sponsor: Professor Alastair Smith, Politics

Emerging Market Governments tend to finance a lot of their development agenda by issuing debt. The costs of borrowing for a country are linked to market perceptions of the riskiness of the particular country’s offerings and how likely they are to renego on debt obligations. This study identifies how market perception of risk, measured using the risk spread, varies as a country’s economic fundamentals change and also assesses the impact of political events and economic shocks on risk spreads. The results find that the risk-spread variation can be explained by the quality of a country’s economic fundamentals with richer countries gaining access to cheaper credit, that leadership change within a country drives up risk perceptions and that in the short-term, political shocks such as terrorist attacks are also likely to drive up risk-premiums.
Ambiguity and Control of Sustainability Concepts in Food Retail’s Sustainability Communications
Catherine Dammer-Jones, Environmental Studies
Sponsor: Professor Sonali McDermid, Environmental Studies

The increasing power of corporations, especially that of big box retail and grocery, has potential for addressing the sustainability issues of the twenty-first century. However, a lack of systematic understandings of sustainability may preclude the development of meaningful strategies to address climate change and other environmental issues from the institutional corporate side. An organization’s sustainability communications, which can involve sustainability reports, disclosure of sustainability goals, or other means, present a unique lens to explore corporate understanding of sustainability, as these communications allow for the elucidation of a company’s priorities, definitions, and proclamations about sustainability and corporate social responsibility. This paper explores the discourse in the sustainability communications of seven big box food retailers, all public companies headquartered in the United States. This is done through content analysis, specifically focusing on how these companies discuss and frame sustainability issues and goals, such as environmental inefficiencies, economic futures, and self-created definitions of corporate environmentalism. Both the presence and absence of these and other ideas will be noted as part of this analysis. By comparing the discourse used in each company’s sustainability reports, the means through which different companies approach sustainability, and the potential lack of systematic understandings of sustainability that still exist across industry, are elucidated.

What Information Do Cancer Clinical Trial Protocols Include on the Reproductive Risk of Treatment and Oncofertility Management?
Angela Dauti, Global Public Health/Chemistry
Sponsor: Professor Antoinette Anazodo, School of Women’s and Children’s Health, University of New South Wales

A number of barriers for oncofertility care exist including clinicians’ knowledge about the teratogenic and gonadotoxic risk of cancer protocols and the recommendations for oncofertility care. The object of this study was to describe the level of reproductive information on the gonadotoxic risk and teratogenic risk of chemotherapy treatment in clinical trial protocols and the recommendations for oncofertility investigation and management. The study team reviewed 84 clinical trials protocols (pediatric, adolescent and young adult, and adult) covering tumors found in patients of a reproductive age from 0–45 years of age and reviewed the literature for the 78 individual chemotherapy drugs. The team then reviewed each clinical trial protocol to document the reported information on gonadotoxicity and teratogenic risk as well as recommendations for oncofertility care. A literature review on the 78 chemotherapy drugs included in the clinical trials protocols showed that information on the teratogenic and gonadotoxicity risk of chemotherapy was available from animal or human studies for many drugs but this information was difficult to find and reported in an inconsistent manner. However, when gonadotoxicity and teratogenic effect of treatment were known, they were not consistently included in all protocols, and the lack of data for new drugs was not reported. Very few protocols gave recommendations for oncofertility management and follow up. This is an additional barrier for fertility preservation consultation or management. A number of recommendations are required for clinicians and pharmaceutical companies developing new trials that will enable clearer information and recommendations for oncofertility, which will lead to improved patient’s reproductive outcomes.

Distribution of Sanitation Kits Associated with Decreased Rates of Infection in Children in Developing Countries
James Davydov, Biology; Kanyon Iwami, Economics; Darshan Mahabare, Biology; Silvia Simonetta, CORP; Cecilia Vaira, CORP
Sponsor: Dr. Alba Gandotra, Department of Veteran Affairs

 Millions of children die every year from preventable illnesses such as diarrhea and pneumonia. Basic education on personal health, in conjunction with distribution of sanitation kits was implemented in order to decrease the morbidity and mortality of children in developing countries. By collaborating with Community Outreach Programme (CORP), data was collected to assess the infection rates of children living in the slums of Sewri, India. Kits were distributed consisting of toothbrushes, toothpaste, shampoo, soap, and nail cutters. The study surveyed the families of 60 children between the ages of 2–5. These 60 families were randomly assigned into equal-sized treatment and control groups. Over the span of three months, sanitation kits were distributed monthly to 30 families in the treatment group, and each family was responsible for answering 5 hygiene questions a day. The 30 families in the control group also answered the same 5 hygiene questions a day with the guarantee of receiving three months of kits at the end of the survey period. The guardians of the children were educated on basic hygiene techniques and were responsible to chart their child’s health by answering the 5 questions. This study analyzes the data from both groups to determine the effectiveness of humanitarian aid in the form of hygiene kits on the health of vulnerable children.
The Interplay of Posture and Vision during Infant Development
Lorraine de Velez, Psychology
Sponsor: Professor Karen Adolph, Psychology

Posture and vision are integrated in everyday life. For example, imagine yourself in a yoga class attempting a difficult “tree pose.” You may fixate on a single stationary point to help maintain balance. In this case, vision helps to stabilize posture. Now imagine trying to read a novel during the bumpy landing of a plane ride. With less control of posture, it is difficult to stabilize your gaze. Although they are clearly integrated, developmental researchers typically study postural and visual systems separately: Research on the development of visual exploration examines where infants point their gaze, and research on motor development focuses on postural skills such as sitting. Here, we examine the bidirectional real-time and developmental relations between posture and vision. Seven-month-old infants with different levels of postural control performed two visual tasks while sitting unsupported—visual fixation on a stationary point and visual tracking of a moving target. For each task, motion-sensing and eye tracking technologies indexed postural sway and eye movements, respectively. Preliminary results show that all infants swayed more while visually tracking a moving object than while fixating a stationary point. This effect was exaggerated in novice sitters, who had less postural control.

Factors for Attrition among Female Neurosurgery Residents
Lana Del Vecchio, Anthropology
Sponsor: Professor Shara Bailey, Anthropology

While the rates of attrition for women in neurosurgical residency are comparable to those of other surgical specialties, an analysis of the 2000–2009 cohort of neurosurgical residents by Renfrow et al. (2016) demonstrated that women were more than three times as likely as men to depart from residency. This study takes a qualitative approach to investigate the causes of attrition in neurosurgery residents, while specifically addressing the gender disparity in attrition rates. For the 2001–2010 cohort of neurosurgery residents, all women who matched to a program, including those who graduated and those who left their training, were asked to participate in a questionnaire either over the phone or anonymously through an online survey (SurveyMonkey). Men who matched but did not graduate were included as a control. The questionnaire aimed to determine the factors that contribute to the decision to withdraw from neurosurgical residency, and whether or not these differ significantly for men and women. The results will help to clarify whether the high rates of attrition among female neurosurgery residents are linked to gender-specific obstacles or concerns, and will lead to more insightful approaches to developing measures to promote retention and prevent attrition.

Effects of Social Support and Visual Attention on Dietary Decision Making and Self-Regulatory Success
Ana DiGiovanni, Psychology
Sponsors: Professor Emily Balcetis, Psychology; Matt Riccio, Psychology

Currently, over one-third of Americans are obese. Perhaps even more frightening is the fact that these numbers seem to be on the rise, as it is predicted that the obesity rate will reach 50% by 2030 among US adults aged 20–74 (CDC, 2015). Obesity has become a major epidemic within the United States, and has become the second leading contributor to premature deaths each year (Flegal, Graubard, et al., 2005). This failure to properly self-regulate is an American issue that is costing both lives and billions of dollars. The current study asks whether social support, goal strength, and visual attention play a critical role in dietary decision-making. In order to study this, participants completed a detailed survey on current levels of health, dietary goals, and current social support systems. Participants then completed a healthy versus unhealthy food paradigm where they were asked to choose between two foods. During this task, an eye tracking machine was used to track participants’ visual attention. It was hypothesized that increased reports of social support and goal strength would predict higher percentages of healthy foods chosen. And, that more visual attention toward unhealthy foods would be correlated with a smaller percentage of healthy foods chosen. The results supported all three hypotheses, showing how social support, goal strength, and visual attention all impact an individual’s ability to self-regulate and choose foods that align with their dietary goals.

Faunal Analysis of Dún Ailinne: An Iron Age Irish Ceremonial Site
Sam Disotell, Anthropology
Sponsor: Professor Pam Crabtree, Anthropology

Dún Ailinne is an archaeological site located in Co. Kildare, Ireland that dates to the Iron Age (600BCE–400CE). The site was a major ceremonial center for the polity of Leinster. The site has been the subject of multiple seasons of excavations, during which faunal analysis was performed on the animal remains. The existing data was incomplete, as many remains were not analyzed or catalogued. A complete, comprehensive faunal analysis is necessary to attain a more accurate understanding of the ceremonies, activities, and subsistence strategies of the site’s occupants as well as the relative importance and prestige of the site to the ancient people of Leinster. The author performs a faunal analysis of this remaining material,
using a reference collection for morphoscopic analysis. An osteometric board and digital sliding calipers are used to determine morphometric values in order to determine the size of animals. Minimum Number of Individuals (MNI) and Number of Identified Specimens (NISP) are calculated to attain a faunal profile. This data is compared to and synthesized with newer quantitative data from a 2016 excavation. The author offers an updated interpretation of the faunal profile from the site. Results show a similar species percentage ratio and age profile to the original published data, indicating a subsistence strategy and prestige status consistent with the original faunal analysis.

**Interacting with Students under Stress**

*Oana Daniela Dumitru, Psychology*

**Sponsor: Professor Tess West, Psychology**

As part of their daily experiences, college students experience stress and are likely to interact with other students under stress. Although a vast amount of research has investigated the intrapersonal effects of stress, less is known about how one individual’s stress can affect an interaction partner. The present research investigated how interacting with a stressed partner impacted students’ performance on an academic task and their level of engagement. The study operationalized engagement as the number of questions answered and the level of physiological linkage to the partner. Results showed that interacting with a stressed partner leads students to perform worse on an academic task and to show greater physiological linkage to their partner. Because stressed partners ask more questions than controls (students not under stress), interacting with them is also associated with answering more questions. Implications for student engagement and performance are discussed.

**Off the Beaten Path: How the Environment Affects Infant Exploratory Behavior**

*Rose Egan, Psychology; Sinclaire O’Grady, Psychology*

**Sponsor: Professor Karen Adolph, Psychology**

What incites infant locomotion? Recent research suggests locomotor exploration is more haphazard than destination-directed (Cole et al., 2015). This study asked whether a room with toys designed to encourage locomotion (stroller, ball, etc.) elicits more exploration than a room with no toys. Findings from 32 15-month-olds (walking range = .79–5.25 months) suggest mere space to travel to new and unexplored areas.

**Faced with Faces: Are Infants at Low and High Risk for Autism Spectrum Disorder Differentially Aroused by Primate Faces?**

*Rebecca Elbogen, Psychology*

**Sponsor: Professor Athena Vouloumanos, Psychology**

By age 2, children with autism spectrum disorder (ASD) consistently look less at people’s faces, which inhibits social development and functioning. Yet it remains unknown exactly when and why they start looking less at faces and if they look less at all faces or specifically human faces. This study presented side-by-side images of human and monkey faces to 9-, 12- and 18-month-old high-risk infants (HR; younger siblings of children diagnosed with ASD) and typically developing low-risk (LR) infants. Remote eye tracking was used to measure infants’ looking time and pupil size as an indication of autonomic and emotional arousal. Both LR and HR infants looked longer at monkey faces compared to human faces. HR infants’ pupils were smaller than LR infants’ pupils when looking at either species’ face, but both groups had larger pupils when looking at monkey faces. Looking time results provide some limited evidence that social factors play a role in why individuals at higher risk of being diagnosed with ASD look less at human faces, and pupil data suggest this behavior may signal indifference towards human faces. Overall, these complex results reveal the importance of using different methodologies.

**Implicit Biases: Varying Pronunciation of Foreign Names in American English**

*Anaïs Elkins, Linguistics*

**Sponsor: Professor Renée Blake, Linguistics**

Levi-Ari (2014) and Weinreich (1968) argue that loanword pronunciation in American English seems to vary based on speakers’ attitudes towards the source language as opposed to a uniform accommodation to the phonological properties of a speaker’s native language. This study uniquely focuses on the variable pronunciation of personal names in American English as a source of sociolinguistic variation and a reflection of individuals’ language ideologies. A sociolinguistic survey was conducted to assess the implicit attitudes of roughly 130 American English speakers as they listened to exchanges between two interlocutors varying pronunciations of personal names with either more American or “foreign” pronunciations (e.g. Isabella pronounced as “Iz-a-bel-la” versus “Ee-sa-bel-la”). It was
hypothesized that an Americanized (native) pronunciation of a foreign name would be rated more negatively than a foreign-like pronunciation and would be more likely interpreted as a sign of disrespect. Raters considered speakers who mispronounced a person’s name, regardless of the direction of the mispronunciation, as less polite, cooperative, and kind than speakers who matched in pronunciation. Mispronunciations where speakers repeat back a foreign pronunciation were rated as significantly more likely to be multilingual than the other speakers. When respondents’ ethnicity and self-reported multilingual ability is considered some trends become more pronounced. Respondents who identified as an ethnicity other than white rated the guise repeating a native mispronunciation overall more negatively than white respondents. Respondents who reported higher levels of multilingual ability rated both mispronouncing guises less harshly than those who reported lower levels of multilingualism. This study examines the social notations of the mispronunciation of foreign names in American English within the broader context of adherence to conversational norms and perceptible cultural disrespect.

(Mis)Perceptions of Exercise
Sharmenie Esin, Global Public Health/Sociology
Sponsor: Professor Emily Balcetis, Psychology

Despite concerted efforts, ranging from the “Healthy Financing Initiative” to “Healthy People 2010” to Michelle Obama’s “Let’s Move!” program, America’s obesity epidemic rages on. Among other factors, these growing obesity rates come as a result of failure to engage in sufficient exercise. Recent research from the Centers for Disease Control and Prevention, for instance, shows that 80% of American adults do not get the recommended amounts of exercise each week, putting them at increased risk for diabetes, heart disease, cancer, and a variety of other morbidity outcomes (CDC, 2015). It was here hypothesized that perceptions of one’s environment, of past performance history, and of both the environment and task difficulty influence individuals’ abilities to successfully exercise. Participants were asked to complete a variety of measures of health and take an initial measure of systolic blood pressure (SBP) and blood glucose. Participants complete a hard, medium, or easy “practice” exercise task and are provided with “false” performance feedback in order to manipulate perceptions of task difficulty for the subsequent exercise task. The second exercise is when a participant carries weights across a predetermined distance; SBP and blood glucose are measured multiple times to capture physiological changes in physiological energization before and during the task. Data revealed that participants were most likely to experience indicators of physiological energization when a task was perceived as “difficult, but manageable.” This suggests that physiological potential, a vital aspect for successful physical activity, can be influenced to make challenges more or less difficult. This information can potentially have an enormous impact on improving rates of exercise in America, which can improve the rates of obesity.

Who Gets to Go to College?
Omar Etman, History, Journalism
Sponsor: Professor Robert S. Boynton, Journalism

What does it take to get a C student attending one of New York’s 500 high schools into college? What about an entire class of C students? An entire city? In the past 15 years, the New York City school system—the largest in the country, with 1.1 million students—has seen a dramatic rise in high school graduation rates but not a commensurate bump in college matriculation rates. College Access for All, an initiative still in its first year, aims to shrink the gap. The work begins with the creation of a “college culture” in each of the city’s high schools, an environment in which college is a reasonable environment for every student, not only the all stars. By improving access to college-going resources, including funding for additional advisors, the city hopes to bring more students into an application process that begins early and has historically alienated disadvantaged students. This project explores existing college cultures at schools in four of the five boroughs as well as schools that have implemented College Access for All’s curriculum, uncovering ways the initiative can incorporate (and has/has not incorporated) different approaches to college access into its rollout of a more uniform model of reform.

Examining Stress Contagion during Tutor-Student Interactions
Faariha Faheem, Psychology
Sponsor: Professor Tessa West, Psychology

Past research has documented stress in academic contexts can lead to negative subjective experiences within academia, which can lead to disidentification with and disengagement from academic domains (Davies, Spencer, et al., 2002; Murphy, Steele, et al., 2007; Steele, 1997). In the West lab, it has been found that stress experienced by one partner in an academic learning context can contribute to another partner’s disengagement within said context (e.g., Major and Schmader, 1998), potentially due to their own cognitive and emotional resources being drained by helping the stressed person (Thorson, Forbes, et al., forthcoming). This project extends previous studies by examining how stress is communicated between tutors and students in an academic learning environment. Much of this research has documented the existence of “stress contagion”—the process whereby one person’s stress becomes embodied and experienced by another person. This study aimed to
investigate the impact of stress (either from a student or tutor) on interactions within academic settings and how this relates to students’ academic interests. Thus, whether stress regarding coursework is “contagious” from one student to another during peer tutoring sessions was tested. This work is important as it will both address a major concern on college campuses, i.e., student stress, and explore how students contribute to each other’s stress levels and impact academic engagement.

Marketing to the Model Minority: Testing the Impact of Asian American Targeted Food and Beverage Marketing
Carolyn A. Fan, Global Public Health/Sociology
Sponsor: Professor Ruth Horowitz, Sociology

Obesity rates in Asian Americans are growing at a faster rate than the general population. Watching food advertising is shown to cause an increase in food consumption and may play a role in the obesity epidemic. It is also established that companies engage in racially targeted food and beverage marketing practices. However, the impact of racially targeted food and beverage marketing on the purchasing preferences of Asian American has yet to be studied. A randomized online experimental survey tested if Asian Americans had significantly greater (1) enjoyment of an Asian American targeted food/beverage advertisement and (2) likelihood of purchasing the advertised product when viewing an Asian American targeted ad compared to a White targeted ad. Participants who watched the Asian American targeted ads rated these ads significantly more positively (6 out of 8 commercial sets) and had greater likelihood to purchase the advertised food or beverage product (5 out of 8 commercial sets) than those who watched the White targeted ads. In general, intervening demographic variables played a significant role when pertinent to a certain quality of an Asian American commercial. The majority of Asian American targeted commercials were able to sway Asian Americans’ opinions in favor of the ad and of the advertised food or beverage product. It follows that targeted advertising may play a role in the increasing burden of obesity in the Asian American community.

Intentions, Outcomes, and Children’s Moral Judgments
Elyana Feldman, Psychology
Sponsors: Professor Marjorie Rhodes, Psychology; Dr. Lisa Chalik, Psychology

People incorporate both intentions and outcomes into their moral judgments. Adults judge moral wrongness based on the perpetrator’s intention during the action and judge whether an act is punishable based on whether there was a harmful outcome. The present work seeks to examine under what circumstances children incorporate outcomes and intentions into their evaluations of inter- and intra-group behaviors. 60 participants between the ages of 4 and 6 were recruited from the Children’s Museum of Manhattan. Participants were introduced to two novel groups of children
and shown a series of social interactions, each occurring between two children from either the same or different groups. Children were then asked to rate the moral wrongness and punishability of the interaction. Children rated bad intentions as worse than good intentions and bad outcomes as worse than good outcomes. Ratings of punishability were similar to ratings of moral badness: children rated bad intentions as more punishable than good intentions, and bad outcomes as more punishable than good outcomes. 4-year-olds responded similarly for inter- and intra-group behaviors, whereas 5- and 6-year-olds showed variation in their responses across group context. This study provided some evidence that children consider both intention and outcome information in evaluating moral transgressions, but the issue of whether the extent to which they consider each feature varies by group information is in need of further investigation.

**Effects of Restrictive Childrearing Practices on Motor Development**

*Sara Fernandes, Psychology*

*Sponsor: Professor Karen Adolph, Psychology*

Does restricted movement in infancy impair motor skills? Do effects persist into early childhood? Researchers have long assumed that movement is critical for motor development. Infants raised in Western cultures are free to move. But infants in Central Asia spend large portions of the day in a traditional “gahvora” cradle—with limbs bound and movements restricted. The gahvora presents a unique opportunity to study effects of constrained movement on motor skills in infancy by observing 173 0- to 24-month-old Tajik infants. It was found that motor skills were delayed compared to Western norms: by 12 months of age, most Western infants crawl and ~50% walk, but only 33% of Tajik infants crawled and none walked. A dose-response effect was also found: infants who spent longer hours in the cradle showed less advanced motor proficiency. To examine long-term effects, the study assessed 73 4.5- to 5-year-old Tajik children using the Test of Gross Motor Development. Results will compare Tajik children’s performance to US norms. Findings from these studies provide new insights into the short- and long-term effects of early experience on motor development.

**Abolish the Backlog: Incorporating Intersectional Feminist Protocol into Rape Kit Testing and Reform**

*Allison Gillespie, Social and Cultural Analysis*

*Sponsor: Professor Melissa Fisher, Social and Cultural Analysis*

Though the exact number is unknown, it is estimated that thousands upon thousands of untested rape kits sit on shelves throughout the United States. The progress among local jurisdictions to eliminate their backlogs, while improving, has revealed inconsistent understandings of justice for violence against women. This project uses the framework of intersectionality to explore how the historical ramifications of marriage, slavery, and colonialism have complicated the category of “women” and thus different survivors’ experiences of sexual assault and legal justice. Following New York City’s successful testing of 17,000 kits in 2003, many other cities across the country have worked to identify and reform their own backlogs. However, much of this progress should be attributed to the survivors, activists, and nonprofit organizations who work to ensure equal justice for women and people of color in the public sphere by training authorities, proposing protocol-based testing reform, and rejecting the “lack of funding” rhetoric used by politicians to justify backlogs. The analysis of existing protocols and methods of testing reveal the ways in which the rape kit backlog continues to exist as evidence of a gendered, racialized public vs. private binary. Contextualized by an interview with prominent rape kit backlog activist Natasha Alexenko, this project evaluates how this binary can be deconstructed, both institutionally and internally, through the adoption of intersectional feminist protocol by federal and local rape reform initiatives.

**Feasibility of Using Global Positioning System (GPS) Methods to Measure the Neighborhood Contexts of Health Behaviors among Transgender Women in New York City**

*William C. Goedel, Global Public Health/Sociology*

*Sponsor: Professor Dustin Duncan, Population Health, NYU School of Medicine*

To date, no studies utilizing global positioning system (GPS) technologies to measure mobility and environmental exposures have been conducted among a sample of transgender women, despite the potential salient role neighborhood contexts may play in the health of this population. This study assesses the acceptability and feasibility of a weeklong GPS protocol among a sample of transgender women in New York City. A sample of 14 transgender women residing in the New York City metropolitan area were recruited through community based methods to wear and charge a GPS device for seven days to measure daily mobility. The acceptability of these methods were assessed using a pre- and post-protocol survey and their feasibility was measured using objective data derived from the GPS device. Pre- and post-protocol survey measures were compared using McNemar’s test. Participants reported high ratings of pre-protocol acceptability as well as few concerns regarding safety, appearance, and losing the device, all
of which were maintained after completing the protocol. All 14 devices that were distributed were returned. All 14 participants had GPS data for at least one hour on one day and 12 participants (85.7%) had at least one of GPS data on all seven days. The findings of this pilot study demonstrate the GPS methods are both acceptable and feasible among this sample of transgender women. GPS devices may be used in research among transgender women to understand area-based determinants of human immunodeficiency virus (HIV) infection in this population.

In Defense of Self: Obesity Stigma and Its Effect on Identity

Tenay Greene, Global Public Health/Sociology
Sponsor: Professor Emily Balcetis, Psychology

Studies have found that exposure to stigmatizing messages detrimentally affects health behavior by creating stereotype threat-like responses (Major and O’Brian, 2005). Other literature on defensiveness makes a similar claim, noting when people come into contact with uncomfortable evaluations of the self, they can turn to harmful behaviors in an attempt to avoid lowering their self-esteem (Belding, Naufel, et al., 2015). Stereotype type threat and other obesity stigma literature find that factors such as identification, sensitivity to threat, social support, and health norms affect how people experience stigma (Marx, Stapel, et al., 2005; Brown and Pinel, 2003; Brewis, 2014). The present research aims to confirm the effects of stereotype threat for overweight people and understand the effect of experiencing a threatening situation on identification and perceptions of the self. In study one, participants were asked to make choices between pictures of healthy and unhealthy foods, about their general eating habits, and feelings of guilt and conflict when eating. Overweight participants chose less healthy foods more often than participants of a healthy weight, and participants of all weights who felt conflicted about making these types of choices in general did the same. In study two, participants made food choices or made choices between water brands (control condition). Their choices were also either primed to be considered as related to weight or not. They were then asked how they identify themselves in terms of weight, perception of threat in everyday occurrences, and what level of support and health norms they detect from those close to them. Overweight participants and in the threatening conditions reported higher ideal body sizes than those in the less threatening conditions, indicating a shift away from healthy goals and toward the self-esteem prioritizing perceptions of the self.

Supervised Injection in Vancouver: The Changing Nature of Drugs and Drug Policy in Canada and the United States

Abraham Gross, Journalism, Politics
Sponsor: Professor Robert S. Boynton, Journalism

The intensifying opiate crisis in America is a medical, legal and political battle that continues to be fought on all levels of government. As drug overdose deaths reach record levels, policy officials in cities from New York to San Francisco are looking to Vancouver’s supervised injection facilities (SIFs), where users inject illegally obtained intravenous drugs in a legal, government-funded and medically supervised environment. Though initially facing harsh criticism, the first and currently sole SIF in North America, Insite, has not had any overdose deaths despite millions of injections in its nearly fourteen years of operation. That track record has led to the present reality where almost a dozen SIFs have been recently approved or are awaiting approval across Canada, and technically “illegal” SIFs operate with the open consent of law enforcement and government leaders. This study catalogues the political and legislative hurdles SIFs in Vancouver have faced through interviews with major political and advocacy figures, and compares them to current efforts and challenges in the United States. The present logistical setup and practical effects of SIFs are documented and analyzed through direct observation and reportage, noting the evolving role of SIFs as reformers seek to address greater social and health issues in Vancouver. Finally, this study demonstrates that the changing nature of heroin is likewise transforming the conversation around drug reform policy. New and highly potent synthetic opiates—primarily fentanyl—have rapidly infiltrated street heroin, leading to an unprecedented amount of overdose deaths across North America and pushing reformers to go beyond SIFs and advocate prescription heroin services. This study not only analyzes the roots, current realities and future possibilities of a controversial drug reform policy in both a Canadian and American context, but also surveys the effects of a new and deadly class of drug spreading across the continent.

Housing Investment, Market Frictions and Inequality

Xiaojun Guan, Economics and Mathematics
Mentor: Professor Virgiliu Mihrigan, Economics

In this paper, an overlapping generation model with heterogeneous households in terms of income and wealth is adopted to study the interactions between housing prices, household portfolio choice, and income inequality, when market is incomplete and has a lot of frictions. The key assumptions in the model are (1) housing is lumpy and is not perfectly divisible and (2) housing acts as a collateral for mortgage loans and (3) housing is treated as both an
investment and consumption good. With this model, it is shown that (1) an increase in the incomes of top earners could cause housing prices to rise if the rich either (a) choose to invest an increasing fraction of their wealth in housing (as opposed to other investment vehicles) or (b) demand upgrades to the existing housing stock, and (2) how the resulting increase in housing prices could have different consequences when income inequality is high versus low.

**Convergence: What Different Measures of Development Say About the Convergence Coefficient of a Nation**

_Tanvi Gupta, Economics_

_Sponsor: Professor Martin Rotemberg, Economics_

The question the paper attempts to tackle is how different measures of development generate different ideas about a nation and its development. This paper evaluates different measures of development and compares convergence coefficients across the different methods for each country. This is done by constructing and evaluating the development index for each country for 40 years using data from the World Bank. The convergence coefficient is then evaluated based on the formula proposed by Barro and Sala-I Martin in their paper _Convergence_ (1992). The development measures taken into consideration are Per Capita GDP, Jones-Klenow measure and a production-based measure. The convergence coefficients for each measure are compared to the coefficient calculated for per capita GDP and large discrepancies are investigated. In order to explain these discrepancies, the underlying measure and its components are analyzed. This is used to pinpoint the specific factor that leads to a country’s convergence coefficient to look either inflated or deflated leading to a conclusion about the emphasis each factor places in deciding the level of development of a country relative to the world.

**Are SSRIs The Best Cure For Depression In Teens?**

_Sam Gutierrez, Journalism, Psychology_

_Sponsor: Professor Robert S. Boynton, Journalism_

Selective Serotonin Reuptake Inhibitors (SSRIs) are even more widely prescribed than ever before but despite having had their place in American medicine cabinets for nearly three decades, little is known about how they affect a very vulnerable and widely using population-teens. Aside from establishing—through a Federal Drug Administration (FDA) black box warning (the most severe warning the agency issues)—that SSRI use may increase suicidal ideation in teens, little else is known about how they may or may not do harm to a teen or even how effective they really are. This project explores the danger of the reliance on antidepressants as treatment for adolescent depression by examining different studies and individual stories that illustrate the many imperfections of SSRIs. Topics covered include publication bias, lack of testing for negative side effects in teens taking SSRIs and a cultural propensity to rely on medications because they seem more legitimate than alternative methods of treatment. The project proposes a move not away from pharmaceuticals, but rather towards individualized pharmacology in order to accurately address symptoms in teens, reduce depression, and avoid adverse events such as suicide.

**Need for Cognition and the Disparity between Racial and Political Bias Detection**

_Peiliang Han, Psychology_

_Sponsors: Annie Hill, Psychology; Professor Gabriele Oettingen, Psychology; Professor David Amodio, Psychology_

It had been found that people detect racial bias more readily than political bias due to their hyper-vigilance for more socially tabooed racial bias cues. The present study examined the role of need for cognition, a dispositional factor that characterized one’s tendency to think elaborately, in this process of differentiating racial and political bias detection. 206 NYU students were recruited to play a modified version of a third-party punishment task and judge offers between difference intergroup contexts as either fair or unfair, with their mouse trajectory recorded. A Generalized Estimating Equation revealed a significant effect of need for cognition on the difference in bias detection between race versus politics intergroup conditions, indicating that need for cognition indeed influence bias detection in different contexts.

**E-Responders Intervention Impact on Empathy and Prosocial Online Behavior**

_Kavish Harjai, French, Psychology_

_Sponsors: Professor Shabnam Javdani, Applied Psychology, Steinhardt School of Culture, Education, and Human Development; Corianna E. Sichel, Applied Psychology, Steinhardt School of Culture, Education, and Human Development_

Online platforms, such as Twitter and Facebook, have emerged as virtual arenas where real-world gun violence is instigated. Youth at risk for gang involvement are particularly vulnerable to the hazards of social media and online communication. Empathy is an emotional construct that includes dimensions of concern for others and perspective taking (Davis, 1980). Empathy has been associated with youths’ likeliness to engage in aggressive behaviors (Castillo, Salguero, et al., 2013) and has been found to be less present in online interactions (Aricak and Ozbay, 2016). The proposed poster will present findings from a pilot implementation of the E-Responder Youth Leadership Program (YL P). E-Responder is a novel intervention, developed by researchers at NYU in partnership with the
New York City Crime Commission, and the YLP aims to prevent the escalation of violence on social media by building on youth’s strengths to promote problem-solving and emotion-regulation skills. Specifically, the proposed poster will examine the following research questions using a quasi-experimental design in a sample of 81 youth: 1) to what extent will youth participating in the YLP intervention demonstrate increased a) prosocial online behavior, b) empathic concern, and c) perspective taking compared to youth not participating in YLP? 2) to what degree will increases in youth’s levels of empathy depend on their engagement in prosocial online behavior? It is expected that youth in YLP will experience greater increases in prosocial online behavior, empathic concern, and perspective taking, and that and that youth with the greatest positive changes in prosocial online behavior will demonstrate the highest levels of empathy over time. If this is the case, the implications may include the establishment of a program that creates more empathic social media users, and therefore, individuals who are less likely to instigate violence online.

Stock Market and the Economy
Anushae Hassan, Economics
Sponsor: Professor Gerald McIntyre, Economics

This paper analyzes the relationship between the stock market performance and real economic activity. There have been disagreements and differing results in terms of the relationship between the economy and the financial markets, requiring additional research in the area. It is interesting to study the foreign influences or international linkages that impact different countries. This paper focuses on the international linkages between Pakistan, China, India, and the United States, given their trade and investment relationships. The correlational analysis examines two aspects. First, the effect of one country’s contemporary and lagged stock returns on GDP growth rates of the other country. The second part studies the effect of the GDP growth rate and lagged dividend yields on the stock returns of the other country. As hypothesized, the results show a significantly positive relationship between Pakistan and the United States and also between Pakistan and China. Whereas, there is no relationship found between Pakistan and India, due to the tense political relationship. In general, the foreign influences help explain why the stock market performance tends to outweigh the real economy in some cases.

Silent-GO in Russian
Alexxa Houk, Linguistics, Russian and Slavic Studies
Sponsor: Professor Stephanie Harves, Linguistics

In a number of languages, it is possible to say phrases such as one literally equivalent to English “I want to go to the beach” to mean “I want to go to the beach.” However, these sentences involving elision of the verb “to go” are not possible in all languages such as in Romance languages and modern English. Van Riemsdjik’s (2002) study on this construction in Germanic languages and Marušič and Žaucer’s (2005) study on the Slavic language Slovenian posit that there is a silent-GO verb present in these sentences as opposed to the modal verbs, such as “want,” directly combining with the prepositional phrase, such as “to the beach.” Through fieldwork with native Russian speakers the author determined aspects of this construction in Russian that had yet to be studied in depth. This includes determining certain restrictions on when “go” can be elided which are dependent on which form of the verb “to go” is required in the given context. Furthermore, data in Russian has been compared cross-linguistically, and evidence for the presence of silent-GO in Slovenian is also evident in Russian; however, there are some other differences between the two closely related languages, such as variance in which modal verbs can be used in this construction.

The Economics of Colonialism
Amanda Hua, Economics
Sponsor: Professor Gerald McIntyre, Economics

This paper explores a variety of historical factors that have been proven to influence modern economic growth. In exploring papers by La Porta et al., Acemoglu et al., and Comin et al., this paper evaluates the law matters thesis and the degree to which colonial origins and adoption of communication technology can contribute to not only modern day income inequality (Comin et al.) and institutional growth (Acemoglu et al.), but also how well it can predict the development of legal systems and corporate governance. While using legal systems as La Porta et al. does in “Law and Finance” (1998) is valid, this paper finds that settler mortality rates can instrument for GDP growth rate changes in the years 2000–2015 and better explain a country’s financial and legal infrastructure today. Additionally, the rate of communications technology adoption in a country as measured from the year 1500 AD is also an influential factor: it can instrument for the legal regime of a country in predicting economic development. In summary, this paper updates the economic development exploration and investigates cross-sectional growth rate differences, rather than using stock variables as previous papers have done. This facet of research further indicates the difficulty of modern day regime transition and policy adoption in the absence of past neglect or disadvantage in social organization.
When Labor Is an Extracurricular Activity: Traditional Indian Values and Their Implications on Attitudes towards Child Labor in India
Kavi Huded, Politics
Sponsor: Professor Michael Gilligan, Politics

In recent years, experts have considered whether India can still be considered a “developing” or “non-industrialized” country. In light of the expansive growth and industrial progress India has experienced in recent decades, the disproportional prevalence of child labor presents a puzzling phenomenon. Adding to the relatively scarce research on factors that influence demand for child labor, this paper hypothesizes that traditional Indian values and culture play a role in keeping the demand for child labor alive in India. Further, this paper also tests the effects of advocating for either globalization and westernization or retaining traditionalism on subsequent attitudes towards the practice of child labor in India. Through the use of an original web survey experiment, this paper finds that while greater levels of traditionalism do not directly correlate with greater acceptance of child labor, advocating for embracing globalization and westernization resulted in lower acceptance of child labor. Additionally, this paper finds that advocating for retaining traditional values and an Indian way of life as opposed to embracing outside influences subsequently resulted in more accepting attitudes towards the practice of child labor.

Interstate Migration and State Taxation Rates
Kristijan Dino Ilievski, Economics
Sponsor: Professor Kevin Thom, Economics

This paper answers two questions. First, whether the tax rate differential has influenced the individual’s decision to migrate within the United States over the past 25 years. Second, whether the responsiveness to the tax rate differential has changed over the past 25 years. Using panel data from 1982 to 2015, the decision to migrate was regressed on the tax rate differentials for personal income, and control variables. The population data are from the Current Population Survey and individual tax data are from National Bureau of Economic Research. The paper fails to discover a statistically significant influence of state tax rate differentials on the individual decision to migrate. The second question in this paper could not be answered conclusively as the findings were not statistically significant for answering the first question of this paper.

Memory, History, Solidarity: Asian/Pacific/ Americans for Arab/Middle Eastern/Muslim Communities
Charissa Joelle Isidro, Journalism, Social and Cultural Analysis
Sponsors: Professor Carolyn Dinshaw, Social and Cultural Analysis; Professor Dean Itsuji Saranillio, Social and Cultural Analysis

There is a history of Asian/Pacific/American (A/P/A) suffering that is being lost in the history books. But it remains in the memories of those who have lived it and continue to live through its consequences. At the same time, the legacies of A/P/A exclusion and marginalization are seen in the contemporary experiences of Arab/Middle Eastern/Muslim American (A/ME/MA) communities and the injustices they face in the current political climate. In many ways, the visibility of their treatment has renewed reflection upon the past treatment of A/P/A communities, sharing many of the same labels: foreign bodies, unable to integrate, undeserving of citizenship. This thesis specifically focuses on the actions of a few A/P/A individuals standing up for A/ME/MA communities, being grounded in empathy and rooted in the contexts of their own experiences, from Japanese internment, to Philippine colonialism, to Vietnamese displacement. It aims to illuminate the cyclical nature of history and examine how sensibilities for the mistreatment of others can develop through personal memories and histories of marginalization and lead to meaningful solidarity movements that legitimize identity-based activism while also creating intersectional networks based on a shared value for human life. This project would be a testament to the communities of ethnic minorities fighting injustice together and finding hope in each other.

No Good Immigrants
Charissa Joelle Isidro, Journalism, Social and Cultural Analysis
Sponsor: Professor Jason Samuels, Journalism

Immigration is one of the most divisive political issues in the United States. Much of President Trump’s inflammatory campaign rhetoric and many of his early executive actions were targeted at immigrant populations. A coherent integration policy and a successful immigration reform bill still do not exist. Furthermore, any and all calls for change in immigration policy have been dominated by a problematic structure known as the good immigrant-bad immigrant binary. This narrative is one that focuses on policies that gauge the “worth” of immigrants and thus is inherently exclusionary and allows some who are more privileged to benefit at the expense of others. At the same time it stigmatizes poor and uneducated immigrants, conflates criminality with immigration status and justifies the neglect of immigrant communities who are viewed as not American enough or are unable to rise out of their economic or legal conditions. The goals of this documentary project are to challenge the good immigrant-bad immigrant binary by giving a voice to individuals deemed “bad” immigrants and ultimately to advocate for immigration reform that is
Refugee Agency and Resiliency
Charissa Joelle Isidro, Journalism, Social and Cultural Analysis
Sponsors: Professor David Abramson, College of Global Public Health; Professor Sukhdev Sandhu, Social and Cultural Analysis

What do we think of when we think of refugees? Perhaps the dead body of a child on a shore, the crying face of a man, or an overcrowded boat in the middle of the ocean. Despite the typical portrayal of refugees being helpless and lowly, refugees have been enormously courageous in their tireless efforts to spread awareness and inspire action. Though states have provided a limited amount of necessary support for basic survival, local communities have rallied around refugees to form organizations and promote initiatives that look at the long-term resettlement of refugees, and in some instances have even taken on functions of the state (providing work, healthcare, housing). At the same time, they’ve also allowed newly politicized refugees and those actively engaged to take part in movements that highlight their own issues and advocate for their own demands.

The Predictability of Brazilian Portuguese Stress and Its Sociolinguistic Implications
Clara Katz-Andrade, Linguistics
Sponsor: Professor Maria Gouskova, Linguistics

The extent of predictability of syllabic stress in Brazilian Portuguese (BP) is a subject long debated by linguists. While many linguists and grammarians have attempted to delineate phonological rules that determine stress in BP (Thomas, 1974; Whitleam, 2011), others have declared stress in BP to be unpredictable, claiming phonological rules can only be used to describe general stress patterns, and cannot fully predict it (Mattoso Camara, 1972). However, all agree stress falls primarily on the penultimate position in BP and it exists only in the penultimate, ultimate, and antepenultimate positions (Mattoso Camara, 1972; Quicoli, 1989; Barbosa and Albano, 2004). BP stress is an important factor in many other phonological rules, such as vowel quality and consonant reduction. Therefore, understanding the extent to which stress is predictable and rule-based can shed light on several other critical phonological processes in BP (Lipski, 1975; Guy, 1981). Additionally, the Northeastern dialect of BP has certain distinctive features, arising from its failure to observe many of the standard stress-based phonological rules of BP, which set it apart from more prestigious dialects of BP (Mattoso Camara, 1972; Guy, 1981; Ramos, 1997). It could be hypothesized that Northeastern Portuguese (NP) would have greater variability in stress determinations than other BP dialects. The purpose of this thesis is to ascertain the extent to which the theorized rules can accurately predict Brazilian stress; furthermore, given the marginalized status of NP, to determine whether greater variability, if present, is a contributing factor to the status of Brazilian dialects. The findings show stress in BP is relatively predictable according to the proposed rules, albeit with many exceptions; meanwhile, although stress in NP does not deviate from the general pattern, phrasal stress demarcations can be significantly different from other dialects of Portuguese.

The Determinants of State Hate Crime Legislation
Afraz Khan, International Relations
Sponsor: Professor Alastair Smith, Politics

Hate- and bias-motivated crimes have occurred for centuries in the United States but their widespread recognition and codification into law is relatively new. There is immense variation in hate crime legislation across all 50 states and the District of Columbia, including but not limited to the categories of people protected under the law, enhanced penalties, and required police trainings on assessing hate crimes. Although studies recognize these inconsistencies, there is minimal research explaining the factors that influence the existence of such laws. This study seeks to analyze whether a state’s racial, political, socioeconomic, educational, and law enforcement-related attributes impact that state’s likelihood to enact hate crime legislation. The results suggest states with Democrat controlled state legislatures and higher rates of international immigrants are more likely to possess hate crime legislation. Ultimately, the political will of a state plays a huge role in a state’s ability to recognize and respond to hate crimes.

A Qualitative Study on the Built Environmental Barriers of Healthy Living among Caregivers of Obese Children Living in New York City Public Housing
Aisha Khan, Anthropology
Sponsor: Professor Dustin Duncan, Population Health, NYU School of Medicine

The United States is currently in the midst of a childhood obesity epidemic. In fact, one third of America’s youth are overweight or obese. However, disparities also
exist in terms of race and socioeconomic status. Studies have revealed Hispanic and black children have higher prevalence rates of obesity than white children and that the prevalence of childhood obesity among children coming from well-educated families has been decreasing, yet increasing for children from less-educated families. Thus, this study aimed to assess family and community-level factors contributing to childhood obesity among a sample of predominantly racial/ethnic minority low-income housing residents in New York City. A sample of fifteen New York City public housing residents were interviewed who were currently caring for an obese or overweight child. This study's results indicated that the cost of living in gentrified neighborhoods, proximity to supermarkets, unmaintained play areas for children and high crime all posed barriers to caregivers attempting to provide children with a health promoting environment in public housing. These findings are important as they add to the growing literature on childhood obesity disparities and the role of the neighborhood context, which can thereby inform future research and the development of tailored interventions.

The Effect of US Foreign Policy on the American Muslim Vote: A Survey Experiment
Sharmeena Khan, Politics
Sponsors: Professor Bernd Beber, Politics; Professor Eric Dickson, Politics

US foreign policy decisions post 9/11 caused an overwhelming shift in the American Muslim vote from the Republican to the Democratic Party. American Muslims have demonstrated high levels of dissatisfaction with US military decisions in the Middle East post 9/11. This study examined how American Muslims view varying levels of military engagement in both Muslim and Christian majority countries today. Through a survey experiment, this study tested how American Muslims view military intervention, local army aid, and drone strikes in a Muslim or Christian majority country facing crisis. The overall findings show that American Muslims have low to neutral levels of support for US military engagement abroad. There was no significant difference in support for a Muslim or Christian majority nation. However, certain demographics within the sample (males, followers of Sunni Islam, and voters in the 2016 presidential election) demonstrated a significant difference in support for drone strikes, indicating lower levels of support for drone strikes in a Muslim majority country.

Deconstructing the Gender Wage Gap in the United States: A Survey Experiment
Jin Ho (Jodie) Kim, Politics
Sponsors: Professor Bernd Beber, Politics; Professor Eric Dickson, Politics; Maria Carreri, Politics

This thesis examines the current state of the gender wage gap in the United States by conducting a survey experiment. Respondents were presented with either a male or female resume of identical caliber, at either a high or moderate qualification level. They were then asked to rank the hypothetical employee’s qualification level and predicted performance. Additionally, respondents were also asked to set an hourly wage for the individual. The resulting data was compiled and segmented into three distinct datasets: one cumulative dataset, one extremely qualified dataset, and one moderately qualified dataset. Regressions were performed to assess whether employees’ gender had an effect on the perceived quality of their resume, predicted performance, and the hourly wage given to them. Statistical significance was found most in the regressions run for the moderately qualified resumes. These regressions showed that male employees were awarded a significantly higher hourly wage although they were predicted to perform significantly worse. This thesis suggests that the gender wage gap is still an issue that needs to be addressed in the United States.

Trust Derived from Kin Recognition Leading to Pro-Social Behavior
Paula Kosciolek, Biochemistry, Psychology
Sponsor: Professor Laurence Maloney, Psychology

People frequently must work in groups in order to achieve a desired goal. But, how do they determine who to cooperate with? Humans have developed the ability to discriminate between not only members of their own kin but also members of others’ kin using visual cues found in the face. These are known as identity kin recognition and allocentric kin recognition. Dal Martelo and Maloney (2006) found individuals can use allocentric kin recognition to recognize face picture pairs as siblings or non-siblings and the frequency of relatedness judgments correspond directly to similarity ratings. Furthermore, Debruine (2002) found individuals ranked as more similar were also rated to be more likely to cooperate in a Prisoner’s Dilemma style game. The purpose of this study was to demonstrate a link between allocentric kin recognition and increased cooperation between related individuals. Using an ultimatum game set up, participants were asked how likely they thought two children were to share a set of gummy bears in a scenario in which one child was originally in possession of all the gummy bears. It was hypothesized that individuals would deem picture pairs that are related as more likely to cooperate and share a larger amount of gummy bears. This cooperative and altruistic behavior on the basis of recognizing kin members provides insight into a perceptual mechanism underlying altruism with the possible evolutionary benefits of kin recognition linking to evolution of altruistic behaviors through population genetics.
A Regional Analysis of Lithic and Chronological Variation in the Protoaurignacian
Tanner Kovach, Anthropology
Sponsor: Professor Randall White, Anthropology

The Protoaurignacian represents one of the earliest modern human occupations in Eurasia and is currently recognized mostly within the Mediterranean and Atlantic regions of Europe. This stone tool industry is defined by the presence of Dufour bladelets of the Dufour subtype and continuity between blade and bladelet production, which serve to differentiate it from the Early Aurignacian. The primary goal of this study is to account for and analyze the lithic variability within the Protoaurignacian based upon a regional analysis of Protoaurignacian assemblages. The second goal is to assess the current corpus of reliable radiocarbon dates from Protoaurignacian contexts to understand the timing and spread of the technocomplex, as well as its temporal and geographic relationship to the Early Aurignacian. These aims were carried out through examination of the published literature, as a first-hand analysis of the lithic materials was not feasible. Preliminary results suggest a wide range of variation among Protoaurignacian lithic assemblages around a central microlithic theme. However, this lithic variation does not appear to be regionally patterned to any significant degree. Instead, chronological information suggests movement towards a more “classic” Aurignacian pattern through time as well as significant overlap between the temporal ranges of the Protoaurignacian and Early Aurignacian. There is also evidence for a range of site functions in the Protoaurignacian that may account for some of the lithic variation.

Violence against Older Adults: Perpetrators and Mechanisms of Geriatric Physical Assault Injuries Treated in US Emergency Departments, 2006–2014
David Lachs, Individualized Major
Sponsor: Professor Tony Rosen, Division of Emergency Medicine, Weill Cornell Medical College

Older adults are commonly victims of assault, but circumstances surrounding these assaults are not well described. This study examined perpetrators and mechanisms of geriatric physical assaults treated at US Emergency Departments (EDs). The author analyzed assault injuries in patients aged ≥60 treated in EDs during 2006–2014 using the National Electronic Injury Surveillance System, which collects data from a nationally representative stratified probability sample of US hospitals and includes a brief narrative about injury circumstances for each case. Narratives were examined using a pre-determined protocol. 7,759 assault injury-related visits occurred, representing an estimated 425,992 treated in US EDs. Perpetrator information was available for 53.3% of cases, mechanism information for 66.7%, and weapon information for 58.7%. Most commonly, perpetrators were family (28.8% of cases with information) and strangers/robbers (27.7%). 57.6% of perpetrators had a relationship with an expectation of trust with the victim suggesting these assaults were physical elder abuse. Most common mechanisms of injury were beating with fists (31.6% of cases with information), striking with objects (27.3%) and fall during altercation (20.2%). Multiple mechanisms were present in 33.3%. The findings provide ideas about circumstances surrounding geriatric assault injuries, with the majority of victims suffering from physical elder abuse.

A Case Study of Environmental Justice in Lower Manhattan, New York
S. Terry Lackovic, Environmental Studies
Sponsor: Professor Jennifer Jacquet, Environmental Studies

This research analyzes and compares specific environmental and demographic indicators and environmental justice indexes of selected buffer zones representing different neighborhoods of Lower Manhattan. By utilizing an environmental justice mapping tool, the author uses demographic information (e.g., linguistic isolation, percent minority, percent low-income) and environmental indicators (e.g., lead paint indicator, proximity to hazardous waste, respiratory hazard index) to draw conclusions about the environmental and social quality of Chinatown and the Lower East Side relative to the surrounding, more affluent communities. This research assists in building a case of possible social and environmental injustices that manifest from city planning preferences and civil disenfranchisement such as inadequate regulatory policy or zoning decisions, further exacerbating issues of gentrifications, commercial development, and poor living conditions. By highlighting the urban environmental health of Chinatown and the Lower East Side, the author argues for increased autonomy in policy making and increased research in these communities to help address social and environmental injustices in urban development.

Asian Americans and American Asians: Components of Race in the New York City Workplace
Jenna Lee, Sociology
Sponsor: Professor Ruth Horowitz, Sociology

This study investigates the experiences of East Asian and East Asian-American young professionals working in large companies in New York City, exploring how multiple facets of Asianess affect job-related feelings, behaviors, and interactions, particularly equal treatment. The results here suggest that the degree to which one feels that race impacts his or her work experiences correlates with strength of identification as “Asian” and/or a specific Asian national origin,
as opposed to identification as more “American.” Overall, “Asian-identifying” subjects reported more instances of perceived discrimination, and believe that stereotypes about Asians play a role in their own work and daily life interactions, whereas “American-identifying” subjects for the most part did not. All female subjects believe their race and gender together significantly impact their work experiences. However, regardless of cultural identification, all subjects believe that Asians as a group are subject to bias in hiring. Those who perceived racialized treatment expressed reluctance to either “play the race card” and speak up, or to downplay their race, believing hard work is the only meaningful course to overcome racial disadvantage in the professional world. Finally, many expressed faith that New York City is more racially-accepting than other parts of America, and that modern corporate diversity initiatives are leveling the playing field for Asians, women, and other people of color.

**Ideological Differences in the Spread of Morality in Online Social Networks**

*Stephanie Leung, Psychology*

*Sponsors: William Brady, Psychology; Professor Jay Van Bavel, Psychology*

Given the impact of social media in recent moral and political events, including the 2016 US Presidential Election, research in moral psychology has begun to examine what factors make moral ideas more likely to spread in online social networks. This study continues this investigation by testing whether different types of moral/political messages are more likely to spread in Liberal versus Conservative social networks. In one study, the author tested whether Liberals and Conservatives showed differences in intentions to retweet moral/political messages depending on the type of moral foundation expressed. A series of “tweets” were created that indicated a topic (gun control, climate change, or same-sex marriage), a political ideology (liberal or conservative), and one of two moral foundations (care/harm or authority/subversion). As expected, Liberals indicated a higher intention to retweet liberal messages, and Conservatives showed a higher intention to retweet conservative messages. Consistent with the Moral Foundations Theory, for Liberals there was an interaction such that Liberals indicated a higher intention to retweet liberal messages containing the Care/harm moral foundation than liberal messages containing the Authority/subversion moral foundation. Inconsistent with the Moral Foundations Theory, Conservatives indicated a higher intention to retweet Care/harm messages regardless of message ideology. These results help shed light on ideological differences that affect the spread of moral and political messages in online social networks.
New York City’s Great, Green Markets  
Kendall Levison, Journalism  
Sponsor: Professor Robert S. Boynton, Journalism

In the 1970s, two New York City employees wanted to find a way to help small farmers in Upstate New York make their land profitable enough to stay in business. At the time, shoppers in New York City were still eating expensive, low-quality produce shipped in from across the country. Those employees, Barry Benepe and Bob Lewis, imagined creating an open-air market where farmers could sell their products directly to consumers. In the nearly 50 years since the first New York City Greenmarket opened, the project has been a wild success. Farmers markets, an essential part of early American life, are coming back. Along with their enormous popularity, the markets now occupy an enviable space in the city’s culture. At the same time, there is a growing effort to make the markets accessible to everyone, especially those who use government assistance to fill their shopping carts. Through in-depth interviews, social and scientific research, and other reporting methods, this project is a journalistic look at how New York City got its Greenmarkets. It also shows how the story of the Greenmarket is part of a larger shift in how Americans think, buy and talk about food.

Effect of Driving Restriction on Air Quality: A Case Study of Nine Chinese Cities  
Yunqi Li, Economics, Mathematics  
Sponsor: Professor Hunt Allcott, Economics

This project builds on previous research to study the effectiveness of different driving restrictions in improving air quality across nine Chinese cities by adopting a regression discontinuity (RD) design to estimate the causal impact of driving restrictions on air pollution using three cross-validated datasets. To understand how people’s behavioral responses have shaped the outcomes of policy in China, the author also uses RD to estimate the impact of the policies on measures including private car sales and gasoline sales. In the end, a speculative cost-benefit analysis is carried out by estimating the social cost of the policy in Beijing. Results indicate that, in general, there exists little evidence supporting the effectiveness of driving restriction in alleviating air pollution except in Beijing and Wuhan. Contrary to previous research, this study finds only partial evidence hinting at possible temporal substitution of driving to the weekends or holidays. It is also found that the lack of effectiveness of policy may be due to a weak motivation for people to switch to public transportation usage. Moreover, different policy implementations in terms of strictness of policy enforcement and area of restriction play an important role in generating different results.

The Ignored Power: Sibling Effects under China’s “One-Child” Policy  
Duan Liu, Economics, History  
Sponsor: Professor Xiaochen Fan, Economics

The implementation of the “one-child” policy since the 1970s has tremendously changed the Chinese household configuration, and gender imbalance has increased due to people’s sex-selective abortions under the strict birth planning policy. This study investigates the influence of sibling structure on children’s educational attainment after the “one-child” policy implementation by conducting ordinary least squares tests. The sibling structure is defined as the number of siblings, gender of siblings, birth order of children, and age spacing between each sibling. The study shows that the child’s gender, sibling’s gender, and birth order all influence children’s education attainment. In general, being female, having a sister instead of a brother, and being the later-born child in the family can bring positive effects to children’s education. The local economic conditions and mother’s education also positively impact children’s education. While previous studies have extensive theories and empirical tests on sibling’s influence on household, most of them only focus on one or two aspects. This research offers a more comprehensive view of how different factors interplay with each other and impact the outcome of children’s education. Starting from 2016, the Chinese government implemented a new family planning policy to allow each household to have two children instead of one. Thus, this study could also contribute to the understanding of such configuration change and reveal the future trends on education and labor market.

The Building Blocks of the Perfect Woman: Women’s Ideal Balance of Masculine and Feminine Traits  
Melissa Lobel, Psychology  
Sponsors: Professor John Jost, Psychology; Joanna Sterling, Psychology

The current study examines the evaluation of women in female-typed domains. Previous research has shown women are penalized when they do not subscribe to feminine stereotypes when evaluated in male-typed domains (Rudman, 1998; Heilman, Wallen, et al., 2004). It has also been demonstrated that masculine traits are rated as more favorable than feminine traits (Broverman, Vogel, et al., 1972). This study sought to determine the ideal proportion of feminine to masculine traits for evaluations of predicted success in female-typed domains. Contrary to stereotype fit predictions, the current study posits that female applicants for a female-typed domain would be predicted to be most successful and admitted to the field more often when they possessed a mixture of feminine and masculine traits as opposed to only feminine traits. Consistent with previous
research, results indicated that when evaluated in a male-typed domain, women who had the lower proportions of feminine traits were predicted to be the most successful. However, when evaluated in a female-typed domain an emerging trend indicated that women with both feminine and masculine traits were rated as most successful. Findings supported the theory that both trait status and stereotype fit influence the evaluation of women in female-typed domains.

The Importance of Interaction: Effects of Instrumental Learning on Reward and Trait Encoding
Siri Loken, Psychology
Sponsor: Professor Dave Amodio, Psychology

When we engage with others, we form impressions of their personality traits (Hackel et al., 2015). However, we can also receive feedback in the form of economic or social reward (Jones et al., 2011). These rewards may be useful in shaping decisions about whether to interact with someone again. Although a large body of work has examined social learning, the majority of this research has tested passive, observational forms of impression formation, which support the acquisition of knowledge about traits but does not involve any of the rewarding feedback present during interactions. Therefore, the present study investigated the effects of reward information on social learning during active interaction as compared with passive impression formation. Findings indicate that although both those who engaged in passive learning and those who engaged in instrumental learning made interaction decisions based on trait information, only participants who engaged in instrumental learning chose social partners based on past rewarding experiences. Further, it was found that reward information influenced the trait impressions and attitudes of those who learned instrumentally but not those who learned through passive observation. This research contributes to the existing social psychology literature by demonstrating that direct interaction with others results in impression formation and behavioral outcomes distinct from passive forms of learning.

Him or Her: How Gender and Medical Riskiness Influence Perceptions and Preferences of Physicians
Ryan Lowder, Psychology
Sponsor: Professor Madeline Heilman, Psychology

The present study seeks to determine how respondents’ perceptions of physicians are influenced by physicians’ sex and the riskiness of a medical situation. Respondents were given limited information about one male and one female physician and asked to rate each doctor on a variety of traits aimed at measuring perceived competency, agency, and communality in either a high or low risk medical situation. Respondents were also asked to choose which doctor they would prefer given the hypothetical medical scenario. Based on the results of 114 participant surveys, across risk conditions respondents perceived male and female physicians as equally competent, female physicians as more communal and diligent, and male physicians as more agentic. Additionally, respondents reported less confidence in both male and female physicians in the high-risk condition than in the low-risk condition. While respondents preferred female physicians more in both risk conditions, an interaction between preference of physician sex and the riskiness of the medical situation was found with the preference of female physicians being significantly decreased from the low to high risk condition and the preference of male physicians being equal across risk conditions. These results indicate stereotypical gender views may apply to men and women in the medical field. However, gender inequalities across many medical specialties are likely not due to patient’s preferences, though medically risky circumstances may be more likely to negatively impact evaluations of female doctors than male doctors.

Indigenous Relationships and Repatriation at American Museums in a Post-NAGPRA Context
Julia Lucas, Anthropology
Sponsor: Professor Jane Anderson, Anthropology

A tumultuous history exists between Native American communities and American museums since the colonization of the Americas. Many of the belongings held in major museums were acquired without the consent of the Indigenous community and were displayed without regard for Indigenous beliefs, histories, and/or traditions. In the twentieth century, Native groups began advocating for the repatriation of many of these belongings—with an added emphasis for the return of ancestral remains. In 1990, Congress passed the Native American Graves Protection and Repatriation Act (NAGPRA), which outlined steps for the repatriation of both human remains and cultural objects. Equally criticized and praised by both Indigenous communities and museum personnel alike, NAGPRA sparked a conversation around Indigenous repatriation and highlighted the historically lopsided relationship between Native communities and American museums. Through a series of interviews with members of various museum repatriation departments and numerous Indigenous scholars, the author explored how NAGPRA completely changed the relational dynamics between Indigenous and museum communities and how the process of repatriation has evolved under this new law. By analyzing a diverse array of academic resources, the study looks forward to the future of NAGPRA as both a law and a cultural phenomenon and makes a series of predictions for relationships and repatriations under NAGPRA in the upcoming years.
How Do Goals and Ideals Affect Young Children’s Category Judgments?
Lauren Lucitt, Psychology
Sponsors: Professor Marjorie Rhodes, Psychology; Emily Foster-Hanson, Psychology

People often think of categories in terms of their best examples (e.g., a robin for the category BIRD). Such “typical” examples are more easily brought to mind than members considered to be poorer illustrations (e.g., a penguin) and are thought to provide more generalizable information about the category. Previous work in the Rhodes lab found young children’s (ages 5–6) judgments of typicality were biased towards more extreme values than adults’ judgments. For example, young children most often picked the fastest cheetah, instead of the cheetah with average running speed, as the best example. Children were also more likely to generalize the features of the fastest cheetah (for example) than the features of the cheetah with the average speed (whereas adults generalized from the average exemplars). The current study asked (1) whether these findings reflect general biases for children to pick extreme values or developmental changes in the role of category ideals in shaping category representations in novel animals, and (2) whether functional information linking properties to a specific survival goal shapes these judgments. Children (ages 5–6) heard about novel animal categories varying along one property (e.g., snout length). Depending on condition, they were then given either (a) functional information about one extreme property value facilitating a survival goal (e.g., longer snouts are better for finding food), or (b) no functional information. They were then asked which example was most typical. It was found that young children’s judgments were influenced by functional information about particular properties.

Art, Uploaded
Josie Luck, Art History, Journalism
Sponsor: Professor Jason Samuels, Journalism

Visual artists are faced with many barriers when trying to pursue art as a career. To be successful, artists need to produce art, but art production itself takes time, money, and space. After the art is made, artists need a space to display their art, and an audience to see and purchase their work, so that they can get enough money to comfortably have the time and space to make more art. In this cycle, gallery representation is crucial, since they support artists with time, space, and money, simultaneously giving the artist exposure and potential income. But this advantage is inaccessible for most artists, based on an underlying system of implicit discrimination, elitism, and a “who you know” attitude that makes it hard for young artists, artists of color, or non-traditionally educated artists to find representation. With a younger generation of artists starting their careers, a shift away from this traditional system is taking place. Young artists are using the internet and social media to create their own opportunities for display and sustainability, creating digital exhibition spaces and collectives to bring awareness and exposure to the artists left out by the old system. Through the experiences of young artists, curators, and art administrators, the research project, Art, Uploaded, looks at the issues in the current art system, analyzes the extent to which the internet is solving them, and inspects the problems still present in the new system.

The Journey Abroad and Capital’s Shadow: How Remittances Influence Social Mobility and the Economic Decision-Making of Immigrants
Jorge Maldonado, Psychology, Sociology
Sponsor: Professor Ruth Horowitz, Sociology

Immigration has largely been motivated by survival, a desire for peace, and the search for opportunity. However, corporate policies imposed on Latin American countries have exacerbated the need to migrate. Market forces, driven by private interests, have created an incentive for individuals to seek sustenance through movement across borders and dependence on remittances. Although many scholars have examined political and economic causes behind these issues, there has been little ethnographic work on the motivation behind the actors that drive these forces. This study examines individual decision-making of working-class Ecuadorian immigrants who send remittances. The study focuses Ecuadorian immigrants because of the nation’s progressive, transnational policies relating to citizenship and migration. Drawing on populations in New York City and Northern New Jersey, the author conducted in-depth interviews to understand participant’s incentives for immigrating; how their investment decisions alter their class positions and social mobility; and the influence of state policy (both abroad and domestic) on their political orientation and feelings of nationalism.

Measuring the “Cultural Horizon” of Music in an Undergraduate Population
Racheed Mani, Biochemistry, Psychology
Sponsor: Professor Pascal Wallisch, Psychology

The notion of cultural memory has garnered increasing attention in the humanities in recent decades. Do we, as a culture, learn from our mistakes, or is there an event horizon, beyond which the past does not affect current decision-making (Assmann and Czaplack, 1995; Hirsch and Smith, 2002; Erll and Nünning, 2015)? This study proposes to put the notion of a “cultural horizon” on solid scientific footing by studying suitable stimulus material—popular music from different epochs. It is possible that students who are now in college will have no awareness of
Every four years in the United States, hopeful Democratic and Republican presidential candidates must first secure the nomination of their party in a primary before moving on to the general election. During the primary season, particular emphasis is placed by campaigns on the states that hold their primaries early on in the primary season, such as Iowa and New Hampshire. Previous research has shown that due to the sequential nature of US presidential primaries, outcomes in states that vote early have a significant effect on which candidate ultimately wins the nomination of their party. Specifically, voters in states that don’t hold early primaries, who are unsure about the quality of the candidates, tend to use previous states’ outcomes to help decide which candidate to vote for. This project updates an existing model of social learning in sequential voting schemes and presidential primaries by exploring the possibility of cross-party effects. More specifically, in years with two simultaneous primaries—i.e., years in which the incumbent is not running—it is possible that voters are updating their preferences based on the outcomes of previous primaries in the other party, in addition to their own. The model is then tested empirically against the 2008 US presidential primary using data from the 2008 National Annenberg Election Survey.

**Let There Be Light: A Geographic Information System (GIS) Analysis Examining the Mechanisms behind Patronage Politics in India**
Jean-Luc Marsh, International Relations
Sponsor: Professor Alastair Smith, Politics

With roughly 1.2 billion people lacking access to electricity, energy poverty is a global problem. Yet, in developing nations where the government has some discretion over the good of electricity, geographic inequalities persist. What is the mechanism behind this disparity? Considering the specific case of India, this study endeavors to illuminate potential political factors behind the uneven distribution of electricity present in that country. Utilizing Geographic Information System (GIS) software to obtain data from nocturnal satellite imagery, three key ideas from the literature regarding patronage politics, namely: political loyalty, marginality, and political business cycles (PBCs), are tested in terms of their influence on electrification. The results point strongly to a manipulation of electricity by the national government and the existence of a PBC, with countrywide electrification rising by 7.0–7.9% in years prior to elections and falling by 4.7–6.6% in the years after elections. Furthermore, party loyalty is shown to be a significant driver of electrification at the state level, with states that share the same party affiliation as the majority bloc in the national government witnessing levels of electrification 2.5–3.3% higher than states that do not match the national government’s party affiliation.

**From East to West: A Reversal in Fortune**
Alyssa Martinez, Economics, International Relations
Sponsor: Professor Michael Gilligan, Politics

This paper empirically investigates why, from 1100–1700, the urban and economic center of gravity shifted from the Islamic world to Europe, using urbanization rates to serve as a proxy for economic success in pre-modern economies. Using a large, newly collected, city-specific data set covering Europe, the Middle East, and Central Asia, the author explores the role of trade mechanisms, education, and institutions in determining long-run city development in two holistic regions: Europe on the one hand and the Middle East and Central Asia (MECA) on the other. In this aim, the project will ultimately show that the main reasons for MECA’s stagnation and Europe’s long-term success are, while specific to each region, interdependent and set in an increasingly globalized landscape. Together,
the consequences of different choices in main transportation modes, reliance on previously fostered trade institutions, and the development of local participative governments in Europe making cities less state-dependent collectively culminate in an explanation as to why Europe’s urban development took off while MECA experienced a loss of dynamism.

Majority Rule: Can Maine’s Ranked Choice Voting Law Save Us from Lesser-Evilism?
Sean McCready, Journalism, Music
Sponsor: Professor Robert S. Boynton, Journalism

On November 8, 2016, Maine voters passed a referendum implementing ranked choice voting (RCV) for all statewide elections. The Libertarian and Green parties, the two largest minor parties in both the state and country, supported the reform because of its potential to eliminate the “spoiler effect,” which discourages voters from voting for candidates who are unlikely to win. RCV does this by allowing voters to rank candidates in order of preference, eliminating the last-place candidate and redistributing votes to voters’ next preferences, in order, until a majority is reached. This piece covers the origins and success of the campaign to pass the referendum through the stories of the people who started it, particularly Dick Woodbury and Kyle Bailey, leaders of the Committee for Ranked Choice Voting. It also follows the ongoing struggle within the state’s government, as the legislature has called RCV’s constitutionality into question and is awaiting a decision from the state’s Supreme Court as to whether they issue an advisory ruling on the issue. Lastly, the piece examines the degree to which RCV could benefit minor parties and the potential for the reform to spread beyond Maine, finding a nationwide combination of RCV and proportional representation to have the most potential for minor party success.

Advance Directives: Does Awareness Matter?
Michelle Mendiolaza, Chemistry
Sponsor: Dr. Sabiha Kazi, Geriatrics and Extended Care, Veteran Affairs

Advanced directives (AD) include living wills and a durable power of attorney/healthcare proxy. These documents give people an opportunity to let their health care wishes be known and applied in the event that they are incapacitated. People who have completed AD have a lesser chance of dying in hospitals and nursing homes, and a greater chance of having their medical wishes understood and carried out appropriately. While AD have shown to be beneficial, many individuals have not completed the documentation. This study examines whether lack of awareness in AD is associated with failure to complete the necessary paperwork. Sixty-two racially and ethnically diverse adults were enrolled from senior centers and primary care clinics throughout New York City. Snowball sampling was employed. Participants aged 55 years or older were asked if they had heard of and completed an AD. Exclusion criteria included non-English speaking status, diagnosis of terminal illnesses, and current or previous enrollment in hospice. Descriptive statistics were also used. Ninety percent of respondents had heard of a living will; however, only 44% had completed one. Similarly, 95% of participants had heard of a durable power of attorney, but only 49% actually had one. This study shows that the overwhelming majority of respondents had heard of AD; however, less than half actually completed the documentation. This suggests that factors other than simple awareness of AD influence older adults’ decisions about completing AD. Additional studies should be done in order to further explore what these particular inhibitory factors may include.

Intersectional Environmentalism: The Environmental Justice Challenge to the Mainstream Movement
Sirkka Miller, History, Sociology
Sponsor: Professor Andrew Needham, History

This thesis focused on the movement for environmental justice within the United States. It is, in part, an account of successful political organizing: how diverse, isolated and case-specific instances of minority environmental justice activism were able to coalesce in the 1980s and early 1990s to form a proactive force that altered the mainstream environmental movement. But further, it is an examination of the forces that necessitated this mobilization: an exploration of the inadequacy and consequent exclusivity of a single-issue environmentalism that failed to account for the social, political, and economic intersections in the distribution of environmental harm, and the practices of the US government that enabled environmental inequities to impact marginalized communities in particular. The rise of the environmental justice movement served to cast these structures into relief and provided a comprehensive challenge to the dominant understanding of environmentalism. This project attempts to elevate an intersectional view of environmental history, an approach that has yet to receive adequate weight in the historical discourse. To tell this story, the author focuses on the voices of the environmental justice organizers, using their critiques and alternative visions as a map and then exploring the reactions of the mainstream environmental groups and the government. In particular, the author focuses on the progression of the SouthWest Organizing Project, a network that began in Albuquerque, NM, that expanded to provide the national infrastructure necessary for the environmental justice movement to take root. The climax of this story was the 1991 First National People of Color Environmental Leadership Summit, which
marked the entrance of environmental justice into the mainstream consciousness.

**Rules of Redistribution: The Effect of Decentralization and Productivity Differentials on Interregional Inequality**  
Alessandro Moghrabi, Comparative Literature, International Relations  
*Sponsor: Professor Alastair Smith, Political Science*

Interregional inequality is a widespread problem that is present even in the world’s richest and most developed economies; as decades pass, large income gaps between regions of the same country inexplicably persist, and occasionally even widen. While differences in economic productivity are certainly key factors that drive interregional inequality, this study seeks to investigate whether decentralization, the delegation of central state governance power to sub-governmental units—regions in this case—has a significant effect on interregional inequality. Results not only affirm its significance with respect to interregional inequality within countries, but also illustrate that decentralization’s effects differ depending on how it affects the central state’s capacity to collect and redistribute wealth; fiscal spending and administrative decentralization lower interregional inequality, while executive, legislative, and tax decentralization increase it. The results are significant because they provide a general empirical basis for rethinking the impact of governance structure on promoting a more equitable society; the different dimensions of decentralization essentially establish the rules that constrain and regulate bargaining for income redistribution.

**Housing the Homeless First**  
Elizabeth Moore, Journalism, Politics  
*Sponsor: Professor Jason Samuels, Journalism*

Many cities have recently begun to implement a surprisingly simple solution to homelessness: Giving the homeless homes. This Housing First approach does away with the typical process of requiring the homeless to prove that they are “ready” to move into housing, instead giving them a place to call home while they get back on their feet rather than forcing them to do so out on the streets. This model posits that the quintessentially American “pull yourself up by your bootstraps” philosophy doesn’t work for chronically homeless men and women if they don’t have a safe, supportive place to live while they attempt to do so. *Housing the Homeless First* examines the success of one such initiative in Ithaca, New York, while comparing it to the newly emerging version on Long Island where many locals are still pushing back against allowing these affordable housing options to arise in their areas, keeping the homeless bouncing from shelter to shelter in some of the island’s wealthiest neighborhoods.

**Paradise Lost: A Puerto Rican Island Community Struggles to Shed the Vestiges of Former Navy Occupation**  
Daniel Moritz-Rabson, Individualized Major  
*Sponsor: Professor Robert S. Boynton, Journalism*

While occupying Vieques from 1941 until 2003, the US Navy dropped up to 662 million pounds of ordnance including bombs, rockets and depleted uranium on the island. Residents lived adjacent to military-controlled territory, separated only by chain fences. Comprehensive health concerns—focused on cancer and diabetes and grounded in past studies indicating higher rates than those found in other areas of Puerto Rico—link directly to qualms about the continuing impact of the Navy, which now disposes of unexploded ordnance by openly detonating munitions. The land of Vieques ties together health concerns with local identity: during the struggle to evict the Navy, activists demanded the military return control of territory to the local population. Fourteen years after the last active troops departed and more than a decade since the cleanup of leftover munitions began Viequenses still lack ownership of half their island. Featuring interviews with government officials, anti-Navy activists, and local residents, among others, this piece will trace the ways that Vieques’ Navy occupation continues to shape the local community. To depict the challenges facing an island community struggling to reassert its agency, the article will discuss Viequenses’ inability to access their land and fierce pride in their land.

**The Scientists behind Exxon’s Climate Change Research**  
Jenny Moroney, Environmental Studies, Politics  
*Sponsor: Professor Jennifer Jacquet, Environmental studies*

Beginning in the late 1970s Exxon funded cutting edge climate change research to determine if carbon dioxide produced from the combustion of fossil fuels made up a significant percentage of rising atmospheric carbon dioxide. However, starting in the late 1980s, Exxon began to stop funding climate change research and began spreading climate change denial even though the results of their research agreed with the modern consensus view of anthropogenic climate change. It was not until 2015 that *Inside Climate News* exposed that “Exxon knew” and could have been integral to innovating in ways that could have greatly reduced today’s concentration of carbon dioxide in the atmosphere. A few of the scientists involved in Exxon’s climate science research were Henry Shaw, Edward Garvey, and Brian Flannery. This study tracks the evolution of the scientists’ relationships with climate science from when they started their careers, while they worked for Exxon, and after they left Exxon. This paper will determine if and how Exxon influenced the scientists’ relationships with climate science.
Christian Student Groups and Environmentalism: A Case Study of Christian Clubs at NYU
Megan Moroney, Environmental Studies
Sponsors: Professor Andrew Bell, Environmental Studies; Professor Jennifer Jacquet, Environmental Studies; Professor Duncan Purves, Environmental Studies

Research on the impact of Christian beliefs on environmental values finds a diversity of environmental beliefs among the faithful. Yet the common public perception of Christians is of a conservative, anti-environmentalist. This study examines this public perception with respect to Christian college students who are here considered a snapshot of the younger, religious generation and as future influential voices within their respective Christian communities. This research attempts to understand the extent to which students involved in Christian clubs on a university campus also engage in environmental activism and hold a pro-environmental ethic. This study investigates what students attribute their environmental values to as well as the influence of the campus environment on their religious and environmental beliefs. Through in-depth interviewing and construction of an ethnographic narrative, the author explores the mindsets of Christian students at New York University in regards to environmentalism and activism. Finally, the author discusses how these students’ attitudes might affect the future of Christianity and its role within the political environmental sphere.

Integrated Family Intervention for Child Problem Behaviors in Toddlers
Mollyrose Napolitano, Psychology
Sponsors: Dr. Elizabeth B. Miller, Applied Psychology, Steinhardt School of Culture, Education, and Human Development; Professor Pamela Morris, Applied Psychology, Steinhardt School of Culture, Education, and Human Development

The purpose of this study is to determine the effectiveness of a targeted, specialized intervention provided to low-income, high-risk families who have high levels of maternal depression and child problem behaviors. Improvement of maternal depression and the home environment from this intervention should lower the child problem behaviors. The present integrated intervention combines the Video Interaction Project (Mendelsohn, Huberman, et al., 2011) and the Family Check-Up (Shaw et al., 2015), two interventions found to improve the home environment and decrease child problem behaviors. Families with infants and toddlers were recruited at Bellevue Hospital to participate. Participants were randomly assigned to control (continued normal pediatric/well-baby visits) or treatment groups. This study is still ongoing. The integrated treatment group will receive the new VIP+FCU intervention. VIP is delivered at every well-baby visit every 3 months. FCU is made of four parts that are delivered over the course of intervention. Scores in child problem behaviors (externalizing and internalizing) will be taken pretest posttest at age 18 months and age 30 months using the Child Behavior Check for toddlers/preschoolers (Achenbach and Rescorla, 2000). Maternal depression will be determined using the Edinburgh Postnatal Depression Scale (Cox, Holden, et al., 1987). All three scores are expected to decrease. If this more intense model is effective, this could be a significant intervention breakthrough for high-risk, low-income families.

Trading in Fear: A Quantitative Analysis of Attitudes towards Foreign Trade and Implicit Racial Bias
Andreyka Natalegawa, Politics
Sponsor: Professor Michael Gilligan, Politics

This paper examines the effect of implicit racial bias on perspectives towards international trade. The author focuses on perspectives towards trade with two of the United States’ largest trading partners in particular: Mexico and China. Here, the author uses the Amazon Mechanical Turk crowdsourcing platform and an iteration of the Implicit Attitude Test as a method to assess whether implicit racial bias has an influence on how respondents perceive trade with Mexico and China. Using this approach, a statistically significant negative relationship between implicit racial bias towards Asians and Latinos, and attitudes towards trade with China and Mexico was found. Building on previous literature on the determinants of attitudes towards trade, this quantitative study will provide an analytical foundation for future discussion on how attitudes towards trade are formed.

Influence of Pornography on Sexual Behavior in College Students
Dali Nemecio, Biochemistry
Sponsor: Professor Chyng-Feng Sun, Paul McGhee Division, School of Professional Studies

A hallmark of the current college generation is the daily immersion and drive to consume mass media. Pornography is estimated to be around 32% of all these infinite scrolls and searches. Within the general population 87% of men and 31% of women consistently masturbate, and by age seventeen, 93% of young men and 62% of young women have been exposed to pornography. These statistics amount to 450 million individual views a month for these sites online. Studies have consistently proven this content affects behavior and perceptions of its viewers, however qualitative data to provide a narrative for this quantitative data has yet to be done. This idea is explored in the short-film Beyond East and West: Pornography’s Global Impact, directed by Dr. Chyng Sun of NYU School of Professional Studies. Working with Dr. Sun in support of the film, interviews
with professors in various intersecting disciplines and students were transcribed and then analyzed for overlapping content and connections. The academic side, with Dr. Paul Wright and Dr. Robert Woznitzer, explained the different psychological mechanisms involved with viewing, a process called Sexual Scripting, as well as the business methodology behind the production of the media. Student interviews contained recurring themes of early exposure to sex and learning opportunities, dependency and addiction, consistent difficulty obtaining and maintaining stimulation, and increased objectification of women in both abstract and specific connotations. The theories and outcomes proposed by statistical data are supported and given a voice by personal testimonies, suggesting that pornography is a medium which is pervasive in the lives of these young adults.

**Flexibility in Action: How Infants and Adults Navigate under a Barrier**  
Sinclaire O’Grady, Psychology  
**Sponsor: Professor Karen Adolph, Psychology**

Behavior flexibility—the ability to tailor motor actions to changing body-environment relations—is critical for adaptive, functional motor action. Navigating the everyday environment, for example, requires selecting the appropriate movement for the current situation. This project assessed flexibility of motor actions for navigating under barriers varying in height (above standing height to shin height) in adults, 17-month-old experienced walkers, 12-month-old novice walkers, and 12-month-old experienced crawlers. The adaptability, accuracy, and efficiency of strategies were examined for each barrier height. Adults displayed tremendous flexibility: they chose an adaptive strategy at the right moment and executed it seamlessly without errors or superfluous effort. Infants, however, did not display flexibility to the same extent. Although infants found an adequate posture to navigate under the barrier on most trials, their methods were inaccurate and inefficient. They did not select an alternative strategy until arriving at the barrier, tested multiple postures prior to selecting an adequate strategy (standing, sitting, squatting, crawling), bumped their heads on most trials, and frequently chose actions that required unnecessary effort (crawling when walking was possible). With increased experience and age, infants showed greater indices of flexibility.

**Immigrants’ Integration Experience in the European Union**  
Emina Osmandzicovic, Political Science, NYU Abu Dhabi  
**Sponsor: Professor Rachel Brule, Political Science, NYU Abu Dhabi**

The approach of academic literature on integration predominantly segregates objective integration outcomes from immigrants’ integration experience and stands in stark contrast to the paucity of studies that jointly examine both. This study bridges the two approaches by quantifying immigrants’ integration experience via two subjective indicators, overall life satisfaction and ease of applying for citizenship or permanent residence, as well as an objective indicator, employment status. By analyzing survey responses of 407 immigrants in seven European Union member states, the author assesses the factors that correlate with more positive integration experience of immigrants and the magnitude of their relationship. The background factors examined are (1) the historical ties between immigrants’ countries of origin and residence and (2) the level of development of country of origin. The immigrant-specific factor examined is (3) the reason for migration. The results show positive and statistically significant correlation between background factors and all three indicators of immigrants’ integration experience. However, the correlation between the humanitarian reason for migration, an immigrant-specific factor, and immigrants’ integration experience is negative, with the exception of ease of applying for citizenship. This paper, therefore, contributes to the literature by examining subjective and objective indicators of immigrants’ integration in conjunction. Further, it is demonstrated that integration is a complex process correlated with a heterogeneity of factors, both background and immigrant-specific ones, that need to be examined jointly.

**The Role of Social Support in Coping with Depression among International College Students**  
Keya Patel, Global Public Health/Anthropology  
**Sponsor: Professor Helena Hansen, Anthropology**

The increasing prevalence of depression combined with the documented underutilization of mental health services among South Asian immigrant youth living in the United States is seemingly worrisome. Yet, previous research has shown that, when faced with depression, South Asians trend towards non-clinical coping mechanisms, such as an increased reliance on social support systems. In this context, the term “social support” is conventionally thought to refer to an informal version of talk therapy occurring amongst family and friends. However, the connotations behind what it means to engage in social support have the potential to be far more flexible and to extend beyond this narrow definition. Moreover, the effects of migration among recently immigrated South Asian youth contribute to an additional layer of complexity wherein traditional forms of social support may not be readily accessible. This project expands upon the existing literature by exploring alternate forms of social support and the effects of migration via ethnographic interviews conducted with international college students diagnosed with depression. The data gathered from interviews ultimately
highlight the collision of two cultures, resulting in a tension between familial dependency and self-reliance.

**Community-Based Mental Healthcare: An Ethnographic Assessment of the Mental Health and Social Needs of Harlem for the Improved Integration of Outpatient Healthcare Services**  
*Parth Patel, Anthropology*  
*Sponsor: Professor Helena Hansen, Anthropology*

Harlem is one of the most medically and socially underserved communities within New York City (NYC). In fact, Harlem has an unemployment rate of 28%–34%, the second highest concentration of public housing within NYC, and a substantially high portion of residents (27%–34%) below the federal poverty line (Wilder and Arniella, 2014). Moreover, these unmet socio-economic needs are paired with psychiatric disorders and chemical dependency, which are the second most critical health issues after asthma (Wilder and Arniella, 2014). However, residents have a low rate of outpatient mental health service utilization, resulting in many to seek treatment only during crises. This forces residents to frequently utilize emergency and inpatient services, which have high-cost but poor long-term health outcomes. As a consequence, it is critical that Harlem has an integrated, community-centered healthcare that addresses the social determinants of health. This project seeks to further understand the mental and social needs of psychiatric patients living in Harlem as well as their barriers to healthcare through targeted, ethnographic interviews of patients at the Manhattan Psychiatric Center: Outpatient Clinic in Harlem. At the same time, this study wishes to determine the perceptions of local providers toward community-centered healthcare as well as the challenges repeatedly encountered in providing integrated social and medical services in an outpatient setting. These issues will primarily be explored through site visits to community organizations as well as ethnographic interviews of local providers and peer support specialists. Ultimately, this study will not only provide an insight into individualistic barriers to healthcare but also inform how outpatient services can be tailored using the resources in the community to fit the specific needs of each patient.

**Climate Change and the Rise of Terrorism in Southeast Asia**  
*Natalie Petrulla, Environmental Studies, Public Policy*  
*Sponsor: Professor Jennifer Jacquet, Environmental Studies*

Climate change is now considered a “threat multiplier” causing political conflict across the world. Although there is strong evidence linking climate change variables like changes in El Nino Southern Oscillation (ENSO) patterns, temperature, and precipitation to conflict in general, there is limited research on the relationship between climate change and terrorism specifically, despite the fact that terrorism is on the rise. This research aims to determine if there is a relationship between climate change and the rise in terrorism in the twenty-first century exists, using Southeast Asia as a case study. Through regression analysis, using the variables of changes in ENSO patterns and instances of terrorist attacks, this paper determines if the relationship between climate change and terrorism is statistically significant. This analysis is followed by case studies of specific nations that allow for causal connections to be drawn between climate change and the rise of terrorism in Southeast Asia.

**Musical Trailers: How Do We Sample and Remember Music?**  
*Sara Philibotte, Economics, Psychology*  
*Sponsor: Professor Pascal Wallisch, Psychology*

Music preference has been widely studied in the field of psychology to analyze people’s personality traits, cognitive tendencies, perceptions, and interpersonal relationships. However, because the sampling methods used by researchers vary, results from these studies are unable to generalize to all types of music. In this study, the author samples a diverse array of music through full songs and corresponding clips of various lengths to determine exactly how much these sampling discrepancies matter and how music sampling can be improved. For virtually all songs, clips as short as 5 seconds extracted from any song section can effectively sample an entire song, as clip preference and song preference are strongly correlated ($r = 0.94$). This relationship is especially strong for classical, country, electronic, and rap/hip-hop music. Not only does this sampling method have commercial implications for digital music companies but it can also improve current psychology research methodology. Furthermore, these findings provide insight into quick judgments regarding complex stimuli such as songs.

**Investigating the Effect of Racial Skin Tones in Politics**  
*Eva (Lilin) Qiu, Psychology*  
*Sponsors: Professor Emily Balcetis, Psychology; Anni Sternisko, Psychology*

An unsettling number of studies suggest voters often heavily rely on irrelevant appearance-based cues to elect leaders (Lawson et al., 2010; Olivola et al., 2012). Background literature has suggested that conservative voters are more ready to use visual cues and stereotypical knowledge to guide their voting decision (e.g. Olivola et al., 2012; Jost et al., 2003) than liberals. Moreover, conservatism is more strongly associated with negative stereotypes against African Americans than liberalism (Terkildsen, 1993). It could therefore be expected that conservatives—more so than liberals—would be inclined to vote for an African American candidate who...
has a lighter skin tone. However, almost a decade later, studies demonstrated a strong need for certainty is particularly tied to one core dimension of conservative thought (Jost et al., 2003). Due to this fear for uncertainty, conservative voters would also be inclined to vote for someone who looks more racially stereotypical (e.g., an African American candidate with darker skin tone). These contradictory predictions were juxtaposed against each other. In an effort to resolve this, it was predicted that conservatives prefer racially prototypical candidates more than liberals do, when choosing a potential candidate to represent their party. The data supported this hypothesis. Conservative voters showed a preference for candidates with racially stereotypical skin tone over racially counter-stereotypical candidates. They were more likely to choose a white candidate with very light skin and a black candidate with very dark skin. Liberal voters showed a preference for darker skinned candidates, regardless of race of the candidate.

The Politics of Prejudice: Do People Show an Affective Response to Political Prejudice When Confronted with Blatant Bias?
Aneela Rahman, Neural Science, Psychology
Sponsor: Professor David Amodio, Psychology

Previous research shows people are generally more inclined to bias toward political than racial out-group members. However, the underlying mechanisms of people’s willingness to express political rather than racial bias remain unclear. This study examines whether differences in bias expression can be attributed to the possibility that people show a less affective response to political than racial bias, even when this bias is directly brought to their attention. It was found that participants who were more aware of the potential influence of political bias were vigilant for bias toward political out-group members. However, participant vigilance did not predict the extent to which participants were willing to punish perpetrators of politically influenced bias. These results provide an increased understanding of the underlying mechanisms of political bias and potential interventions to reduce this bias. Additionally, these results can shed light on bias regulation in contexts of intergroup conflict in which people openly express prejudice toward out-group members.

Education Not Deportation: An Analysis of the Educational Rights and Restrictions of Unaccompanied Latina/o Minors in the United States
Maura Reinbrecht, Global Liberal Studies, Spanish
Sponsors: Professor Peter Diamond, Liberal Studies; Professor Jordana Mendelson, Spanish and Portuguese

Every child in the United States, regardless of immigration status, is entitled to public primary and secondary education based on the 1982 Supreme Court decision in Plyler v. Doe. Yet unaccompanied Latina/o minors in the United States face barriers to education in both children’s shelters and public high schools due to current immigration law and education politics. “Unaccompanied minor” is the legal term for an individual under the age of eighteen who has no lawful immigration status nor a parent or legal guardian in the United States. During the 2016 fiscal year, 59,692 minors were apprehended crossing the US-Mexico border. Of these minors, 90% were from the Northern Triangle—El Salvador, Honduras, and Guatemala—where extreme poverty, gang violence, family separation, and lack of job and educational opportunities drive children of all ages to travel upwards of 1,800 miles north. Unaccompanied minors are placed in the custody and care of the Office of Refugee Resettlement, which funds children’s shelters. Approximately 85% of children apprehended by federal authorities are reunited with a relative or alternative guardian in the United States. They attend public schools, where they require specialized resources, including English instruction and translation to graduate and have the opportunity to pursue higher education. This thesis explores how immigration law, education policy and legal classification influence the resources available to unaccompanied minors in a children’s shelter in Brownsville, Texas, and in a public high school in Los Angeles, California.

Entry, Exit, and Technology Adoption with Network Externality
Yiman Ren, Visiting Student
Sponsor: Professor Boyan Jovanovic, Economics

Modern technologies often display a network externality, which is the effect that the one user of a good or service has on the value of that product to other people. One example is an online social network. The more people join Facebook, the more valuable Facebook is to each user. This creates a positive externality because a user may join the social network without intending to create value for other users but does so in any case. With heterogeneous agents, positive network externality, one-time joining cost, and zero usage fee, there may be a smooth adoption equilibrium in which people join continuously as well as a step equilibrium in which a positive measure of agents join simultaneously. People who value social network a lot join first while people who do not care about it join later. The fraction of people on the online social network eventually approaches one. If the usage fee of network is not zero but increases over time, agents who have zero utility will exit the network. In equilibrium, there may be an entry rate and an exit rate. The fraction of people on the online social network may not be one in the end. Moreover, after Facebook there may one day be a better platform. At that time, agents choose
Better?

Power: Does Leadership Help Me Understand Others than Republican-veterans. Democrat-veterans experience a larger electoral advantage of victory endures, controlling for other factors which may a significant relationship between military service and margin of victory. Draft is a strong instrument and a positive and statistically significant, F-statistic results suggest the Vietnam-Era inher the instrumental variable in a two-stage least squares approach that leverages the natural experiment the relationship between military service and electoral success. This study addresses this gap by implementing an instrumental variable approach that leverages the natural experiment. From Bullet to Ballot: The Effect of a Candidate’s Veteran Status on Electoral Success: An Instrumental Variable Analysis

Nikita Roach, Politics
Sponsor: Professor Bernd Beber, Politics

Returning from the Trojan War, literature’s most famous veteran, Odysseus, expresses a sentiment that still rings true, “Sometimes you need to serve in order to lead.” During the Civil War, diplomat and author, Nathaniel Hawthorne, opined about a similar cohort of leaders, “Even supposing the war should end to-morrow…military merit…will be the measure of all claims to civil distinction. One bullet-headed general will succeed another in the Presidential chair; and veterans will hold the offices at home and abroad…in Congress and the State legislatures.” Many studies have examined the impact of “celebrity status” on electoral outcome, but few narrow the focus to veteran status. Of the latter, these studies do not overcome the endogeneity and self-selection biases inherent in veteran status, making it difficult to identify causal effect between military service and electoral success. This study addresses this gap by implementing an instrumental variable approach that leverages the natural experiment contained within the Vietnam-Era Draft Lottery to induce exogenous variation in military service and better predict the endogenous explanatory variable, veteran status. This instrument is adapted from its hallmark implementation in Angrist’s 1990 study for use in this political context, examining United States Senate candidates from 1970–2012. Results indicate the relationship between military service and margin of victory is positive and statistically significant in an ordinary least squares regression. After implementing the instrumental variable in a two-stage least squares regression, F-statistic results suggest the Vietnam-Era Draft is a strong instrument and a positive and statistically significant relationship between military service and margin of victory endures, controlling for other factors which may drive margin of victory. Additionally, the results suggest that Democrat-veterans experience a larger electoral advantage than Republican-veterans.

Power: Does Leadership Help Me Understand Others Better?
Siena P. Rumbough, Psychology
Sponsor: Kate Thorson, Psychology

This study aims to understand how empathic accuracy is affected by psychological power by investigating whether participants’ confidence moderated the impact of power on empathic accuracy. Participants were placed into unacquainted dyads and instructed to answer LSAT questions under either the condition of manager (high power), not manager (low power), or a no-information control group. It was predicted that, for individuals high in confidence, their role would not impact levels of empathic accuracy but that, for individuals low in confidence, those in the low power condition would show lower empathic accuracy than those in the high power condition. Empathic accuracy was measured in three different domains: anxiety, dominance, and partner rapport. After the dyad task, participants were asked to indicate on a Likert scale the extent to which they felt each target emotion. Participants were then asked to fill in the same questionnaire, but this time they indicated the extent to which they felt their partner felt each target emotion. Results indicated there was no main effect of condition on one’s accuracy for judging a partner’s anxiety, dominance, or rapport. Furthermore, there was no moderating effect of confidence on the relationship between psychological power and empathic accuracy. This study did find a significant effect of participants’ judgments of their own anxiety, dominance, and feelings of rapport predicting participants’ judgments of their partners’ empathic accuracy, suggesting that participants based their judgments of their partners’ emotions on their own.

New York City Preservation: When Modern Architecture Becomes Historic
Jonathan Schifman, Economics, Journalism
Sponsor: Professor Robert S. Boynton, Journalism

The goal of this thesis is to understand how New York City preservation efforts have evolved toward protecting modernist architecture. Buildings are preserved by the Landmarks Preservation Commission, the city agency that regulates and designates official landmarks. Granting a building landmark status works as a preventative measure against demolition and heavy alteration. Since the Landmarks Law was passed in 1965, the Landmarks Preservation Commission has designated about 1,350 individual landmarks. The law’s passage was the culmination of outrage over the bulldozing of entire blocks in the name of urban renewal. The demolished buildings were typically from the nineteenth century. Their replacements were modernist. In this research, a case-by-case study of three buildings was done. University Village’s construction was protested in the 1950s; in 2008, it became a landmark. Two Columbus Circle is infamous as a modernist building that, despite widespread support, did not receive designation from the commission. Lever House was the first modernist building to receive designation. Through research and conversations

whether to stay on Facebook or switch to the advanced one. Switching to the advanced one, agents may have a higher utility growth rate but a smaller starting level of network externality comparing to staying on Facebook. The switching cost is the loss of positive network externality. In equilibrium, there may be constant welfare improvement.
with those involved in each preservation case, it was learned that preservation is both a subjective and a political process, and that tastes have changed ever so slowly.

Problems Associated with ESG and Sustainable Banking: A Case Study of Twenty-Three US Banks
Peter Schott, Environmental Science
Sponsor: Professor Jennifer Jacquet, Environmental Science

In the past decade, banks and investment institutions have started to consider the social and environmental consequences of their investments. By adopting Environmental, Social, and Governance (ESG) Performance Standards—voluntary frameworks that identify, avoid, manage, and mitigate a firm’s environmental and social risks and impacts—the financial services industry hopes to communicate their socially responsible business practices. By doing so, they seek to gain positive financial and strategic benefits including but not limited to increased competitive advantage, a stronger financial valuation, and better positioning to manage and mitigate risk. But even as banks commit to ESG performance standards like the Equator Principles (EPs), several have contradicted their commitments. Consider Wells Fargo, Citigroup, and TD Bank which are signatories of the EPs but in the meantime, have also loaned money to construct the Dakota Access Pipeline (DAPL); not only does constructing the DAPL raise issues regarding the violation of indigenous peoples’ rights, but also there is concern for the pipeline’s potential impact on climate change and the contamination of Native American drinking water and land. This study first investigates the sustainable banking performance of 23 insured US-chartered commercial banks using an integral scoring system. And second, this study attempts to examine the challenges resulting from the commitments to ESG standards in the lending and investments decisions through document analysis.

Electoral Gender Quotas and Female Empowerment: Can Gender Equality Be Forced? The Impact of Gender Quotas on Gender Parity
Isabella Schumann, Art History, International Relations
Sponsor: Professor Alastair Smith, Politics

Female leaders are credited with increasing levels of democracies in nations and for being more effective and efficient than their male counterparts in passing policies, making spending decisions, and achieving greater results. Women representation in government is also one of the pillars of reaching gender equality. The quota system is often adopted as a way to promote female participation in government in the hopes of leveraging the benefits of female leadership. This paper investigates the role of quotas in increasing female leadership and decreasing the gender inequality gap. The results of this analysis show that when women attain positions of power due to a quota system, they are less effective in promoting gender equality than those who are freely elected. The analysis is fixed to look at the effects of women leadership in promoting equality in societies and not at the equal societies promoting women.

Seeing the Bigger Picture Together: How Abstract Thinking Facilitates Conflict Resolution in Couples
Rachel Shamos, Psychology
Sponsor: Professor Patrick Shrout, Psychology

The present study investigated whether priming committed couples to approach topics of disagreement abstractly promoted better conflict outcomes. A mediation model is proposed and tested in which cognitive interdependence (Agnew, Van Lange, et al., 1996)—a pluralistic representation of the self-within-relationship—explains this effect. Couples were randomly assigned to a high-level construal or low-level construal condition in which they completed a worksheet that induced them to consider an ongoing conflict in the relationship from either an abstract or concrete perspective, followed by a 15-minute conflict discussion. Afterwards, they reported their conflict outcomes including quality of communication, productivity, and negative affect. Cognitive interdependence was operationalized by counting the first-person singular, first-person plural, and second-person singular pronouns used during conflict discussion. Marginally significant effects of construal-level on productivity and negative affect were found. Cognitive interdependence was not found to mediate the effects of construal-level on conflict outcomes. Future directions point to conceptualizing cognitive interdependence as a stable relationship trait that can be activated via construal level under certain circumstances or depending on individual differences.

A Constitution for Outer Space: Cosmopolitanism, Ontologization, and the Earth in the United Nation’s Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies
Adelaida Shelley, Social and Cultural Analysis
Sponsor: Professor Sharon Heijin Lee, Social and Cultural Analysis

On January 27, 1967, the United Nations ratified the “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies” into international law. Colloquially referred to as the Outer Space Treaty (OST), it stipulates all state activities in extraterrestrial space are to be guided by the principles of international reciprocity...
and cooperation, most notably in its definition of outer space itself as “the province of all mankind.” Heavily influenced by the so-called “space race” of the 1950s and 1960s, the COPUOS delegates faced the unique challenge of producing a document that would diplomatically coerce the United States and U.S.S.R. into behaving “rationally.” The discursive production of “the Earth” and “mankind” as objects of universal concern proved to be crucial in ensuring the OST’s astoundingly high number of signatory nations, and therefore its binding capacities. Following this, it is argued that the treaty only gains its widespread political coherence when coupled with particular understandings of “the Earth” and “mankind” as hermeneutically sealed and ontologically stable units of legal concern. Ultimately, by identifying the sheer discursivity of these terms we can begin to unpack—and refute—the law’s mythologies of omnipresence and omnicompetence.

What Did You Just Say? Contemporary Functions of the N-Word
Shaquille Sinclair, Language and Mind
Sponsor: Professor Chris Barker, Linguistics

Though heavily studied, slurs like “nigger” or “bitch” are a source of contention for many linguists and non-linguists alike. Most people can identify their offensiveness, yet there is little consensus on what makes them so. Do they carry an offensive meaning endemic to themselves? Or are they just inappropriate to be spoken aloud, and a sign of a lack of etiquette? Nigger seems to be especially offensive, being euphemized in all public media as “the N-word.” Still, there is an interesting phenomenon with nigger in which it has been reclaimed as the positive word nigga for in-group usage amongst African Americans (Rahman, 2012). It functions as a marker of solidarity that has roots in being mutual members of the same diaspora. This theory is three-fold. First it is suggested there are two distinct uses of the word nigger: the racist slur nigger and the reclaimed term nigga (spelled and pronounced differently), and that the two are different words with dissimilar meanings (Rahman, 2012; Croom, 2014; Hedger, 2012). It is then posited that the two words originated from a divergence from an earlier use of nigger used to describe blacks during slavery (Rahman, 2012). Finally, it is asserted that nigger and other slurs are offensive because of the offensive content contained within their meanings rather than simply being a breach of etiquette when used (Hom, 2008; Sennet, Copp, et al., 2015).

Wage Inequality and Differing Returns to Education amongst Different Races in the United States
Jahaan Singh, Dramatic Literature, Economics
Sponsor: Professor Kevin Thom, Economics

While it is common knowledge that there is usually a vast difference between high-income earners and low-income earners, a large literature documents a substantial widening of the wage structure since the 1980s in the United States. The country has witnessed a rise in wage differentials by education, occupation, age and experience group in the last forty years. This paper studies the evolution of wage inequality amongst different races in the United States. In particular, this paper aims to determine if there is a significant difference in the wage inequality and returns to education between black and white individuals in the United States. Even though there has been a relative improvement in the economic fortunes of different races over time, and an observed convergence in earnings and educational attainment between different races, particularly between blacks and whites since the 1940s, racial differences in these markers still remain, and seem to be growing in recent decades.

The Eyes of the Ocean: Understanding the Dangers Fisheries Observers Face
Samantha Snowden, Environmental Studies, Film and Television
Sponsors: Professor Jennifer Jacquet, Environmental Studies; Professor Christopher Schlottmann, Environmental Studies

Due to a decades-long trend of overexploitation, many fisheries today are depleted at critical levels, with some in danger of collapse. There is an urgent need for accurate information on catches, informed management decisions, and additional sustainability measures. Fisheries observers are contractors placed on vessels to collect catch data and monitor fishing activity, providing valuable information to fisheries managers. Recent reports of observer disappearances at sea, as well as increasing reported incidents of harassment and assault against observers, indicate a rising threat to observer safety. By identifying the conditions surrounding reported incidents of harassment, assault, and disappearances, this paper identifies the broader context of fisheries observer mistreatment. The connection between noncompliance with fisheries regulations and harassment and assault of observers is examined with the goal of determining the factors behind observer safety violations and suggesting potential solutions.

What Makes a Good Relationship? Examining the Role of Construal Level and Shared Reality in Romantic Relationships
Sukhveen Soni, Psychology
Sponsors: Marika Yip-Bannicq, Psychology; Professor Patrick Shrout, Psychology

People have an innate desire to understand and share their experiences to validate them as an objective, or shared
realists. According to construal level theory, people tend to think abstractly or concretely about their relationships and problems. This study aims to investigate the associations between relationship construal level, shared reality, conflict and relationship types. Two studies were conducted to examine the role between construal level, shared reality, and relationship quality: 1) a dyadic interaction study examining whether shared reality is the mechanism through which construal level affects conflict processes and outcomes in romantic relationships, and 2) An online survey testing whether shared reality and construal level differs between relationship types (e.g. chosen versus arranged marriages). Study 1 hypothesized that individuals in chosen relationships would display a higher construal level, greater shared reality, and higher relationship satisfaction, compared to arranged relationships. Study 2 hypothesized that a high versus low construal level would lead to greater conflict productivity, better communication quality and less negative affect. Study 1 shows that compared to arranged relationships chosen relationships are characterized by higher relationship construal level, but show no difference in shared reality. Study 2 shows that a high versus low construal leads to lower negative affect during conflict and greater productivity of conflict discussions. These findings suggest that it might be possible to develop clinical interventions to manipulate construal level and improve conflict outcomes in couples.

Drone Strikes and Partisanship: An Endorsement Experiment
Bre'Anna Sonnier-Thompson, International Relations
Sponsor: Professor Michael Gilgigan, Politics

Since its introduction, the US drone strikes program has grown immensely and has become more fraught with controversy as time has gone on. The deaths of innocent civilians in drone strikes, murky statistics of deaths, lack of congressional oversight, and arguments over where the use of drones falls with respect to international laws has been brought to the forefront of political discussion in the past five years. Research has shown partisan differences in support for or opposition to the US drone program, with conservatives being more likely in general to support the United States’ pro-military narrative and drone strikes than liberals, who are more concerned with the human costs of the program. However, after the 2008 election of President Barack Obama, the drone program grew extensively and introduced into the political sphere the case of a liberal president actively supporting what had been considered a conservative tactic of foreign intervention. This paper examines, through an endorsement experiment, the effects of President Obama’s support of the US drone strikes program on conservative and liberal voters’ support of the program and opinions on its effects. This paper provides the first quantitative study that examines how a possibly polarizing political figure’s endorsement of a controversial policy might change opinions about said policy among liberal and conservative voters.

Rad: A Documentary about Olympic Skateboarding
Daniela Sorgente, Journalism, Politics
Sponsor: Professor Jason Samuels, Journalism

In the summer of 2016 the International Olympic Committee made a unanimous decision to include skateboarding in the 2020 summer games in Tokyo. For many, skateboarding is a counter-cultural and outsider activity, virtually the opposite of what an Olympic sport represents. This project, presented as linear documentary, examines the controversy over skateboarding as an Olympic sport. The story begins with the author’s brother, Alex Sorgente, an aspiring Olympic skateboarder. Skateboarding has been Alex’s entire life, and he earned the title of world champion for park skateboarding last year. However, Alex only represents a small segment of the skateboarding community. Most skaters, in fact, do not consider skateboarding a sport but more of an art form, hobby, or craft. This project explores both sides of the spectrum, as well as what skateboarding will actually look like as an Olympic sport. For this part of the story, Ryan Clements, who has been involved with the planning for Olympic skateboarding, describes how the selection and competition processes will work. Finally the documentary sheds light on some of the new possibilities for skateboarders as a result of this Olympic decision: more training facilities, coaching opportunities, even the prospect of collegiate skateboarding. What makes this documentary unique is that it looks at skateboarding as more than an anti-establishment and individualized activity. Skateboarding has another dimension that is rarely explored: its transition into a more mainstream and organized sport, especially now that it is an Olympic sport.

Racial and Gender Essentialism and Its Effects on the Self
Stephanie Sotir, Philosophy, Psychology
Sponsor: Professor John Jost, Psychology

Psychological essentialism refers to the belief that social categories have underlying essences. It involves thinking about social categories as natural categories that are inalterable and have predictable potential. Essentialist beliefs have been linked to negative social effects such as negative out-group bias, increased prejudice toward stigmatized groups, and stereotype endorsement. There is substantial research regarding essentialism however it focuses on others’ essentialist beliefs towards stigmatized out-groups, while saying little about the effects on the self.
of one’s essentialist beliefs about one’s own group. The present research aims to investigate the causes and effects of essentializing one’s own stigmatized in-group. Study 1 examined how the perception of unfair treatment toward one’s in-group affected their perceptions of their group. It was predicted that reading about negative treatment based on race or gender group membership would increase essentialist beliefs compared to reading about negative treatment based on individual characteristics or positive treatment based on group membership. Study 2 investigated how the essentialization of one’s own group affects the self, in particular how it constrains the self. It was hypothesized that reading a scientific article proposing race or gender as biological compared to social would cause increased essentialist beliefs, identification with the in-group, self-stereotyping, and acceptance of inequality.

**Familiarity Effects on Musical Appraisal**  
*Nathaniel Spilka, Philosophy, Psychology*  
*Sponsor: Professor Pascal Wallisch, Psychology*

This study is interested in the mere-exposure effect in music. Previous research, (Zajonc, 1968; Hunter and Schellenberg, 2011), suggests there is a mere-exposure as well as an over-exposure effect for a variety of stimuli, including music. However, most of this prior research is underpowered, thus making it difficult to ascertain for any given study, whether any or both of these effects (which combined would create an “inverted-U” trajectory) are present. In this experiment, 600 participants provided familiarity and musical appraisal ratings for entire songs as well as 12 repeats of music clips from any given song. Using this high-powered sample—and music that was not disliked, on average—it can be shown that there is no evidence for a mere exposure effect in music. Instead, repeated exposure to musical stimuli results in an immediate and near-linear drop in preference on the order of 1.3% per exposure. This research supports the prevalence of over-exposure effects for musical stimuli and puts the generality of the mere-exposure effect in question.

**TTIP: A Democratic Renaissance?**  
*Caroline Sutton, European and Mediterranean Studies, Politics*  
*Sponsor: Professor Fabio Mattioli, European and Mediterranean Studies*

This project involves analyzing the influence of non-governmental organizations (NGOs) on European public opinion regarding the Transatlantic Trade and Investment Partnership (TTIP). The goal is to explore ways that political power in the European Union is privatized in the Internet, post-Lisbon Treaty era. This has been done by conducting interviews in the United States, Italy, and Germany with relevant politicians, academics, and NGO leaders. Upon completion of these interviews, it becomes clear that this was not grassroots campaign as it has been portrayed but a highly coordinated, top-down effort by an initially small number of NGOs and related groups trying to move public opinion. Through showing the strategies NGOs used and the demanding requirements imposed by the European Citizen’s Initiative, this research highlights the great likelihood that in the future more highly successful, highly coordinated political campaigns managed by private groups will be seen.

**The Development of Social Status Stereotypes**  
*Christine Tai, Psychology*  
*Sponsors: Professor Marjorie Rhodes, Psychology; Dr. Tara Mandalaywala, Psychology*

Stereotypes about social status often center on race and gender (i.e., White individuals and males are perceived by society to have greater social status than do Black individuals and females, respectively), however, little work has examined the development of the belief that race or gender reflect physical markers of social status. The present study \((N = 197, M_{age} = 4.54)\) examined 3.5- to 6-year-old children to determine (a) whether and when children begin to use an individual’s race or gender to predict social status, and (b) how participant characteristics (age, gender, and race) affect whether children use race or gender as a marker for social status. Results suggest that children use both gender and race as a marker for social status, but that usage varied depending upon participant characteristics. Female participants displayed developmental changes in their use of gender as a marker of social status, with older female participants (5- and 6-year-olds) rating girl stimuli as lower in social status as compared to younger female participants (3.5 and 4-year-olds). Although no age related changes were seen in participants’ use of race, non-White participants were more likely to use race as a marker of social status than were White participants. This suggests that although children from a young age can use social group membership to make predictions about an individual’s relative social status, these beliefs may vary depending on participant characteristics.

**Preserving the Future’s Past: The Conservation of Time-Based Media Art in a Digital Age**  
*Gabriela Tama, Cinema Studies, Journalism*  
*Sponsor: Professor Jason Samuels, Journalism*

The conservation of time-based media artworks is developing as a specialization within the larger field of contemporary art conservation. The term “time-based media” refers to contemporary artworks that have duration as a dimension, including video, slide, audio, performance, software and digital technology. Since the 1960s, artists have incorporated time-based media in their work to explore...
its artistic potential. The resulting work, reliant on rapidly developing technologies that run the risk of becoming obsolete, have challenged traditional conservation practice. This documentary surveys new art conservation strategies for the preservation and documentation of time-based media artwork in the museum setting. It addresses the various conceptual and technical challenges faced in creating, treating, and preserving time-based media art from the perspective of both the new media artist and the time-based media conservator. This emerging contemporary conservation practice is compared to traditional conservation practice. With this documentary, the evolution in art conservation practice is revealed. No longer “the behind-the-scenes work of minimally invasive technocrats” (Lerner, 2016), conservation has become a dynamic and multifaceted practice that involves cross-disciplinary collaborations and grapples with issues of culture, value, and artistic legacy.

**Comparing Green Building Certifications and Their Use in Southeast Asia: LEED vs BCA Green Mark**

*Ying Xin Tan, Environmental Studies, Urban Design and Architecture Studies*

Sponsor: Professor Jennifer Jacquet, Environmental Studies

Buildings account for about 20% of energy consumption worldwide. To reduce this environmental impact, green buildings have been gaining popularity, with the global green building sector doubling every three years. Green buildings are environmentally sustainable and resource-efficient and may gain certification through various rating systems. The LEED (Leadership in Energy and Environmental Design) certification system, which originated in the United States, is the most common standard worldwide. While LEED has been successful on many fronts, it is not completely adaptable to other climatic regions around the world. To study how LEED is adaptable to areas in Southeast Asia, this research compares LEED to the Building Construction Authority (BCA) Green Mark certification system, which was founded in Singapore. Both systems are used widely in Southeast Asia. This comparison of the LEED and Green Mark systems highlights differences in focus areas and discusses the causes and implications of these variations. Through this analysis, this work also provides recommendations to improve both certifications so that they are both more effective in measuring the sustainability of buildings, as well as encouraging the construction of green buildings.

**Does the Pursuing of Performance Goals Foster the Emergence of the Socio-Economic Achievement Gap?**

*Yu Tang, Economics, Psychology*

Sponsors: Professor Yaacov Trope, Psychology; Dr. Marie Crouzeville, Psychology

People of High socioeconomic status (SES) usually achieve better life outcomes such as higher chance of obtaining a college degree, and inequality rose due to the discrepancy of resources (family’s wealth and parents’ education) possessed by Low and High SES groups. One study showed only 3% of students in the 146 top-ranked colleges came from families with the bottom income quartile, but 74% of students came from the top quartile (Carnevale and Rose, 2004). Moreover, Low-SES individuals encounter difficulties to adjust their interdependent and protective mindset (adjust to the needs of others) to the mainstream independent and expressive mindset (freedom) dominant in educational settings and which favors High-SES students, thus impairing their chances to perform optimally (Stephens, Markus, et al., 2014). However, recent work reveals the motivational mindset endorsed by students can alleviate achievement gap between the High-SES and Low-SES group. Mastery goals motivate students to improve skills and knowledge. Performance (selection) goals emphasize the importance of outperforming other students. The study shows that when the Mastery goal was emphasized High-SES students did not perform significantly better than Low-SES students (Smeding, Annique, et al., 2013). The present study aims to replicate that study with American participants. The author manipulated relative social class mindset and then motivated participants to pursue either a Mastery goal or a Performance goal and then measured participants’ performance. It was predicted that people in the Low-SES group will underperform High-SES group in the Performance goal setting, but no significant difference should be found in the Mastery goal setting. With the implementation of mastery goal assessment, schools might be able to reduce the achievement gap between students from different SES backgrounds and provide a better learning environment.

**Active Goal Pursuit in DanceSport: The Champion’s Mindset**

*Isabelle Tay Qi Yin, Psychology*

Sponsor: Professor Gabriele Oettingen, Psychology

Positive fantasies have been shown to impede effort and success if experienced as free-floating thoughts and images (Oettingen, 1996). In contrast, Mental Contrasting (MC) has proven to enact behavioral change in goal pursuit via the consideration of reality and its obstacles following a desired outcome fantasy (Oettingen, 2000). In Part I of this study, it was hypothesized that the mode of thought and presence of specific goals is dependent on the level of DanceSport expertise. It was also predicted that higher positivity scores would impede the performance of non-experts. In addition, goal congruence among team members has shown to enhance group performance (e.g., Kristof-Brown et al., 2001). In Part II of the study, it was predicted...
that consistent modes of thought and MC presence would augment DanceSport couple performance. DanceSport athletes answered a questionnaire examining their wishes before a competition. Results of Part I demonstrated that experts are more likely than non-experts to spontaneously MC and identify specific physical, mental and cooperation goals. However, while expertise significantly predicted performance, positivity scores did not, and their interaction was not significant. Results of Part II showed that although consistency in mode of thought did not significantly predict couple performance, there was a significant main effect of the presence of MC. Furthermore, there was a significant interaction between the presence of MC and consistency: results further revealed that couples in which both partners mental contrasted performed best, suggesting potential interventions that could help lower-performing athletes achieve their goals.

Authentic and Resilient Leaders: Supporting Queer and Trans Black Men in Leadership
Robert Wesley Anthony Taylor, Jr., Gender and Sexuality Studies, History
Sponsor: Dr. Monroe France, Associate Vice President for Student Affairs and Diversity Initiatives

This research features a qualitative study approach coupled with a theoretical and social justice framework to explore how queer and trans Black men view and engage in positional leadership within the context of a predominantly White, private institution of higher learning. Pulling from leadership focused literature, substantially based off of heterosexual, cisgender populations, the author argues that queer and trans black men, and subsequently queer and trans students of color in leadership, require the creation of equitable institutional structures and an investment in culturally competent leadership training. Based upon this research and the suggestions made by the participants of this study, some recommendations have been made for enhancing support systems for queer and trans student leaders of color.

State Participation and Compliance in International Environmental Agreements: A Hazard Rate Analysis
Konstantine Tettonis, Politics
Sponsor: Professor Alastair Smith, Politics

Time lag in the treaty ratification process persists as one of the most serious drawbacks of the treaty approach to global environmental policy-making. Swift entry into force bodes well for the accelerated implementation of treaty provisions, which are necessary to address urgent and impending environmental crises. However, sluggish ratification by certain states often delays this process, thereby impeding environmental action. Using a hazard analysis framework, this study investigates the impact of various country characteristics on the duration of time taken to ratify 43 international environmental agreements (IEAs) from 1972–2016. The results suggest that democracies with highly developed and rapidly growing economies are the quickest to ratify such agreements. A case study of the Kyoto Protocol addresses the question of whether or not ratification delay time is correlated with a state’s level of compliance with an IEA. The results suggest that states quicker to ratify are not necessarily more likely to comply with IEA provisions.

A Strange Animal in the Zoo of Italian Politics
Juliana Tobin, Italian Studies, Politics
Sponsors: Professor Stefano Albertini, Italian; Professor Bernd Beber, Politics; Professor Eric Dickson, Politics

The Five Star Movement (M5S) and its recent success in Italy has become one of the most radical deviations in Italian voter behavior. The 2013 General Elections exposed a transformation from the bipolar system, due to what has become the largest anti-establishment platform across Europe. This thesis will be of importance as it seeks to uncover the cause behind M5S’s groundbreaking popularity, by examining the effect of economic crisis on the protest vote. In proving that the economy is the explanatory variable behind the recent surge in the M5S popularity, municipal income brackets and the unemployment rates will be examined in year t on election outcomes in year t+1. Immigration levels and education attainment levels of the different communes will also be controlled for. In order to examine whether or not the economy plays different roles in the different areas of the country, regressions will be run specifically on the communes in the North, South, and Central macro-regions. The analysis shows that the change in municipal economic conditions has a positive, statistically significant effect on the change in the M5S vote. The variables’ effects are magnified in certain macro-regions as well as by high levels of immigration. The results expose a predominant anti-establishment and catch-all rhetoric that has surpassed class demographics. Electoral geography presents itself as a key feature in the local triumphs of the M5S: the protest movement masters grass-roots techniques in capturing its diverse electorate.

Beyond the Big 5: Enjoyment of Horror Movies, Personality and Sensation Seeking
Alexis Trakhtorochuk, Psychology
Sponsor: Professor Pascal Wallisch, Psychology

The relationship between movie preference and personality was examined. A survey, comprising four hundred carefully chosen movies from different genres, a personality scale, a sensation-seeking questionnaire, birth order, and a
movie-experience survey was administered to over 700 participants. A relationship between movie taste, specifically a person’s enjoyment of horror movies, and extroversion was found; people who enjoyed horror movies were more likely to be extroverts and sensation-seekers. The relationship between birth order and having a preference for horror movies was also identified—those that enjoy horror movies tended to be the youngest or only children. These findings suggest that personal movie taste is a factor in diagnosing risk-taking tendencies and may be an additional tool for identifying those behaviors in at-risk-populations and diagnosing personality disorders.

Caught in Limbo
Marita Vlachou, Economics, Journalism
Sponsor: Professor Jason Samuels, Journalism

This research project investigates what challenges are faced by refugee children and unaccompanied minors caught in limbo in Greece as a result of Europe’s refugee crisis. Children are among the most vulnerable populations overall, especially when they travel to flee war or seek a better future sometimes even without having their families by their side. Throughout Europe’s refugee crisis, Greece has been one of the countries receiving a large number of refugees and migrants seeking entry in Europe. After the closure of the border between northern Greece and the Former Yugoslav Republic of Macedonia (FYROM), refugee children and unaccompanied minors have found themselves stranded in a country unable to get to their final destination, usually more prosperous countries in Northern Europe like Germany. As a result, those children are caught in limbo. Despite the large number of refugee children Greece has received, the country still lacks suitable accommodation and a comprehensive protection system for these children. This project explores the reality for those refugee children and unaccompanied minors as well as the potential solutions to this crisis going forward.

Governments and Risky Business: A Study of Foreign Direct Investment and Political Instability
Fiona Wang, Economics, International Relations
Sponsor: Professor Alastair Smith, Politics

This paper investigates the determinants of Foreign Direct Investment (FDI) inflows to countries, concentrating on the effects of political instability, such as the occurrence of strikes, coups, and revolutions. The empirical analysis also addresses the role of FDI policy and a nation’s democracy score. Most research in this field has focused on economic factors, such as GDP and economic growth, as the determinants of FDI inflows. This research takes direction from previous research that links FDI inflows to political stability, and seeks to provide an alternative explanation for the differences in FDI inflows across countries. Democracy, government crisis and riots are found to have the most significant effects on FDI, which highlights the role of political stability and government regime to promote FDI inflows.

Tuning the Tone: An Experimental Survey Analysis of the Effects of Positive and Negative Emotional Rhetoric on Aggregate Voter Support
William Wang, Politics, Public Policy
Sponsors: Professor Eric Dickson, Politics; Professor Bernd Beber, Politics

To what extent does emotional rhetoric on policy issues affect voter support for political candidates? With lower barriers for political candidates to speak directly to American Citizens through social media, the tone candidates take matters now more than ever. The study of emotional rhetoric’s impact on support for politicians’ political agendas represents a venture into an important section of political engagement largely unexplored. This causal analysis experiment utilized a pairwise comparison of aggregate voter support across three popular policy issues which tested (1) whether positive or negative emotional rhetoric results in greater support for the candidate and whether (2) the effects of positive and negative rhetoric on voter support are consistent across policy issues. After surveying over 3700 qualified respondents on the three policy issues with three different emotional vignettes per issue, this study concluded that positive emotional rhetoric attracts greater support compared to negative emotional rhetoric. The effects of positive vs. negative rhetoric are consistent across policy issues, and the negative vignettes also consistently attracted less support than the neutral vignettes. The results of positive vs. neutral vignettes are mixed, indicating the effect of a positive vignette against a neutral vignette varies issue by issue. The political impact of these results is most relevant at the primary election level where candidates are more likely to have similar policy positions with competing candidates. The results indicate that candidates can achieve greater levels of support relative to primary opponents by changing their emotional rhetoric when they share similar policy positions. These findings show emotional rhetoric’s impact to be significant and worth testing on additional policy issues.

Visualizing Police Brutality: Dash-Cams, Cell Phones, and the Rhetoric of Police Violence
Sean Louis Waxman, Gender and Sexuality Studies
Sponsor: Professor Phillip Brian Harper, English

This thesis critically examines how various pieces of video footage recorded with either a police dashboard camera or civilian cell phone, once released to the public, shape local media coverage of two roughly contemporaneous
police brutality incidents. In the 2014 shooting of Laquan McDonald and the 2015 arrest and death of Sandra Bland, video footage was disseminated after local media coverage had already begun. It is argued the video recordings disrupt “official” narratives about the two incidents and, by extension, reframe the incidents as police brutality, troubling the United States’ racialized criminal discourse in the process through the representation of those brutalized as “innocent” and of the police officers involved as “criminal.” Said otherwise, the video recordings re-narrativize “what” happened to these unarmed black civilians. Dashboard camera recordings require state authorization for public release, thereby allowing the state to regulate itself. Cell phone videos, as civilian property, can be utilized by civilians to pressure the state into taking action. This study on how state-owned dashboard camera and civilian-owned cell phone videos impact the rhetoric used to depict police brutality is useful, not only because it demonstrates how these visual technologies mediate state-sponsored violence and allow for the construction of a civilian-police dichotomy but also because it emphasizes how cell phones can facilitate civilian empowerment and pressure the state into being accountable.

“The Damage is Already Done:” How Perceptions of Neighborhood Gentrification Inform Gentrifier Identity

Rebecca Weiser, Sociology
Sponsor: Professor Ruth Horowitz, Sociology

Because the influx of higher income people into lower income neighborhoods has been studied as a major force driving gentrification, it is vital to research how gentrifiers negotiate their role. This study compares and examines how young adults living in gentrified and gentrifying neighborhoods (Alphabet City and Bushwick respectively) understand their contribution to the process. Based on twenty interviews with residents from these neighborhoods, the study finds that Alphabet City participants are more likely to depersonalize themselves as gentrifiers than their Bushwick counterparts. They express less feelings of guilt, see themselves as part of a larger system of gentrification (rather than as individual gentrifiers), and grapple to a lesser degree with the ways in which gentrification, an otherwise negative process, benefits them specifically. These findings suggest that the identity construction of the gentrifier depends heavily on their neighborhood positionality, proving significant in terms of how this self-embedment can facilitate or block community action.

Value, Success and Representation in Global Cities: Comparative Study between Singapore and New York City on Activation of Social and Cultural Capital for Social Mobility

Belinda Wong, Metropolitan Studies
Sponsors: Professor John Kuo Wei Tchen, Social and Cultural Analysis; Professor Ricardo Cardoso, Social and Cultural Analysis

Cities are sites of capital agglomeration in the world economy, breeding intensified development of specific sectors, namely business and finance. Studies of capital in global cities are often tightly linked to economic theory, focusing on divisions between elites and low-wage workers, and stratifications amongst the middle class. However, little has been discussed on daily phenomena in global cities that mitigate polarization arising from processes of capitalism. This project aims to understand how metropolitan environments mobilize individual work efforts in generating monetary wealth, through the representation of unique forms of capital beyond economic capital. Comparing case studies of two entrepreneurs in New York City and Malaysia/Singapore who have managed to expand their businesses through tapping upon their social networks and cultural heritage, this thesis examines how social mobility may be attained through activation of one’s social and cultural capital. Overall, findings reveal that the premium put upon heterogeneity in global cities opens up pathways through which unique sociocultural identities of individuals can be recognized and have their value be exchanged for monetary wealth. In turn, the conclusions bring attention to further areas of research on how forms of capital possessed by marginalized individuals can be represented in ways that encourage constructive recognition in this new era of development in global cities.

Meeting NYU’s Mental Health Need: Barriers and Facilitators

Kathleen Wright, Global Public Health/Sociology
Sponsor: Professor Jennifer Jennings, Sociology

NYU conducts a range of programs to tackle mental health issues on campus. However, unmet mental health care needs are still a large problem among students. Untreated mental illness affects class attendance and grades and also increases the likelihood that a student will engage in unsafe sexual or drug-related behavior. Preliminary survey data suggest that 32% of students who have screened positively within the last year for symptoms of mental illness, such as feeling blue or anxious, never received treatment. This ongoing mixed methods project utilizes surveys and interviews to gather information about the barriers and facilitators that NYU students experience when they consider seeking out mental health care. The research found that in
addition to traditional barriers such as cost and scheduling difficulties, NYU students are deterred by uncertainty about what mental health care entails and by concerns about the long-term feasibility and effectiveness of treatment. Additionally, this project explores the potentially valuable role of professors and teaching assistants as mediators, a possible facilitating factor that could be leveraged by the University.

Where is Home?: The Continuous Displacement of Chinatown Residents

Lawrence Wu, Social and Cultural Analysis
Sponsor: Betts Brown, Social and Cultural Analysis

Since the early 2000s, the expansion of SoHo has steadily encroached into Chinatown, Manhattan, as old apartment buildings are bought out and new complexes are built. As of now, this Chinatown continues to undergo gentrification that is pushing out residents to this very day, most of them being immigrant families with first- and/or second-generation children, and the elderly who live alone. Because of this, residents of Chinatown find themselves displaced and in search for a new home, where often times the only resort is to move into another Chinese community in New York City such as Flushing, Queens, or Sunset Park, Brooklyn. The question then becomes, what does it mean to be further displaced from one’s “home,” for immigrant families that have already left their motherland due to political strife and poverty. Furthermore, how does one readjust to another Chinese community in many ways different from their own, and what are the effects that this may have on family dynamics. Through visual and audio storytelling, this project provides a lens into the life of Manhattan Chinatown residents that have already moved or are planning to. The focus will be on Chinatown community organizers and families and individuals who can speak about the physical and social readjustment of both their public and private lives. Through this documentation, the project also explores the idea of “home” as perceived by different generations. Lastly, this project is not meant to speak for all Chinese immigrant families; rather, it is to give insight into the constant displacement that occurs even after one is forced to leave their homeland.

Developmental Differences in Motor Planning for Tool Use

Melody Xu, Individualized Major
Sponsor: Professor Karen Adolph, Psychology

Movement planning requires translating perceptual information into a series of actions to complete a goal—for example, shaping the hand in preparation for grasping an object. For some actions, however, the final movements in the series are not immediately available to perception. This often entails use of an initially awkward or uncomfortable movement to ensure that the final position enables efficient goal achievement—a phenomenon termed “end-state comfort.” Previous studies showed adults consistently plan for end-state comfort. In contrast, young children plan for start-state comfort, resulting in a final awkward position. This study examined whether children’s inefficient movement planning arises from differences in where they direct their visual attention. To that end, the author compared the behavior of 10 4-year-olds and 10 adults in a peg-hammering task. A head-mounted eye tracker was used to measure participants’ visual fixations prior to reaching for the hammer, and their grips were evaluated from video. It was found that children inconsistently used end-state comfort grips compared to adults. Furthermore, fixation location prior to hand movement was correlated with the type of grip used, suggesting that differences in planning for end-state comfort can be explained by differences in visual attention. These findings provide important insights into the lack of efficiency in young children’s motor planning.

Acoustic Correlates of Lexical Stress Produced by Mandarin and Cantonese Non-Native Speakers of English

Sara Zhong, Communicative Sciences and Disorders
Sponsor: Professor Maria Grigos, Communicative Sciences and Disorders, Steinhardt School of Culture, Education, and Human Development

Lexical stress is defined as the prominence of a syllable or syllables in a word and is an important feature of English but is not used in tonal languages, such as Mandarin and Cantonese. The production of lexical stress may pose a challenge for native speakers of tonal languages when speaking a second language that uses lexical stress. There is limited research, however, examining English lexical stress production in native speakers of tonal languages. This study addressed this research need by examining how native Mandarin and Cantonese speakers produced English lexical stress as compared to native speakers of English. Twenty-four participants produced disyllabic minimal stress pairs (e.g., SUBject vs. subJECT) within a carrier phrase. Acoustic analysis was performed to measure the three primary acoustic cues that mark lexical stress, fundamental frequency, duration and intensity. The results illustrated between group differences in the use of acoustic cues to mark lexical stress. The findings were interpreted with respect to theories of speech production.
The role of a liberal arts education is to give broad knowledge to students to prepare them to face the world. Students can often graduate from college without gaining the most basic understanding of the sciences. Some may even prefer this, believing that science is reserved for a specific segment of our society. In fact, since Leonardo da Vinci, science has been infiltrating all aspects of society, from communication to energy to medicine, from the vineyards of Bordeaux to the classrooms where philosophical debates take place. Thus, scientific knowledge and an understanding of the basic principles of how it is obtained is absolutely essential for anyone hoping to understand and contribute to the world. As the ultimate goal of a university is to spread and foster knowledge and truth, it must provide a strong scientific education to all students.

—Claude Desplan, Professor of Biology

NATURAL SCIENCES

Association of BDNF Val66Met Polymorphism with Enhanced Excitation in the Intact Cerebral Hemisphere of Mice Following Functional Recovery from Ischemic Stroke
Leah Alexander, Neural Science
Sponsor: Professor Chiye Aoki, Neural Science

Brain-derived neurotrophic factor (BDNF) plays a critical role in structural plasticity and behavioral adaption during stroke recovery. Previous studies revealed that mice carrying the BDNF Val66Met variant exhibit greater short-term motor impairments but enhanced long-term motor function during stroke recovery, due to contribution by the intact hemisphere. However, the mechanism through which BDNF Val66Met promotes functional recovery remains unknown. This study proposed that BDNF Val66Met enhances synaptic excitation by increasing dendritic spine count in the intact hemisphere. To determine the effects of BDNF Val66Met on post-stroke spine density, homozygous variant (Met/Met) and wild type (Val/Val) mice underwent ischemic stroke by middle cerebral artery occlusion (MCAO) or a sham procedure. All four groups were analyzed by electron microscopy (EM) 6 months post-stroke.

This study was part of a larger project that included analysis of post-stroke GABAergic innervation. Among the stroke-recovered mice, greater spine densities were found in the somatosensory cortex and dorsal striatum of Met/Met mice than of Val/Val mice. GABAergic innervation of cortical layer V and the dorsal striatum did not change for any group, but GABAergic innervation of cortical layer I decreased for both variant groups. Altogether, these results suggest that BDNF Val66Met enhances excitation through structural plasticity, which may promote functional recovery.

Adsorbate Induced-Segregation Effects in Mixed Oxides: A Computer-Based Study
Marwan Amin, Engineering Science, Borough of Manhattan Community College, CUNY
Sponsor: Professor Daniel Torres, Chemistry, Borough of Manhattan Community College, CUNY

Catalysts are substances that increase the rate of chemical reactions without undergoing any permanent chemical change itself. A real life example of a catalyst can be found inside the muffler of a car. A muffler contains a platinum catalyst able to convert poisonous CO into harmful CO₂. A
mixed oxide catalyst, however, is one of the most prevalent types of catalyst in modern research, as they represent a cheap version of real catalysts normally made of costly precious metals such as platinum. They are made of oxygen combined with two metals in the form of a solid compound. Mixed oxide catalysts have complicated structures and various structural defects such as oxygen vacancies that control its chemical reactivity. The specific role of these atomic vacancies and the strength of its interaction with the two metals in the compound are unknown, which is what motivates this project. In this computer-based project the author carried out quantum mechanics simulations to study the structure of mixed oxides made of magnesium combined with another metal impurity. Then a wide range of metallic impurities were selected and combinatorial methods were used to study a large set of mixed oxides with and without oxygen vacancies. This has helped develop a better understanding of the role of atomic vacancies and their strength in these compounds.

**Engineering TCR-CD3 Interactions for Enhanced T-Cell Anti-Tumor Activity**

*Kendyl Barron, Biology*

*Sponsor: Professor Michelle Krogsgaard, Pathology, NYU School of Medicine*

Cancer immunotherapy aims to harness the body’s own immune system to fight off potential tumors. T-cells are critical to the adaptive immune response by recognizing foreign and pathogenic proteins (antigens) and destroying invading cells presenting these antigens. However, T-cells of a healthy immune system do not usually recognize or react to cancer antigens because, unlike foreign invaders, they are mostly derived from the body’s own proteins. This research proposes to engineer the T-cell surface receptor (TCR) for enhanced detection and destruction of cancerous cells. The interaction of the TCR and its co-receptor proteins (CD3ε and CD3δε) is necessary for the intracellular signal transmission that activates the T-cell. Previous data demonstrated mutations in the TCR-CD3 interacting region affect functional immune signaling. The research described here investigates the hypothesis that increased activation by T cells can be achieved by improving CD3-TCR binding interactions. The strategy is to introduce mutations in the TCR at the CD3 binding site and then use CD3-tetramer binding to screen retroviral TCR combinatorial libraries to identify TCR mutations that mediate enhanced binding and T-cell activation. A library screening approach was validated by demonstrating that TCR-expressing cells bind fluorescent CD3γ-ε-tetramers in a concentration dependent manner. Further, binding of the CD3-tetramer was reduced by mutations in the TCR-CD3 interaction site that was previously shown to influence T-cell functionality. Together, the data indicate a correlation may exist between the TCR-CD3 binding affinity and effector function that can be exploited for enhancing T-cells for immunotherapy.

**Validation of a Novel Computational Program through the Synthesis of Peptide Inhibitors for a Difficult-to-Target Protein-Protein Interaction**

*Viktoriya Berdan, Chemistry*

*Sponsor: Professor Paramjit Arora, Chemistry*

Protein-protein interactions (PPIs) are essential to cellular function, and their misregulation can lead to development of various diseases, including cancer. Targeting misregulated PPIs with peptidomimetic inhibitors is a viable therapeutic approach; however, it is difficult to design specific and tight-binding inhibitors for PPI interfaces, which are often shallow and broad (Mapp, Pricer, et al., 2015). Advancements in computational analysis have led to the development of reliable programs that ease the way towards rational design of inhibitors. The goal of this project is to validate the accuracy of a novel fragment-centric computational program called AlphaSpace (Rooklin, Wang, et al., 2015). As a proof-of-concept, AlphaSpace mapped and designed inhibitors for a difficult-to-target PPI between the transcriptional co-activator protein p300 and the transcription factor mixed lineage leukemia (MLL) (Majmudar, Hoffeldt, et al., 2012; Denis, Chitayat, et al., 2012). Over 20 peptide inhibitors have been synthesized using solid phase peptide synthesis (SPPS) and their binding affinities evaluated using fluorescence polarization (FP) assays. The resulting data correlated with simulated predictions and demonstrated AlphaSpace’s potential as a reliable and accurate computational program. These results have also led to a viable linear peptide inhibitor.

**Long-Range Projection of Holographic Tractor Beams**

*Lauren Blackburn, Physics; Nikitas Kanellakopoulos, Physics*

*Sponsor: Professor David Grier, Physics*

A tractor beam is a traveling wave that transports illuminated objects back to its source. Long a staple of science fiction, tractor beams have become a technological reality, having been demonstrated experimentally with computer-generated holograms. The idea of using a beam of light to pull on an object is revolutionary. As early as 1619, Johannes Kepler understood that conventional beams of light exert radiation pressure that pushes objects downstream along the direction of propagation. Thanks to the recently developed theory of photokinetic effect, it is possible to flip the direction of radiation pressure to create a tractor beam by using a special case of high structured beams of light. Pioneering implementations use computer-designed holograms to convert ordinary beams of light into tractor-beam modes. These experimental realizations have been able to
transport micrometer-scale objects a few micrometers, their limited range and strength reflecting boundaries inherent in the holographic projection technique. Here, the authors introduce and demonstrate a new approach to long-range holographic projection dubbed intermediate-plane holography. The implementation projects propagation-invariant tractor-beam modes extending to several meters at several hundred times the previous record brightness. Tractor beams implemented with intermediate-plane holography not only illustrate fascinating new principles of light-matter interactions but also should have practical applications in environmental monitoring and space exploration.

Constructing a Turbidostat and Examining Its Capacity to Analyze Evolutionary Changes in the Growth Rate of Yeast Cells

Natalie Boykoff, Chemistry  
Sponsor: Professor Mark Siegel, Biology

As yeast cells mature in a petri dish, they are exposed to fluctuations in nutrients available, waste produced, and population size. A static environment is necessary to observe the evolutionary changes in growth rate as yeast develops. A turbidostat works on a feedback loop to preserve a constant cell density and create an environment where the conditions remain controlled. The hard-wiring and parts of the turbidostat have been constructed into a multiplexed continuous culture system. Several parts required trouble-shooting or alterations based on the available material. Since the prototype of the turbidostat is complete, the amount of noise in the optical density (OD) readings is being studied. By running both dead and live yeast, it will be determined if there is a standard fluctuation in OD measurement at constant temperature. The effect of temperature on the OD readings of the laser diode is also being addressed. This will be investigated by comparing the noise of the OD readings of dead yeast at a constant temperature vs. altering the temperature ± 5 degrees. The temperature range can be reduced to see if the fluctuation in OD measurements also decreases. In the future, further modifications will be designed and prototyped, including a temperature filament to heat shock the yeast cells and a feedback component that can pump in toxins at intervals. Any alterations to the design will also be made open-source to provide other labs with the instructions.

Synthesis of Hemicyanine-Based Sensors for Mg$^{2+}$ and Ca$^{2+}$ Detection

Kishen Bulsara, Biochemistry  
Sponsor: Professor Daniela Buccella, Chemistry

Hemicyanine dyes have extensive applications in technology and medicine. Due to their excellent photophysical properties, including photostability and high molar extinction coefficients, they have been used as fluorescent sensors and molecular probes for studying biological systems. Hemicyanines emit in the red region of the visible spectrum and contain a “push-pull” structure that can be incorporated into ratiometric sensors with low energy excitation and emission. Such sensors can allow one to better understand the nature of metals ions such as Mg$^{2+}$ and Ca$^{2+}$ in biological contexts. To date, ratiometric sensors for Mg$^{2+}$ and Ca$^{2+}$ with low energy excitation are very scarce. To fill this gap, the presented work describes the synthesis of two novel probes based on the Mg$^{2+}$-chelator, o-aminophenol-N,N,O-triacetic acid (APTRA), and the Ca$^{2+}$ chelator, 1,2-bis(o-aminophenoxy)ethane-N,N',N''-tetraacetic acid (BAPTA) integrated into a hemicyanine scaffold. APTRA and BAPTA aldehydes were condensed as the locus of threat response. This is widely investigated in studies of Pavlovian threat conditioning (PTC), in which signals regarding noxious stimuli and neutral stimuli project to the lateral amygdala (LA) from thalamus and cortex, mediating their association. The LA projects to the basolateral amygdala (BLA), and both the LA and BLA project to the central amygdala (CeA), which projects further downstream to elicit physical responses related to threat, such as freezing. One of the targets of the CeA is the locus coeruleus (LC), which projects norepinephrine (NE) back to the amygdala, forming a reciprocal feedback loop mediated by noradrenergic amygdala receptors. These receptors include the metabotropic alpha (αAR) and beta (βAR) noradrenergic receptors, which constrain and mediate threat memory acquisition in the LA, respectively. The roles of these receptors in CeA are not determined. This study investigates how modulating alpha-1 receptor activity in the CeA influences the expression of threat memories in PTC rats. Separate experiments test the effects of infusing an αAR agonist, cirazoline, an αAR antagonist, terazosin, or norepinephrine into the CeA shortly before testing for the expression of threat memories. Infusions of the αAR agonist and αAR antagonist respectively decreased and increased threat memory expression. These results demonstrate how CeA αAR activity may constrain threat memory expression, offering a more complete understanding of circuit-based projections in the amygdala, and propose a pathway, by which disorders such as generalized anxiety disorder and posttraumatic stress disorder, may be modulated.
with 1,2,3,3-tetramethyl-3H-indolium iodide to yield the sensors. Spectroscopic properties and characterizations of these sensors are detailed.

**Investigating Bacillus subtilis Spore Crust Formation through Morphogenetic Protein Localization**

*Sally Buttar, Biology*

**Sponsor: Professor Patrick Eichenberger, Biology**

Bacterial spores are very resistant, which allows them to be efficiently transmitted throughout the environment. The spore coat is made up of four concentric layers—base-ment layer, inner coat, outer coat, and crust. The essential morphogenetic coat proteins needed for spore coat assembly in Bacillus subtilis have been identified, but the function of individual proteins and how they affect the structural properties of the coat is only partially understood. Each spore coat layer consists of at least one specific morpho-genetic protein that recruits other proteins and determines the assembly of that layer. The crust is the outermost layer; thus it is the one that comes in contact with the environment and may influence spore dispersal. While each crust morph-ogenetic protein—CotX, CotY, and CotZ—participates in crust formation, the respective contributions of each protein to crust assembly remains unclear. It is shown here that knockouts of CotX, CotY, and CotZ significantly decrease the wild type hydrophilicity of B. subtilis spores. Time-course fluorescence microscopy experiments show each crust morphogenetic protein has a distinct role in proper crust formation and modulation of B. subtilis spores’ hydrophilicity. Therefore, the results suggest that CotX and CotY are both essential for complete spore encasement and CotZ is essential for guiding each crust protein to its correct localization on the spore. These results can help further understand how to perturb these spores in a way to stop them from adhering to surfaces and infecting individuals.

**The Effect of MicroRNAs on Neurite Outgrowth**

*Justin Chan, Biology*

**Sponsor: Professor Esperanza Recio-Pinto, Biochemistry and Molecular Pharmacology, NYU School of Medicine**

In the field of chronic neuropathic pain, the treatment of pain is quite complex. While peripheral nerve injuries are typically healed by targeting certain proteins in the dorsal root ganglia (DRG), chronic pain treatment is much less known as there are many more proteins that are involved in chronic pain. One study of interest for treating chronic pain is in microRNAs. It has been shown that certain miRNAs can modulate the effect of chronic pain but the mechanism is still unclear. To examine the effect of miRNAs on chronic pain more closely, the neurite outgrowths of DRGs could be analyzed for potential insight into how miRNAs affect pain sensing. In this study, 2 particular miRNAs are tested: mir-143 and mir133b and their respective anti-mirs. The results indicated that there were significant decreases in the number of neurite lengths that were greater than 2x the diameter of the cell transfected with mir-143 compared to the control. In addition, there seemed to be significant increases in length of neurites in cells transfected with mir-133b compared to the control. The data further suggests that when combining the findings of number of neurites that are greater than 2x diameter and lengths of those neurites, mir-133b seems to have an upregulated neurite growth compared to the control group.

**Two Different Approaches for the Stirling Numbers of the Second Kind**

*Xueying Chen, Mathematics, Borough of Manhattan Community College, CUNY*

**Sponsor: Professor Jaewoo Lee, Mathematics, Borough of Manhattan Community College, CUNY**

The Stirling number of the second kind, denoted \( S(n,r) \) where \( n \) and \( r \) are positive integers, counts numbers of ways to arrange \( n \) objects into \( r \) nonempty identical blocks. It is important to count the number of arrangements or patterns, but it is impossible to list all of arrangements in practice. Therefore, this project seeks the general methods that make it possible to count this more effectively. Namely, combinatorics will be used, generating functions and inductive arguments. The first formula is derived by counting with inclusion-exclusion principle:

\[
S(n,r) = \frac{1}{r!} \sum_{i=0}^{r} (-1)^i \binom{r}{i} (r-i)^n
\]

After going over this method briefly, the study will give an introductory overview of generating functions and how these can be used to prove formula for the Stirling number of the second kind.

**The Effect of Early-Life Intestinal Microbiota Alteration on DNA Methylation in C57BL/6 Mice**

*Julia Chesler, English and American Literature*

**Sponsors: Professor Martin Blaser, Medicine, NYU School of Medicine; Daniel Liao, Medicine, NYU School of Medicine**

Across many vertebrate species, antibiotic exposure in early life has been shown to increase adiposity. This experiment aims to test whether early life intestinal microbiota disruption from antibiotic exposure results in changes in epigenetic methylation patterns in the small intestine, liver, and adipose of C57BL/6 mice. In the test condition, pregnant C57BL/6 mice were exposed to sub-therapeutic antibiotic therapy (STAT) shortly before giving birth and through weaning. The weights of their pups were tracked since weaning, and serial DEXA scans have been performed since week of life (WOL) 12. Small intestine, liver, and adipose were collected at WOL 4, 8, and 28. Individual cell types were isolated from each of these tissues before DNA from these cells was isolated. The next step, currently ongoing,
is to employ an assay that assesses methylation status on a genome-wide scale. The HELP-tagging (HpaII tiny fragment Enrichment by Ligation-mediated PCR) assay is being used for this purpose. The assay utilizes a restriction enzyme-based approach with two different enzymes—one methyl sensitive and one methyl insensitive—to generate libraries for massively parallel sequencing (MPS). The results from this assay will yield quantitative methylation data, which can be normalized by comparing results of the two digestions. Additionally, sequence reads can be mapped back to a reference genome. Differentially methylated regions (DMRs) between cases and controls will prompt further investigation into the significance of these regions (i.e., gene body, promoter, transcription factor, etc.).

**Emotion Regulation Exerts Independent Effects in PTSD Even When Accounting for Effortful Control**

*Brittany Cho, Psychology*

**Sponsor: Professor Marin Kautz, Psychiatry, Icahn School of Medicine at Mount Sinai*

Effortful control (EC) and emotion regulation (ER) are overlapping constructs, both of which are altered in posttraumatic stress disorder (PTSD). This study aimed to identify the unique contributions of ER after controlling for EC in probable PTSD. Data was collected from 429 adults through an online survey. Participants were divided into 3 groups: probable PTSD (pPTSD), trauma-controls (TC), and healthy controls (HC). Groups were determined using the PTSD Checklist for DSM-5 (PCL-5) and the Brief Trauma Questionnaire (BTQ). pPTSD was classified by using DSM-5 diagnostic criteria via PCL-5 symptom cluster scoring. Data on ER was collected with the Difficulties in Emotion Regulation Scale (DERS) and EC was assessed with the Adult Temperament Questionnaire—Effortful Control subscales (ATQ-EC). Correlations indicated significant relationships among PCL-5, DERS, and ATQ-EC. TC had the highest ER, followed by HC and, the pPTSD group. Post hoc tests revealed every group was significantly different from the others. For the EC subscales, only the pPTSD group was significantly different from the other groups. Using an ANCOVA, ER was significantly different between TC and pPTSD groups when accounting for activation control and significantly different between all the groups when accounting for inhibition control but not attentional control. The findings suggest activation control and inhibition control do not fully account for differences in ER between groups. Including attentional control as a covariate, however, does eliminate significant group differences in ER when analyzing matched sample size groups. These findings are consistent with observations of attentional threat biases observed in PTSD and may provide evidence of a link between this bias and ER in probable PTSD.

**Regulatory Logic of Rhodopsin Expression in Subsets of Photoreceptors**

*Brittany Cho, Psychology*

**Sponsor: Professor Daniela Buccella, Chemistry**

Multicellular organisms, such as the fly *Drosophila melanogaster*, are able to perceive the world around them through the various sensory receptors that they express in specific sensory neurons. Each sensory neuron generally expresses only one or very few sensory receptor genes. The aim of this project is to unravel the regulatory logic that underlies the restricted expression of light-sensing *Drosophila Rhodopsins* in specific subsets of photoreceptors, which is a prerequisite for color vision. Rhodopsin genes are a great model for studying the regulatory logic of sensory receptor genes because the promoter regions that control their restricted expression in subsets of photoreceptors are very compact: upstream regions of less than 300 base pairs fused to a reporter gene are sufficient to reproduce the endogenous Rhodopsin expression patterns. It has been shown that this involves short regulatory motifs in both the proximal and the distal promoter regions and that few motifs are shared between different Rhodopsins. However, it is unclear how these motifs interact to generate the correct spatial expression patterns. To this end, this study will analyze hybrid promoter constructs that mismatch the proximal and distal promoter regions of different Rhodopsin genes. This will give insight into the regulatory architecture of sensory receptor genes.

**Synthesis of Targeted Fluorescent Sensors for Compartimentalized Cellular Mg²⁺ Detection**

*Kevan Chu, Biochemistry*

**Sponsor: Professor Daniela Buccella, Chemistry**

X-linked immunodeficiency with Mg²⁺ defect, Epstein-Barr virus infection and neoplasia (XMEM) disease is caused by a loss-of-function mutation in the MAGT1 gene, resulting in a deficiency in the corresponding Mg²⁺ transport protein, MagT1. XMEM disease is primarily characterized by the attenuation of T-cell activation and chronic viral infection. Intensity-based, “turn-on” Mg²⁺ fluorescent sensors have been used thus far to observe the ion’s flux in T-cells of XMEM patients to deduce T-cell receptor activation; however, such experiments have been met with challenges such as poor quantification ability and lack of control over sensor cellular localization. This work describes the synthesis and characterization of Mag-Indo-Tz, an a-aminophenol-N,N,O-triacetic acid (APTRA)-based fluorescent sensor that allows Mg²⁺ quantification for use in microscopy and flow cytometry applications. The author plans to utilize a method previously reported by the Buccella lab (Gruskos, Zhang, et al., 2016), in which a fluorescent Mg²⁺ sensor is anchored and activated within a desired
preferentially affects inputs that were active at the time the accumbens caused by repeated cocaine administration provide in vivo evidence that the synaptic potentiation in cells that encode the cocaine-paired location. These findings strengthening of hippocampal inputs arising from place recruitment was driven predominantly by selective neurons (MSNs) to fire in the cocaine-paired location, and with recruitment of nucleus accumbens in cocaine CPP. It was found that CPP was associated interactions between the hippocampus and nucleus accum silicon probe recordings in freely moving mice to examine mechanism is not understood. This study used dual site model of addiction-related behavior whose underlying practical steps: cell culture and maintenance, microscopy, image processing, and data analysis. This research project focuses on developing the third step for the sake of observing nuclei features, in this case either induced or natural strand breaks in chromatin, with the goal of developing an image processing procedure that detects and tracks these breaks (which appear in microscope images as bright spots). The project begins by investigating with the software ImageJ what specific processing techniques apply best to the microscopy data, which in this case comprise brief videos of breaks in individual nuclei, then develops a system for determining the statistical reliability of a processing procedure written for these videos with the software Matlab by Jonah Eaton of NYU’s Zidovska lab. A diagnostic protocol using ImageJ functions for assessing the likelihood that a given video will offer reliable data is outlined and statistics for trials that apply the Matlab procedure to both real and mock data are provided.

Investigation of Processing Methods for Nucleus Feature Detection
Eli Corcos, Mathematics, Physics
Sponsor: Professor Alexandra Zidovska, Physics

Chromatin dynamics, or the physical and statistical motion patterns of actively functioning DNA, are poorly understood and predicted. The process of studying them typically requires four general steps: cell culture and maintenance, microscopy, image processing, and data analysis. This research project focuses on developing the third step for the sake of observing nuclei features, in this case either induced or natural strand breaks in chromatin, with the goal of developing an image processing procedure that detects and tracks these breaks (which appear in microscope images as bright spots). The project begins by investigating with the software ImageJ what specific processing techniques apply best to the microscopy data, which in this case comprise brief videos of breaks in individual nuclei, then develops a system for determining the statistical reliability of a processing procedure written for these videos with the software Matlab by Jonah Eaton of NYU’s Zidovska lab. A diagnostic protocol using ImageJ functions for assessing the likelihood that a given video will offer reliable data is outlined and statistics for trials that apply the Matlab procedure to both real and mock data are provided.

Cocaine Place Conditioning Strengthens Location-Specific Hippocampal Inputs to the Nucleus Accumbens
Andrea Cumpelik, Neural Science
Sponsors: Professor György Buzsáki, Neuroscience, NYU School of Medicine; Dr. Lucas Sjulson, Psychiatry, NYU School of Medicine

Conditioned place preference (CPP) is a widely used model of addiction-related behavior whose underlying mechanism is not understood. The study used dual site silicon probe recordings in freely moving mice to examine interactions between the hippocampus and nucleus accumbens in cocaine CPP. It was found that CPP was associated with recruitment of nucleus accumbens medium spiny neurons (MSNs) to fire in the cocaine-paired location, and this recruitment was driven predominantly by selective strengthening of hippocampal inputs arising from place cells that encode the cocaine-paired location. These findings provide in vivo evidence that the synaptic potentiation in the accumbens caused by repeated cocaine administration preferentially affects inputs that were active at the time of drug exposure. This provides a plausible physiological mechanism by which drug use becomes associated with specific environmental contexts.

Chemically Modified Biomaterials for the Adsorption of Penicillin G
Tesfamichael Demeke, Science, Borough of Manhattan Community College, CUNY
Sponsor: Professor Abel Navarro, Science, Borough of Manhattan Community College, CUNY

The presence of antibiotics in water bodies has lately become a big environmental concern. Antibiotic waste from industries has been found to pollute the environment and create microbial resistance. Research performed on biomaterials such as spent tea leaves, which are rich in functional and thiol functional groups and suitable for chemical modification, have found these plants to be effective adsorbents of certain antibiotics. This research proposes the use of spent tea leaves of chamomile (CM), green tea (GT) and peppermint (PM) for the incorporation of carboxyl, sulfonyl and thiol functional groups to improve adsorptive property towards the antibiotic Penicillin G (Pe). Adsorbent characterization after chemical modification confirmed the presence of numerous functional groups in the adsorbents. SEM analysis showed changes on the surface of the adsorbents due to reaction conditions with Penicillin G, with a stronger effect on thiolated and sulfonated adsorbents. Elemental analysis by EDS also revealed chemical modification with sulfur atoms was able to increase oxygen/carbon ratios. Batch adsorption experiments performed at various pH values showed a strong pH-dependence of the adsorbents, with a high adsorption percentage at a pH of 8 for all the adsorbents. The adsorption follows the trend CM>GTs>PMs. Among the chemical modification categories, thiolation and sulfonation reported higher adsorption and effectiveness, most likely due to the sulfur bridge formation, reaching adsorption percentages of up to 25%. These results could create a new mindset in the use of spent tea leaves as inexpensive and environmentally friendly bioremediation agents against pollution caused by antibiotic waste.

A New Class of Chiral Palladium Complexes: Asymmetric Catalysis and Applications in Pharmaceutical Synthesis
Wenyu Deng, Chemistry
Sponsor: Professor Tianming Diao, Chemistry

The project is organic chemistry based and involves studying a chemical reaction of a type of compound containing carbon. Due to carbon’s ability to form four bonds with four unique substituents, it can form two enantiomer products or molecules with the same chemical formula but are mirror images of each other. Such a property is called
chirality. The reaction in which a product contains an unequal amount of enantiomers is called enantioselective synthesis. Such processes are useful in pharmaceutical research, where the ability to control the shape of a drug molecule is vital in synthesizing effective drugs to treat patients. The purpose of this experiment is to devise a catalyst that may be used to cause a certain type of reaction to produce a specific enantiomer rather than a mixture. This catalyst design involves a cyclic guanidine ligand that would be transferred onto the transition metal, palladium. The design of this ligand and the synthetic scheme underwent many changes in an effort to maximize the final yield of the catalyst. In the end, a chiral phenyl-substituted triazabicyclodecene (TBD) ligand was synthesized and purified.

Functional Mapping of the O-polypeptide N-Acetyl-galactosaminy1 Transferases 1-5 (GALNT1-5) via High-Throughput Analyses of the miRNA-mRNA Interactions
Deepika Dhawan, Biochemistry
Sponsor: Professor Lara Mahal, Chemistry

Almost all surface proteins, which are crucial in understanding cell-to-cell interactions, are glycosylated. Glycans are complex biopolymers of carbohydrates made by different enzymes through glycosylation, the most abundant post-translational modification. These glycans are synthesized by glycosyltransferases, which are enzymes coded for by the genes being studied. All (~20) of the GALNT family of genes lead to the same glycosylation, attaching the same glycan (GalNAc) to a serine or threonine on a protein. However, from an evolutionary aspect, there must be some purpose of having “redundant genes.” Therefore, the hypothesis of this experiment assumes that although these genes are redundant at the functional level, they are not at the regulatory level. Almost every mRNA is regulated differently by the action of multiple microRNAs and other post-transcriptional regulators. Since miRNA only target genes involved in pathways which they regulate, studying which miRNA molecules target which genes can help understand the functional role of that gene using the function of the miRNAs as a proxy. Thus, biological function can be assigned to the individual GALNT genes by looking at the miRNA regulators of the gene. This research project focuses on mapping the biological function of these genes using this miRNA-proxy approach by identifying the miRNA that regulate them. GALNTs 1-5 encode enzymes responsible for the first step in the biosynthesis of O-glycans. The goal of this research is to map the functional role of the first 5 GALNTs (GALNT1-5) of the ~20 that are known thus far by identifying the miRNAs that regulate them.

Creating Gated Cascades for Nested Conditionals Using DNA Strand Displacement
James Ding, Biochemistry
Sponsors: Professor Nadrian Seeman, Chemistry; Professor Dennis Shasha, Computer Science

The predictability of DNA Watson-Crick base pairing and the development of DNA synthesis has allowed for the construction of nanostructures and nanodevices such as DNA computational systems. These DNA computing systems allow for the manipulation of encoded information in a biological context. DNA mechanisms such as logic gates and cascades normally require enzymes, scaffolding, or multiple DNA strand complexes. Here, the author designs an integrated gated cascading system built solely on the basis of DNA strand displacement. Using non-denaturing polyacrylamide gels, it is possible to show that the opening of gates in each step in the cascade can be controlled, which implements what computer programmers would term a “nested if.” This system sets a foundation for the development for more complex DNA computing systems. The study also proposes an application in which the identification of several strands present in an input solution can be possible using a cascading asynchronous DNA circuit with fluorophores.

Regulation of Neuroprogenitor Proliferation and Consequences of Its Disruption in Brain Development
Caren Doueiry, Biology
Sponsors: Professor Claude Desplan, Biology; Dr. Filipe Teixeira, Biology

A major challenge during brain development is the specification of the number of each cell type produced. While there is some understanding about the specification of neuronal type, mechanisms that specify cell number remain to a great extent enigmatic. Ways by which neuronal cell number is regulated include programmed cell death (apoptosis) or terminal cell division of neuroprogenitors and the subsequent end of their proliferation. Here, the author studies the regulation and consequences of inhibiting neuroprogenitor apoptosis in the developing optic lobe of Drosophila melanogaster. The study looks into the short-lived multipotent neuroprogenitors, called neuroblasts (NBs), of the ventral tip of the proximal Inner Proliferation Center (vtp-IPC), which normally undergo apoptosis at the end of their proliferation. It is shown here that “immortalized” vtp-IPC neuroblasts are maintained to the Drosophila adult stage and keep dividing, producing supernumerary neurons. “Immortalized” NBs exhibit a change in their response to spatial cues that define their capacity to give rise to specific neuronal types and produce neurons of an identity not found in the wild type. It is further shown that preventing apoptosis results in the development
of abnormal neuropiles and aberrant neuronal projections.
The results highlight the effects of inhibiting regulation of
cell proliferation on NB number, neuronal type, and brain
morphology. These results help understand how cell fate
can be manipulated, valuable knowledge for future research
aiming for more efficient control of cell type and number
in a therapeutic stem cell setting.

Motivational Circuits
Cassandra Draus, Neural Science
Sponsor: Dr. Vincent Campese, Neural Science

Humans have two different motivational circuits—one
where they know a negative event is occurring so they will
work to avoid it, and the other where they know a positive
event is occurring so they will work to obtain the result.
Results have been seen when a rat uses its negative moti-
vational circuit, and the attempt is being made to try to
determine if the positive motivational circuit can produce
the same effect. Pavlovian-to-instrumental training (PIT)
and lever press for food is used to test this. PIT teaches
the animal to avoid a shock by shuttling in a chamber, known
as avoidance. It is possible to test the negative motivational
circuit using a tone paired with a shock or a tone paired with
no food, and the positive motivational circuit can be tested
using a tone paired with no shock or a tone paired with food.
There are three groups: group one associates light with food
and light-tone with no food; group two will associate tone
to food; and group three is tone unpaired. It is possible to
test these using PIT, where a tone is presented. It is expected
that the rats that view the tone as an inhibitor and utilize
the negative motivational circuit will shuttle to avoid the
response, while the rats that see the tone as an exciter and
utilize the positive motivational circuit should not increase
shuttling because they are not working to avoid anything.
The same motivation across the two groups should show
inhibitory stimuli cause the same shuttling results as avoid-
ance, and if not, it will be known that motivation is not
sufficient enough.

Homogeneity in the Ground State of Phytochrome Cph1
Jordan Epstein, Chemistry
Sponsor: Professor Daniel Turner, Chemistry

Numerous time-resolved studies of the Pr to Pfr
photoisomerization in phytochrome Cph1 revealed mul-
tiphasic excited-state decay kinetics. It remains unclear
whether these kinetics arise from multiple conformational
subpopulations, or from branching that occurs during an
excited-state photoisomerization process. Using 5.6-fs laser
pulses, this study provides spectroscopic evidence that is
consistent with the latter mechanism. Two-dimensional
electronic spectra display negligible inhomogeneous line
broadening, and vibrational coherence spectra extracted
from transient absorption measurements do not contain
nodes and phase shifts at the fluorescence maximum.
These spectroscopic results support the homogeneous
model, wherein the multiphasic kinetics arise from a single
population that relaxes through sequential intermediates.
Thus the primary photochemical transformation of Pr to
Lumi-R occurs adiabatically on the excited-state potential
energy surface.

Profiling of Drosophila melanogaster Adult Optic Lobe
Neurons Using Single-Cell Analysis
Chaimaa Fadil, Biology, NYU Abu Dhabi
Sponsor: Professor Claude Desplan, Biology

In order to encompass cellular diversity in the brain,
it is crucial to understand developmental trajectories
underlying cellular specification. Study of neurogenesis
in the fruit fly Drosophila melanogaster optic lobe has
eclucidated several mechanisms regulating proliferation
and differentiation of neural progenitors. The goal of this project
is to expand the understanding of cellular diversity in the
Drosophila optic lobe through transcriptional profiling of
adult neurons and modeling of transcription factor (TF)
and neuronal phenotype correlations. This high-throughput
approach relies on a comprehensive single-cell database
generated by Drop-seq. Single-cells were grouped in clus-
ters of transcriptionally distinct cell populations. Validation
and annotation of neuronal subclasses corresponding to
each cluster is performed based on cluster-specific mark-
ers. For this purpose, reporter gene constructs along with
immunofluorescent staining are used to characterize the
morphology and projection pattern of cells in each cluster
based on their characteristic markers. A subsequent study of
transcription factor (TF) function aims to establish correla-
tions between neuronal terminal differentiation markers and
TF factor expression. Gaining a better understanding of the
 genetic markers and transcription factors defining a cell’s
 identity and phenotypic characters will contribute to better
understanding the genetic basis of neuronal specification,
thus opening the possibility of programming neural stem
cells towards specific neuronal types.

A Hidden Element of Color: Transposable Element
Investigation
Zoë Fresquez, Biochemistry
Sponsor: Professor Michael Purugganan, Biology

Transposable elements (TE) are sequences of DNA
that vary in length and are capable of inserting themselves
throughout the genome. Depending on where they insert,
these elements can be benign and simply extend the length
of the genome or they can cause mutations in an organism
(Bennetzen and Wang, 2014). In the case of the Phoenix
dactylifera (date palm) Vi rescens gene, a TE that exists
in mutant alleles causes a co-dominant mutation in date palm fruit color. The mutant homozygote confers to yellow fruit color cultivars, the homozygous wild type to red fruit cultivars, and—due to the co-dominant nature of the mutation—the heterozygous cultivars have yellow fruit with red freckling. The mystery surrounding this transposable element is that no one was able to sequence it fully in its genomic context. Here, the author has fully sequenced and characterized the transposable element. It is a novel, copia-like long terminal repeat retrotransposon (LTR TE) 11,643 nucleotides long. With the sequence it was possible to determine a general time frame for the insertion of the element in the gene as well, that far predates the domestication of date palm. The retention of splice site sequences in different cultivars of yellow fruit homozygotes is currently being determined. Furthermore, date palm is a perennial plant and therefore date palm farmers have to wait 5–7 years to discover if the fruit of a seedling will be red or yellow. With the full, correct sequence of the TE further research can also go towards the design and patent of genotype-specific primers in order for farmers to find out the fruit color from germination.

**Investigating Expression of Dpr/DIP Cell Adhesion Molecules in the Drosophila Color Vision Pathway**

Juliana Gabbay, Biology

Sponsor: Professor Claude Desplan, Biology

Color vision in the retina of *Drosophila melanogaster* is mediated by photoreceptor neurons that sense different wavelengths of light. In the *Drosophila* retina, there are 800 unit eyes, or ommatidia, each of which contains two photoreceptors, R7 and R8, responsible for color vision. Photoreceptors can be further divided into two subtypes, pale and yellow, that differ in the wavelength they perceive. These photoreceptors transmit sensory input to neurons in the medulla region of the brain, but the specific neurons that receive these pale and yellow inputs have not been identified. The goal of this study is to find out if color photoreceptor fate, pale or yellow, is communicated to its targets in the medulla. Two members of the cell-adhesion molecule families, Dpr (Defective Proboscis Extension Response) and its interacting partner DIP (Dpr Interacting Protein), are thought to play a role in determining synaptic specificity in this process: Dpr11 is expressed in yellow R7 photoreceptor neurons and its binding partner, DIP-Gamma, is expressed in the Dm8 neurons that are post-synaptic to yellow R7s. To identify medulla neurons that have pale and yellow fates, expression of Dpr/DIPs in photoreceptor and medulla neurons were studied. Photoreceptor neurons and their known targets Dm8, Dm9, and Tm20 neurons for all Dpr and DIP cell-adhesion molecules were screened using a genetic approach in order to find DIP/Dprs that specifically label pale or yellow medulla neurons. This approach made it possible to probe photoreceptors and medulla neurons for Dpr and DIP molecule expression. It is shown here that there is a difference in expression of some Dprs and DIPs in target Dm8, Dm9, and Tm20 neurons. Further tests will be conducted to determine if photoreceptor fate, pale or yellow, is communicated to its targets and identify medulla neurons that have pale and yellow fates.

**The Effects of Forskolin on Cultured SH-SY5Y Neuroblastoma Cells**

Jay Gadsden, Biotechnology, Borough of Manhattan Community College, CUNY

Sponsor: Professor Jane M. Johnston, Science, Borough of Manhattan Community College, CUNY

Neuroblastoma is a pediatric cancer that starts in nerve cells and is responsible for almost 700 new cases of cancer per year. This study investigates the effects of forskolin, a root extract derived from *Plectranthus barbatus*, on viability and growth of neuroblastoma cells. Forskolin is known to boost cyclic adenosine monophosphate (cAMP), crucial for signal transduction, to influence cell growth and differentiation. Because understanding these pathways in neuroblastoma cells may be beneficial to developing new therapies, the author performed dose response studies using forskolin and SH-SY5Y cells (derived from a human neuroblastoma) as well as E18 embryonic neurons from Sprague-Dawley rats. A significant time dependent trend of declining cell viability when SH-SY5Y cells were exposed to forskolin was observed. However, forskolin treatment significantly increased survival of E18 neurons compared to untreated controls. These results suggest that forskolin has differential effects on normal and tumor cells and further investigation is warranted.

**Steady Shapes of Elastic Film under Laminar Flow**

Likhit Ganedi, Computer Science and Mathematics, Physics

Sponsors: Professor Leif Ristroph, Mathematics; Professor Michael Shelley, Mathematics

Conceptually, consider blowing on a soap film constrained by a ring at constant velocity. The soap film will assume a smooth shape where the surface tension force is in equilibrium with the aerodynamic force or it will blow out. The shape in the absence of external flows was studied extensively by Richard Courant and Joseph Plateau. They found that films minimize surface area as constrained by the boundary in the absence of external flows. In a similar vein, what shapes will evolve from the film with dependence on drag and velocity when we allow for fluid flows? In everyday life, we encounter flexible shapes interacting with flows. This fascinating set of phenomena includes leaves rolling up in a breeze and the flapping of a flag. This
study considers the phenomenon with experiments using oil film in a water tunnel and simulations to uncover some unexpected relationships between shape, velocity, and drag.

Predicting Memory Formation from EEG Signals Emitted during Study
Camille Gasser, Psychology
Sponsor: Professor Todd Gureckis, Psychology

A major goal of memory research is to improve the process of human learning. Such improvements may come from recent developments in cognitive neuroscience, which have led to the discovery of the subsequent memory effect: at the time of learning, specific brain areas emit different signals for items that will be later remembered than for items that will be forgotten. In this study, electroencephalogram (EEG) data were recorded while participants studied words for a later memory test. The author then searched for EEG responses that best predicted whether participants remembered or forgot studied words. It was found that an event-related potential (ERP) recorded by a frontal sensor was informative across all participants, predicting memory at the group level with above-chance accuracy. Additionally, it was found that identifying the most predictive ERP within each individual participant increased the accuracy of memory predictions. Predictive EEG signals may contribute to the design of intelligent tutoring systems, which could use both neural and behavioral measures to customize sequences of study items for individual learners, removing items that are already known and re-presenting those that are likely to be forgotten. By identifying EEG measures that reliably predict memory performance, therefore, the foundation has been laid for developing a system that improves how people study and learn.

Expanding Color Vision: The Developmental Basis for the Diversification of Retinal Mosaics in Butterflies
Cara Genduso, Biology
Sponsor: Professor Claude Desplan, Biology

Butterflies live in diverse environments and use color vision for a range of behaviors. Butterfly retinas are more complex than those found in the fly Drosophila melanogaster, allowing them to make additional color comparisons (Arikawa, 2003). The key difference between fly and butterfly retinas is the recruitment of an additional R7 photoreceptor cell during development, which produces three stochastically distributed types of ommatidia (unit eyes) instead of Drosophila’s two (Perry, Kinoshita, et al., 2016). The genetic and developmental basis of this difference is unknown. The extra R7 photoreceptor is recruited in the same place where a cell known as the “mystery cell” has been previously characterized in Drosophila (Tomlinson, Bowtell, et al., 1987). It is shown that butterflies retain this cell as an additional R7-type photoreceptor. The author tested the model that a change in the photoreceptors neighboring the mystery cell are responsible for its recruitment as an R7 by examining gene expression in butterflies, testing relationships between these genes in Drosophila, and by using CRISPR/Cas9 to test their function in the butterfly Vanessa cardui. These experiments suggest a change in expression of the transcription factors Lozenge or Rough. Knockout of the Sevenless (Sev) receptor caused loss of both R7 cells, indicating that components of R7 signaling and recruitment are conserved. Unexpectedly, Sev knockout also caused the loss of additional photoreceptors, suggesting butterflies have an increased reliance on Sev signaling compared to Drosophila. Future experiments will use regulatory sequences from butterflies to recruit a second R7 photoreceptor in Drosophila. Determining how the additional R7 is recruited in butterflies will lead to a greater understanding of the genetic basis of adaptation and will specifically show how the addition of a single cell of an existing type can modify the way an organism sees.

A Quantitative Characterization of Bacillus subtilis Strains’ Endospore Properties
Adriana Gonzalez, Biology
Sponsor: Professor Patrick Eichenberger, Biology

Sporulation is a specialized bacterial stress response whereby the bacteria’s DNA can be stored in an extremely hardy, multi-layered dormant cell called an endospore. B. subtilis is a prime model for the study of pathogenic spore-forming bacteria. Studies have shown that sporulation is important for dispersal and host-to-host transmission of both pathogens and commensal bacteria. Specifically, physical properties of the spores can influence their ability to disperse into the environment. There is evidence that the protein and polysaccharide composition of the spore surface affects adhesive properties, such as hydrophobicity. Significant variability in spore hydrophobicity has been found between wild type strains and wild isolates. These findings invite the question of what genotypes underlie these phenotypic differences. This study investigated if the phenotypes of wild isolates whose spore properties have yet to be characterized could reveal information about the function of genes influencing hydrophobicity. The main assay used here to study the hydrophilicity of spores is the BATH assay. This assay made it possible to quantify spore hydrophobicity by comparing spores’ affinities for an aqueous or hydrophobic phase after being disrupted for set amounts of time by vortexing. This assay also made it possible to characterize the phenotypes of wild isolates and other strains of interest. It was found that disruptions in the various layers of the spore coat significantly affect the hydrophobicity of the spores. Wild isolate strain Natto
exhibits a similar phenotype to a known hydrophobic control, a spore polysaccharide synthesis 1 (spsl) mutant. Finding these types of associations has made it possible to move forward in pinpointing what controls the development of spore properties.

**Nickel-Catalyzed Reductive Cycloisomerization of Enynes with CO2**

*Tyler Heitmann, Biochemistry*

*Sponsor: Professor Tianning Diao, Chemistry*

As carbon dioxide levels in the atmosphere have risen in the past century, a large amount of research has been placed into understanding the reactivity of the gas. Carbon dioxide, an inexpensive, abundant, non-flammable and non-toxic gas, has received much attention recently as a sustainable single carbon source for the installation of useful functional groups such as carboxylic acids, esters, and carbamates. However, carbon dioxide has a significant barrier to activation. To overcome this large activation barrier, this study employed the use of a transition metal catalyst. Here, the author presents a simple, selective, and mild procedure for the synthesis of (hetero)cyclic α,β-unsaturated carboxylic acids from 1,6- and 1,7-enynes and carbon dioxide using a nickel catalyst. Terminal 1,7-enynes, as well as sterically hindered alkenes, experience a unique regioselective preference to form unconjugated carboxylic acids. These mechanistic studies explain this regioselective preference with a hydride insertion pathway, which is distinguished from previous transition metal catalyzed reactions involving carbon dioxide.

**Dissociating Task Knowledge from Performance during Associative Learning**

*Tom A. Hindmarsh Sten, Neural Science.*

*Sponsor: Professor Robert Froemke, Neuroscience and Physiology, NYU School of Medicine*

Learning and performance are often conflated during behavioral paradigms. Yet, evidence from humans suggests internal state signals in the brain may impinge heavily on performance. For example, a tennis player who reliably delivers a serve in practice can fail to do so under the pressures of a tournament. Here, mice were trained to switch between two different contexts: in one “passive” context, mice passively listen to pure tones, while in the other “active” context, they perform an auditory stimulus recognition task to the same stimuli. In the active context, a licktube to deliver a reward is present, whereas this licktube is removed in the passive context. It was found that it takes mice 10–15 days of training to reach expert performance levels in the active context. Remarkably, however, upon removal of the licktube mice continue to lick to the tone and perform at expert levels after a mere 3–5 days of training. That is, by introducing probe passive trials following predominantly active training, it is possible to behaviorally reveal that mice acquire the sensorimotor skills necessary to discriminate between stimuli long before their active performance becomes optimal. It is speculated that this dissociation between performance levels is not due to differential access to underlying knowledge but rather contingent on context-dependent signals in the brain that impinge on decision-making. To assess the likelihood of this possibility, a novel neurally-inspired reinforcement-learning model subject was constructed to both context-dependent signaling and reward-prediction error (RPE) based learning, making it possible to distinguish between changes in underlying knowledge and performance. Interestingly, it was found that the dissociation between learning and performance can solely be captured by allowing learning to proceed rapidly, whilst context-dependent signals driving an inhibitory circuit are modulated across the entire time-course of learning.

**Restoration in an Urban Environment: Modeling Growth and Mortality of Oysters in the Hudson River Estuary**

*Walter Hutcheson, Biology*

*Sponsor: Professor Mary Killilea, Biology*

Restoration of the eastern oyster (*C. virginica*) could bring improvements to water quality, ecological health, and environmental education opportunities in New York City’s (NYC) waterways. However, it is unclear how restored oysters are responding to the abiotic and human-induced environmental factors of the highly urbanized Hudson River Estuary (HRE). This study models oysters’ response to a set of environmental variables in the HRE, including temperature, salinity, dissolved oxygen, and distance to combined sewage overflows. The Billion Oyster Project measured shell length and abundance of oysters at their restoration sites in the HRE from Spring 2016 to Spring 2017. The author created multiple regression models to test for the responses of oyster growth and mortality to environmental factors. Notably, high salinity and low dissolved oxygen were predictors for high mortality. Using the regression models, a map was created to predict oyster growth and mortality within the HRE. Thus, this study locates specific environmental factors affecting oysters in the HRE, as well as sites with the highest potential for restoration based on these factors. Most importantly, this model shows oyster restoration is possible and, at some sites, has a high probability of success in NYC waterways.
Calix[4]arene-based Covalent Porous Polymer for Water Purification
Ilma Jahovic, Chemistry
Sponsor: Professor Ali Trabolsi, Chemistry, NYU Abu Dhabi

Contamination of water with organic micropollutants, such as pesticides and pharmaceuticals, has been shown to cause a wide array of health problems in animals, as well as a range of environmental issues. In this study, we crosslink calix[4]arene with alkyne rich moieties to produce a porous covalent calix[4]arene-based polymer (CalP), which possesses a high surface area and large pore size (Shetty, 2017). The ability of CalP to remove organic micropollutants of different size, charge, and hydrophobicity, that encompass common pesticides, pharmaceuticals and constituents of plastic was evaluated. Results show that the polymer can uptake a variety of micropollutants in under 15 minutes and that its uptake efficiency is comparable to that of commercially available activated carbon. Given the success in synthesizing, characterizing, and using the first calix[4]arene-based porous polymer for micropollutant removal from an aqueous solution, it is believed that these polymers can be used for water treatment and other environmental applications in the future.

Identifying Developmental Markers in the Root Tip of Arabidopsis thaliana
Sidharth Jain, Biology
Sponsor: Professor Kenneth Birnbaum, Biology

Development in the root meristems of Arabidopsis is dependent on spatial position of progenitor cells around a cluster of undifferentiated stem cells known as the quiescent center (Clowes, 1958). As the root grows and develops, the cells in these trajectories undergo differentiation that locks them into specific fates. Certain molecular markers are known to exist in these trajectories that identify specific cell fates, but remain uncharacterized. Using Next-Generation Sequencing (NGS) technology, single-cell RNA sequence (scRNA-Seq) data was obtained from a set of cells in various root-tip developmental lines. An agnostic approach was taken to determine which transcriptome profiles belong to each cell type. An NGS pipeline was established to clean, process, and align the sequences and determine read counts. Several genetic markers were identified to serve as developmental signatures. The data was also processed using Seurat, a machine learning tool developed in the Satija Lab (2015, 2016) for spatial and temporal reconstruction utilizing popular clustering algorithms. The results show the markers identified are associated with a significant amount of variation seen between cell types in the root meristem.

Investigating the Temporal Requirement of Insomniac, a Sleep-Regulating Gene
Hyun Soo (James) Jang, Biology
Sponsor: Professor Nicholas Stavropoulos, Neuroscience, NYU School of Medicine

Sleep is a fundamental and evolutionarily conserved animal behavior. However, the cellular mechanisms underlying sleep regulation are still poorly understood. The Stavropoulos Lab studies the genetic and molecular underpinnings of sleep by studying a novel and highly conserved pathway, using Drosophila melanogaster. Work in the Stavropoulos lab was the first to show that a gene named insomniac (inc) functions within neurons to promote sleep (Stavropoulos and Young, 2011). This project aims to define the temporal window in which inc is required with regard to sleep. At one extreme, inc may function during development, for example, to assemble neural circuits that are crucial for sleep. Or alternatively, it may function in an ongoing manner in the adult brain, through mechanisms linked to the dynamic regulation of sleep drive. To test these hypotheses, a conditional gene expression system, the Q-system, was used to manipulate inc activity in a temporally restricted manner (Riabinina et al., 2015). The flies with manipulated genotypes with the Q-system undergo a Sleep-Regulating Gene

Building Tools for Quantitative Imaging of Transcription in Drosophila Retinas Using the MS2 System
Saera Jeon, Economics
Sponsor: Professor Claude Desplan, Biology

Overall patterns of gene expression result from the dynamic process of transcription within individual cells. It has been proposed that the amount and timing of active transcription can be important for producing developmental outcomes (Garcia et al., 2013; Bothma et al., 2014). The Desplan lab has developed tools to help test this prediction using the Drosophila visual system as a model. The “MS2” system can be used to directly visualize transcription in living tissues and was recently used for the first time in a multicellular organism in the Drosophila embryo (Garcia et al., 2013; Lucas et al., 2013; Bothma et al., 2014). To bring these tools into other tissues and developmental contexts, a UAS-MCP-eGFP fly line for use with the UAS/GAL4
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system was made. A series of GAL4 drivers was tested for activity in the eye imaginal disc at a range of developmental stages. Level of expression of the drivers can be adjusted using the temperature sensitive GAL80ts system to optimize drivers in different tissues. To better understand how transcriptional dynamics affect cell fate decisions in development, MS2 will be used to watch stochastic expression of the transcription factor Spineless (Ss). Ss controls which Rhodopsin proteins are expressed in R7 photoreceptors and therefore what wavelengths are detected. Next, the R7-photoreceptor specific enhancer PM181 was cloned in front of a red fluorescent reporter, mCherry, to mark R7 photoreceptors. sgRNA-containing constructs will be used to insert 24 copies of MS2 repeats directly into the Spineless intron and 5’UTR, as well as a Prospero control. Further development of the MS2 system will allow the visualization and quantification of gene expression in a wide variety of developmental contexts.

Glycogen Synthase in *Entamoeba histolytica*
Dhara Kadakia, Chemistry
Sponsor: Professor Burt Goldberg, Chemistry

The *Entamoeba histolytica* is a unicellular eukaryotic pathogenic organism that causes amoebiasis, a gastrointestinal disease prevalent in many countries where significant contamination exists in the food and water. This organism reveals strong similarities to other human pathogens including *Trichomonas vaginalis*, *Toxoplasma gondii*, *Giardia lamblia*, *Clostridium difficile*, and *Escherichia coli*. The protein glycogen synthase is used for glycogenesis, the metabolic process producing glycogen—a short-term storage molecule for glucose. *E. histolytica* is of particular interest to study, as kinetic and structural data reveal its unusual prokaryotic tendencies. Sequence alignments and comparisons are used to determine homology across taxonomies. Molecular modeling software such as Swiss Model Maker, Phyre, Pymol, and UCSF Chimera make the 3D analysis of the glycogen synthase in *Entamoeba histolytica* possible. Elucidation of the 3D structure allows for localization and visualization of the various protein sites, particularly the protein’s ADP-binding site and homodimer interface, two regions that are crucial for its function. Using bioinformatics and proteomic approaches to understand the sequence and structural homology of this protein, steps towards more effectively targeting this pathogen can be determined.

The Relationship between TET2 and P54NRB in Regulating the Genome in Mammalian Cells
Suhail Kaleem, Biochemistry
Sponsor: Professor Mamta Tahiliani, Biochemistry and Molecular Pharmacology, NYU School of Medicine

Ten-eleven translocation methylcytosine dioxygenase 2 (TET2) belongs to the TET family of enzymes. It is involved in the formation of novel nucleotides in the coding region of genes. TET2 has also been shown to bind many RNA molecules in cells and is therefore implicated in the regulation of gene expression through processing RNA. P54NRB is one of the three proteins that interact with the long non-coding RNA called NEAT1 to form subnuclear bodies called paraspeckles, and are thought to be involved in the processing of RNA transcripts. In addition to this role in paraspeckles, P54NRB is also known to regulate transcription as well as to play a role in repairing DNA damage. The Tahiliani lab has identified P54NRB as a binding partner of TET2 in human cells. The major goal of the project is to understand the functional consequences of the physical interaction between these two proteins. The interaction will be explored by determining if TET2 forms subnuclear bodies in cells and whether these structures contain the paraspeckle components P54NRB and the long-noncoding-RNA NEAT1. A greater understanding of how TET2 and P54NRB cooperate to regulate the genome will lead to insights into how mutations in the TET2 gene lead to leukemia. Methylation of the nucleotide cytosine is essential for embryonic development, and aberrant methylation patterns are strongly associated with the onset of cancer and aging. DNA methylation is critical for imprinting, X-chromosome inactivation, silencing endogenous retroviruses, and gene regulation.
Characterization of Lobula Plate Tangential Cell Subtypes Using MultiColor FlpOut (MCFO) Technology
Kristine Karibandi, Global Public Health/Prehealth
Sponsor: Professor Claude Desplan, Biology

Neuronal morphologies and functions of multicellular organisms are extensively diverse, but not all have been described. One function of neurons is to perceive movement relative to the visual environment one is in, requiring information of the global movement of the visual scene. To further understand global visual motion, the author examines Lobula Plate Tangential Cells (LPTCs)—a wide-field visual motion sensitive cell in the optic lobe of Drosophila melanogaster. Many subtypes of LPTCs of the blowfly have been described with each responding to specific optic flow field patterns. However, in Drosophila, only 4 subtypes have been described to date. The Desplan Lab has identified 7 genetic driver lines for 6 previously undescribed LPTC subtypes during Gal4 driver screening. The aim of this experiment is to describe the morphology and anatomy of two of these candidate LPTC subtypes using the multicolor stochastic labeling technique, MultiColor FlpOut (MCFO). Because LPTCs have stereotypical structures that may infer function, the author hypothesizes what visual motion in which part of the visual field the cells would respond to based on the anatomical areas they innervate in the brain. This opens up an array of possibilities for future behavioral experiments and functional studies.

Molecular Asymmetry in the Spermathecae of Drosophila melanogaster
Sean Karott, Psychology
Sponsor: Professor Mark Siegal, Biology

To better understand the mechanisms by which embryogenesis leads to functional differentiation in Drosophila melanogaster, it is important to study the development of certain structures that are superficially similar but distinct at a molecular level. In Drosophila, the wingless (wg) and engrailed (en) genes are present in all 14 segments of the developing embryo. These genes are important for the development of the spermathecae, a pair of organs in females that receives and stores sperm from the male. Each segment of the developing embryo is divided into anterior and posterior compartments, which are associated with either expression of the wg or en genes respectively. Each female has two spermathecae, and each of those is developmentally specified by either wg or en expression in the A9 segment (Keisman, 2001). The goal of this project is to determine whether there is molecular and functional asymmetry between the two spermathecae due to each one being specified by a different gene. The author investigated this possibility using a UAS-GFP trace element driven by either wg-GAL4 or en-GAL4 to track the development of each spermatheca (Evans et al., 2009). The author then dissected adults and analyzed whether there was a left-right developmental bias for either spermatheca. This was followed by a mating experiment using fluorescently labeled sperm to ask whether there is a functional difference in sperm storage capacity between the two spermathecae.

Studying the Fluorescence Efficiency of Diels Alder Cycloaddition Reactions of Tetrazine-Functionalized Fluorophores
Sameer Khan, Biochemistry
Sponsor: Professor Daniela Buccella, Chemistry

Inverse electron demand Diels-Alder (IEDDA) reactions between tetrazines and strained alkenes have extensive applications from bioconjugation of fluorophores to the functionalization of surfaces. The attractiveness of these reactions comes from their fast kinetics, the generation of only one by-product (N2), and their potential fluorogenic properties, in which a luminescent product is created from nonemissive starting materials. The fluorogenic nature of this reaction originates from the ability of tetrazines to quench fluorescence of various fluorophores prior to reaction, whereas the products show reduced quenching abilities. This project explores the extent and possible mechanisms of fluorescence quenching by tetrazines and the reaction products. The lab has studied the behavior of different Coumarin- and BODIPY-based dyes in presence of different quenchers and plans to correlate the quenching efficiency with the electrochemical properties of the fluorophores. This will make it possible to understand which Diels Alder cycloaddition product leads to a better fluorogenic efficiency, which will provide a controlled way of turning on and off the fluorescence emission of probes based on dye-tetrazine combinations within the cell.

Candidate Transcription Factors Regulate the Birth Order of Mushroom Body Neurons during Development
So Un Kim, Global Public Health/Biology
Sponsor: Professor Claude Desplan, Biology

In the central nervous system of many species, distinct types of neurons are generated as a result of spatial and temporal patterning. However, the molecular mechanisms/genes controlling the generation of neuronal diversity during development are poorly understood. Drosophila mushroom bodies (MB) offer a unique opportunity to study this phenomenon because some of the genes that are expressed in these cells and their stem cell parents, their adult morphologies and their precise time of birth have been extensively studied. Previously in the Desplan lab, 13 genes were identified that are differentially expressed through time in the developing MBs. This project studies how manipulating these 13 genes will affect neuronal diversity...
in the MB by utilizing a molecular tool called RNA interference (RNAi), which targets messenger RNA (mRNA) for “knockdown” and effectively represses the activity of a specific gene. It is hypothesized if these candidate genes play a role in creating neuronal diversity in the MB, then RNAi knockdown of them will lead to a loss of neuronal diversity, a result that can be determined by analyzing the morphology of mushroom bodies in the adult brain. Out of the 8 genes analyzed, homeobrain, Ftz-f1, and deformed showed phenotypic deformity. Determining the effects on MB will help better understand the molecular mechanisms controlling neuronal diversity in a complex brain structure.

The Effects of the Candidate Drug “RuX” on Mice with Induced Lung Fibrosis
JaqueLyn Kinney, Biology
Sponsor: Professor Anthony Szema, Occupational Medicine, Epidemiology, and Preventive Medicine, Hofstra Northwell School of Medicine

The goal of this experiment is to investigate the delayed treatment effects of a specific alpha-lipoic acid-ruthenium complex, called RuX, on mice induced with lung fibrosis. Previous research by the Szema lab using a mouse model has shown evidence of lung fibrosis in mice, instigated by instillation of Camp Victory, Iraq, grab sample. Grab sample spectroscopy showed insoluble metals (chromium, iron, magnesium), all of which could be inhaled leading to fibrotic lungs. Histological reporting depicted inflamed lung tissue and flow-cytometry measurements showed diminishing T-regulatory cell count (T-Reg in the spleen), both of which are markers of pulmonary fibrosis (PF). When RuX was administered immediately after dust instillation, lung histology reporting appeared to be healthy and T-reg cells counts were comparable to the control. In these experiments, dust was instilled, and subsequently RuX was administered. As a result, it is unclear whether RuX helped prevent lung fibrosis from occurring, or if it helped treat the condition caused by the dust. By delaying RuX treatment in current experiments, it was possible to allow pulmonary fibrosis to develop in the mice’s lungs and then to determine the ultimate usefulness of this candidate drug poses to lung injury.

Impact of Comorbidities on Survival after Incident Heart Failure: Findings from the NHANES I Epidemiologic Follow-Up Study (NHEFS)
Adithya Kumar, Economics
Sponsor: Professor Sundar Natarajan, Medicine, NYU School of Medicine

Heart failure (HF) is the leading cause of hospitalization among US adults, resulting in significant reductions in quality of life. This population-based observational study evaluates individuals hospitalized for HF and the impact of co-existing clinical conditions on survival. The author identified participants admitted for heart failure from the NHEFS cohort of 14,407 adults. They were followed from 1971–1992; information regarding risk factors was collected periodically. Facility stay data was used to identify diagnosis of incident HF. The impact of comorbidities was evaluated using median survival time from life table analyses and hazard ratios from Cox proportional-hazards models; adjusted for age, sex, race, and education. All analyses incorporated the complex sampling design. The analysis focused on the sample of 1080 participants who survived hospitalization. Their median age was 72.2 years, 46.8% participants were male, 89.3% were white, and 37.2% did not complete high school. Median survival time was lower for individuals with DM and prior MI. There was no significant difference in median survival time for hypertension or hyperlipidemia. Participants with DM, hypertension, and hyperlipidemia were at very high risk for mortality after adjusting for age, sex, race, and education. Participants with diabetes had the highest mortality after incident HF. In both adjusted and unadjusted analyses, patients with diabetes had significantly worse outcomes than those with other conditions. Patients with diabetes should be targeted for HF prevention and if HF develops, they should be the focus of intense monitoring and treatment.

Smartphone-Based Teleophthalmology at Rural Community Eye Centers in Nepal
Alisha Kumar, Global Public Health/Biology
Sponsor: Professor David J. Myung, Ophthalmology, Stanford University Medical Center

With ~81% of people in Nepal living in rural villages with limited access to eye care, patients are required to travel hundreds of miles to obtain subspecialty ophthalmologic services at the Tilganga Institute of Ophthalmology (TIO) in Kathmandu. A portable teleophthalmology diagnostics platform has the potential to decrease unnecessary travel and alleviate clinical burden. The goal of this study is to assess the viability of Paxos Scope—a smartphone-based ophthalmologic camera system as a triage aid at Community Eye Centers (CECs). A previous study validated the Paxos Scope as a diagnostic tool in assessing referral-warranted diabetic retinopathy. The current study aims to referral-warranted eye disease in the anterior and posterior segments of the eye. Paxos Scope units and ancillary tools were donated to CECs where technicians were trained to use the technology. Standard ophthalmologic examinations were documented along with image collection using Paxos Scope. Images are being measured using a five-point Likert scale. The standard ophthalmologic workup has been collected for reading by blinded faculty readers at TIOHCS. Over 375 patients at three CECs have been examined.
and a wide variety of pathology photographed. Analyses correlating the in-person examination and remote faculty reader assessment are in progress. The smartphone camera system was often the only ophthalmologic camera system available at the CECs. PAXOS Scope provided both high quality images of the anterior and posterior segments of the eye and teleophthalmologic capabilities where care is otherwise unavailable. This technology appears to provide a low-cost, high yield telemedicine solution for rural settings with limited access to subspecialty ophthalmologic care.

**Probing Homogeneous Line Broadening in CdSe Nanocrystals Using Multidimensional Electronic Spectroscopy**

*Jet Lem, Chemistry, East Asian Studies*

**Sponsor: Professor Daniel Turner, Chemistry**

Cadmium selenide semiconductor nanocrystals have a broad range of applications in biomedical imaging, light-emitting diodes, lasers and solar cells. However, the performance of nanocrystal-based devices is limited by the broadening of spectral line shapes through both homogenous and inhomogeneous mechanisms. In order to elucidate the contributions to the homogenous line width, two-dimensional electronic spectroscopy (2D-ES) measurements were taken of wurtzite (hexagonal) and zinc blende (cubic) CdSe nanocrystals as a function of nanocrystal size. The results show that the homogenous line width decreases with increasing crystal radius and that surface chemistry plays a critical role in controlling this line width. To explore the hypothesis that unpassivated surface states serve to broaden the homogenous line width, three-dimensional electronic spectroscopy (3D-ES) was used to identify signatures of exciton-phonon coupling to optical and acoustic modes. Nanocrystals that lack electron-passivating ligands exhibit stronger coupling to optical modes, suggesting that localized surface charges enhance exciton-phonon coupling via the Fröhlich interaction.

**Characterization of Otd-Bound Genomic Regions**

*Rimma Levina, Biology*

**Sponsor: Professor Stephen Small, Biology**

The otd gene regulates gene expression in *Drosophila melanogaster* (*Dm*) during development. It is understood that the Otd protein localizes in the anterior of the embryo. Throughout evolution, otd has been highly conserved and is a critical determinant in head formation in several organisms; however, in *Dm* it is the Bcd protein that determines head formation. Little is known about Otd's mechanistic role in body plan development, but it is clear that its role is a crucial one because when mutated, the result is lethality in the organism. Attempts are currently being made to elucidate Otd's new role in *Dm* and its ability to regulate gene activity both in concert with and independently of Bcd.

Through molecular tests and genetic crosses, the effects a mutation in *otd* has on particular enhancer expression are being analyzed. With this work the author hopes to create a framework of Otd's binding characteristics.

**Early Life Abuse Reduces the Emergence of Parvalbumin Inhibitory Interneurons in the Amygdala**

*Kayla Ying Yan Lim, Neural Science, Psychology*

**Sponsors: Professor Chiye Aoki, Neural Science; Professor Regina Sullivan, Child and Adolescent Psychiatry, NYU School of Medicine; Adrienne Santiago, Neural Science**

Early life trauma from a caregiver is a major risk factor for development of psychiatric disorders involving abnormal threat responses (Teicher et al., 2016). Juveniles reared by an abusive caregiver exhibit heightened activity in the basolateral amygdala (BLA), a region known for its critical role in threat response to innate and learned fears (Tottenham et al., 2011). Similarly, maternally abused rat pups exhibit increased threat response, which correlates with heightened BLA activity (Perry et al., 2017). However, the neural substrates and circuitry mediating this BLA hyperactivity are unclear. Here, a naturalistic model of maternally-induced trauma is applied during the developmental sensitive period for attachment–postnatal days (PN) 5 to 12. It was hypothesized that, following this critical window, extracellular matrix structures called perineuronal nets (PNN) lock in the excitatory and inhibitory inputs onto parvalbumin-containing (PV+) inhibitory interneurons in the BLA, yielding abnormality that underlies BLA hyperactivity. This study tests this hypothesis by establishing the effects of maternal maltreatment on the ontogeny of PV+ cell and PNN maturation at PN12 (during trauma), PN15 (post-trauma), PN18 (during recovery), and PN23 (weaning), quantified using immunohistochemistry and light microscopy. BLA of abused rats exhibited reduced PV+ cell density at PN15 and reduced PNN density at PN12 through 15 (p <0.05), both of which normalized by weaning age. This is in contrast to threat response, which persists at a heightened level up to weaning age (Perry et al., 2017). Results suggest exposure to an abusive caregiver in the sensitive period for attachment delays the efficacy of PV+ inhibition of BLA’s excitatory outflow, and a yet unknown additional mechanism exists that underlies the persistently heightened threat response at weaning. These findings provide the groundwork for future experiments that aim to normalize threat response to abused rats.

**Effect of VIP-HA on Fibrosis Induced by IAW-LI**

*David Lin, Psychology*

**Sponsor: Professor Anthony M. Szema, Occupational Medicine, Epidemiology, and Preventive Medicine, Hofstra Northwell School of Medicine**

Military personnel post-deployment to Iraq and
Afghanistan have noted new-onset respiratory illness. This study’s primary objective was to further develop an animal model of Iraq Afghanistan War Lung Injury (IAW-LI) and to test a novel class of anti-injury drug called Vasoactive Intestinal Peptide (VIP) Hyaluronan Pendant, or VIP-HA Pendant in comparison to RuX, an anti-inflammatory compound. Particulate Matter (PM) samples were obtained in Iraq then characterized by spectromicroscopy. C57BL/6 mice underwent orotracheal instillation with PM, followed by drinkable treatment with RuX. Lung histology, inspiratory capacity (FlexiVent), thymic/splenic regulatory T cell (Treg) number, and whole-lung genomics were analyzed. Tracheal instillation of Iraq PM led to lung septate thickening and lymphocytic inflammation. PM-exposed mice had suppression of thymic/splenic regulatory T-cells (Tregs). Drinking RuX after PM exposure attenuated the histologic lung injury response, improved lung inspiratory capacity, and increased Tregs. Pooled whole lung genomics suggest differences among gene expression of IL-15 among control, PM, and PM+RuX groups. VIP-HA Pendant’s efficacy is still being tested, but the results seem promising.

Validation of Acute Proteomic Changes in Hippocampal and Cortical Lysates of ASD Model Mice
Derek Lin, Neural Science
Sponsors: Professor Eric Klann, Neural Science; Dr. Heather Bowling, Neural Science

Fragile X Syndrome (FXS) is the most common known cause of inherited intellectual disability and single genetic cause of Autism spectrum disorders (ASDs). FXS is caused by a mutation in the FMR1 gene, specifically the mutative over-abundance of CGG repeats (normal: <50 repeats; full mutation: >200 repeats), which leads to hyper-methylation and gene silencing. Although there have been many studies on FXS to date, the exact mechanisms underlying the disorder remain unclear. One cellular process that has been implicated in FXS is inappropriate protein synthesis (due to a lack of control from the lack of corresponding fragile X mental retardation protein—FMRP) that can lead to the cellular and synaptic network defects that characterize some of the ASD phenotypes observed in both patients and FXS animal models. To date, few studies have placed emphasis on identifying and examining specific transcript changes at the proteomic level in ASD mouse models. With this goal in mind, this study utilized a combinatorial proteomic technique, BONLAC (bioorthogonal noncanonical amino acid tagging (BONCAT) and stable isotope labeling by amino acids in circuits (SILAC)) to measure acute proteomic changes in hippocampal/cortical slices of ASD model mice and their wild type counterparts.

Prefrontal Morphological and Projection Abnormalities in a Methylazoxymethanol Acetate Insult Model
Raven Lin, Neural Science, Psychology
Sponsor: Dr. Kally O'Reilly, Neural Science

A core cognitive symptom of schizophrenia involves impairments in working memory, which retains information for the sole purpose of performing a moment-to-moment task. Intimately coupled with working memory is cognitive control, in which irrelevant stimuli must be ignored to perform a goal-directed task. Such processes involve the highly associated prefrontal cortex. Previous studies implicate that the cognitive inflexibility in schizophrenia can be attributed to higher neuronal density without net neuron loss in the prefrontal cortex, suggesting decreased connectivity within the prefrontal cortex and between other important regions in dysfunctional working memory (Moore et al., 2016). Prenatal methylazoxymethanol acetate (MAM) exposure in rodents offers a reliable schizophrenia model with similar anatomical, cognitive and behavioral patterns to examine the anticipated decreases in neuronal connectivity and packing density in the MAM prefrontal cortices. Branching analyses between the Golgi-stained neurons of the MAM-insult rodents and their saline counterparts characterize the morphological abnormalities in the cingulate, prelimbic and infralimbic subcortical regions of the prefrontal cortex. Additionally, retrograde tracer injections describe the projection anomalies in the input pathways to these prefrontal cortical regions.

Haploid Genotype of Sperm in Astyanax mexicanus Cavefish Plays a Role in Determining Sperm Fertilization Success
Alissa Luk, Biology
Sponsor: Professor Richard Borowsky, Biology

Sperm competition has traditionally been viewed as the competition between ejaculates of different males for the fertilization of an egg, where the diploid genotype of the male producer determines the success of its sperm. In Astyanax mexicanus, there are distinct subpopulations of cavefish and surface fish that are able to interbreed and produce fertile hybrids. It is proposed here that there is a barrier in further hybrid reproduction due to selection by intra-sperm competition, where sperm from the same male will compete with one another, and that the haploid genotype of the sperm (rather than the diploid genotype of the male) plays a role in determining fertilization success. To test this, cavefish, surface fish, and hybrid fish were examined to determine whether the variability in sperm characteristics (sperm motility and sperm tail length) would increase as the genetic variation in the male increased. It was found that the straightness (LIN) and the wobble (WOB) of the sperm pathway were significantly correlated with
Synthesis and Evaluation of Triazolamer-Based Scaffolds as Secondary Structure Mimics
Igor Maksimovic, Chemistry
Sponsor: Professor Paramjit Arora, Chemistry

Protein-protein interactions regulate fundamental processes involved in normal functions, yet diseased states remain difficult to inhibit. The Arora lab has previously shown that synthetic scaffolds can mimic the geometry of interacting residues and function as potent inhibitors of protein-protein interactions (PPIs). Reported here is progress towards the synthesis and testing of a beta-strand mimic of T-cell factor 4 (TCF4). This mimic is intended to act as an inhibitor of the TCF4/β-catenin PPI. Misregulation of this interaction has been linked to the initiation and progression of cancers and fibroses (Huang, Zhang, et al., 2014). The strand mimics are derived from a triazolamer scaffold and were synthesized using solid phase synthesis techniques and purified by high-pressure liquid chromatography (HPLC). Solution phase synthesis techniques were utilized to modify the amino acids to replace the acid termini with alkynes as is required for the oligomer synthesis. The potential of these compounds to bind to the target protein surface will be assessed by a competition fluorescence polarization (FP) assay. The fluorescent probe used in this assay is a portion of TCF4 protein conjugated to fluorescein. The conjugate was synthesized using solid phase peptide synthesis (SPPS) and purified by HPLC. The ability of the probe to bind β-catenin has been evaluated by a direct binding FP assay. If successful, this project will serve as an example of how triazolamers could affect other complexes that have interacting beta-strands at their interfaces.

Controlling the Chromosome: How Histone Methylation Affects C. elegans Dosage Compensation
Nina Maryn, Biology
Sponsor: Professor Sevinc Ercan, Biology

Sexually dimorphic species must compensate for unbalanced gene expression due to unequal numbers of sex chromosomes between males and females, a process referred to as dosage compensation (Straub, 2007). The nematode Caenorhabditis elegans has co-opted a condensin-like protein complex, called the Dosage Compensation Complex (DCC) to repress X-linked genes in hermaphrodites (XX) to equalize expression to that of males (XO) (Meyer, 2010). It has been found that histone methylation markers provide an epigenetic signal to assist in dosage compensation, but the mechanism of their interaction with dosage compensation machinery is unclear (Brinkman, 2006; Vielle, 2012; Kramer, 2015). In wild type animals, the histone marker H4K20me1 is enriched on the X-chromosome relative to the autosomes, due in part to differential activity of the di-tri methyltransferase enzyme SET-4 (Vielle, 2012; Kramer, 2015). Here it is shown that the H4K20me1 marker may act as a binding site to facilitate stabilization of the DCC at its target sites on the X chromosome. It was found that hyper-enriching the H4K20me1 marker decreases ectopic spreading of the DCC found in X;Autosomal fusion mutants, possibly by trapping the DCC on the X chromosome near its recruitment sites. This hypothesis is confirmed in part by RNAi experiments showing that SET-4 deletions make the animals sensitive to the amount of available DCC-specific protein, DPY-27. This study suggests that H4K20me1 may play a critical role in physically securing the DCC to the X-chromosome during dosage compensation.

Exome Sequencing Reveals Activation of STAT3 Signaling Pathway in Non-VHL Tumors in Hemangioblastoma
Elad Mashiach, Neural Science
Sponsor: Professor David Zagzag, Neuropathology and Neurosurgery, NYU School of Medicine

Hemangioblastoma are benign, slow growing, and highly vascular tumors predominantly of the nervous system in adults. Histologically, these tumors are comprised of neoplastic stromal cells within a network of small capillaries. While most hemangioblastoma are sporadic and occur predominantly in the cerebellum, they may also present familial form associated with von Hippel-Lindau (VHL) syndrome, an autosomal dominant disorder with neural and extraneural (e.g., renal cell carcinoma) manifestations caused by germline mutations of the VHL gene on chromosome 3. Although inactivation of VHL, a tumor suppressor, has been previously observed in some sporadic hemangioblastoma, the underlying pathogenic mechanisms responsible for familial and sporadic hemangioblastoma remain poorly understood. The author therefore performed whole exome sequencing of cerebellar hemangioblastoma tumors from 24 patients, age 24–63, and their matched peripheral blood leukocytes. After preparation and amplification of genomic DNA libraries, exomes were selectively captured using biotinylated long oligonucleotide probes, and sequenced by paired-end next generation sequencing to an average 100-fold coverage. Having aligned the sequenced reads to the human reference genome hg19, tumor and germline (leukocyte) sequences were compared, and pathogenic single nucleotide variants (SNVs) identified. Both germline and somatic mutations were validated by re-sequencing.
followed by pathway analysis of the SNVs. Five patients had \( VHL \) syndrome (germline \( VHL \) mutation) and four carried somatic \( VHL \) mutations. Among the \( VHL \) tumors, 61 mutations were identified most commonly in \( HNF1B \), \( NOTCH1 \) and \( TCF7L1 \), suggesting potential contribution of altered RNA metabolism in oncogenesis based upon pathway analysis. In non-\( VHL \) tumors, germline or somatic growth factor receptor variants (\( FGFR4 \) (9/16 patients), \( EGFR \), \( IGF1R \), \( PDGFRA \) and \( TYK2 \)), known to activate STAT3 signaling to stimulate angiogenesis via enhanced HIF-1\( \alpha \) expression, were identified. These findings indicate that hemangioblastoma can also occur by germline mutations activating STAT3 pathway, which may have significant implication in genetic testing and counseling for VHL disorder.

The Importance of Virulence Factors in the Growth and Infection of \( Listeria \)

\textit{Toby Mathew, Biology}  
\textit{Sponsor: Professor Kurt Schesser, Microbiology and Immunology, University of Miami Miller School of Medicine}

\( Listeria monocytogenes \) is a common bacterium that causes human infections, like miscarriage and septicemia. \( Listeria \) uses specific virulence factors to produce proteins that will assist in invasion, replication, and escape. By manipulation of the virulence factors through knockout mutants, this study observed their role and importance in the infection and proliferation life cycle. JEG-3 cells, a human placental line, were infected with wild type \( Listeria \) or knockout mutants of specific virulence factors, Internalin A&B, Listeriolysin O, and ActA. Through Colony Forming Unit Assay, it was possible to analyze the number of colonies representing the number of \( Listeria \) bacteria after specific time points. Each virulence factor did play a significant role in the growth and infection of \( Listeria \) in the JEG-3 cells as fewer colonies were found in the knockout mutant plates than the wild type. Each virulence factor affected a specific portion of the invasion, replication, and escape cycle. The role of the \( Listeria \) virulence factors were tested in JEG-3 cells, but can have different roles in different cell types, like macrophages. Further studies must be done to determine the effect of these specific virulence factors in other cell lines.

Secernin-1 Is a Novel Protein Found in the Pathological Hallmarks of Alzheimer’s Disease

\textit{Sacha McElligott, Neural Science}  
\textit{Sponsor: Professor Eleanor Drummond, Neurology, NYU School of Medicine}

Amyloid plaques and neurofibrillary tangles (NFTs) are the two pathological hallmarks that define Alzheimer’s disease (AD). Recently, the Drummond lab has completed the most comprehensive analysis of the plaque proteome
and revealed a variety of novel proteins, which had never before been implicated in the disease. Among these, SCRN1 exhibited consistently high expression in amyloid plaques. SCRN1 was primarily identified as a cytosolic protein that regulates mast cells. Previous studies have also suggested that misregulation of SCRN1 may have a contributing role in a variety of cancers as well as schizophrenia and bipolar disorder. However, very few studies have been associating SCRN1 with AD, and a definitive role of SCRN1 in AD pathology remains elusive. This study used fluorescent immunohistochemistry on hippocampal sections from formalin-fixed paraffin-embedded, AD brain tissue to show that SCRN1 co-localizes with phosphorylated Tau (pTau), present in both NFTs and dystrophic neurites. Surprisingly, SCRN1 staining also exhibited variation across brain regions and across individuals, suggesting a possible role of SCRN1 distribution in AD. Overall, the preliminary data generated from this study imply a potential relationship between SCRN1, pTau and cognitive impairment.

Place and Habit Memory: The Effects of Acute Stress on Retrieval of Contextual and Stimulus-Response Memory
Yeva Mendelevich, Psychology
Sponsors: Professor Elizabeth Phelps, Psychology; Elizabeth Goldfarb, Psychology

How does acute stress affect people's ability to remember something previously learned? Stress affects multiple memory systems in different ways depending on the timing of stress relative to learning. Existing literature investigating the effect of pre-retrieval stress on contextual (“place”) and stimulus-response (“habit”) memory in rats has shown that subjects experiencing emotional arousal before retention testing were impaired in both contextual (McGaugh, 1998) and stimulus-response memory (Atsak et al., 2016). The majority of human research on stress and memory studies the effects of stress on the explicit, declarative memory of words. Fewer studies have looked at its effects on stimulus-response memory, either alone or in relation to implicit or explicit contextual memory. To test the effects of pre-retrieval stress in humans, a 2-day protocol was implemented in which participants completed the visual search task (Chun and Phelps, 1999; Goldfarb, Chun, et al., 2016) on day 1, and underwent either a stress manipulation with the cold pressor task (CPT) or a control manipulation on day 2 before retention testing. The author expects to find that participants who had been exposed to stress on day 2 will show impaired contextual memory and impaired stimulus-response memory on the visual search task through increased relative reaction time on the visual search task.

Neuroeconomic Investigation of Opioid Craving on the Subjective Valuation of Drug Related and Drug Unrelated Goods
John Messinger, Neural Science
Sponsor: Professor Kenway Louie, Neural Science

Craving, defined as a strong, almost insatiable, desire for a particular substance, is important for the maintenance of addictive behaviors. Craving leads to a type of myopia for the crave substance, where the importance of consuming the substance soon outweighs the importance of maintaining abstinence that can result in a return to its consumption even after a long period of protracted abstinence. Despite progress in establishing the clinical importance of craving, a basic understanding of what craving is and how craving might operate to bias choice in addicted individuals such as those seeking treatment for an opioid use disorder (OUD) is lacking. This study employs a neuroeconomic framework and attempts to establish a quantitatively meaningful understanding of opioid (and specifically heroin) craving in chronic, moderate to severe OUD. The approach combines a manipulation of the craving state with self-report measures, physiological monitoring, and a novel decision-making paradigm. Preliminary results suggest heroin craving is associated with enhanced willingness-to-pay (a measure of subjective value) for goods identified as personally reminiscent of an individual’s heroin use but not for goods unrelated to heroin use. Further, it is shown that individuals disproportionately value having more of these heroin-related goods than less of them. Finally, initial evidence is provided that this quantitative measure is correlated with chronicity of heroin use: individuals who have used heroin longer assign higher value to heroin-related goods. The lab’s ongoing work seeks to link these behavioral and subjective report measures with physiological indices of valence and arousal. Through a better understanding of the multiple manifestations of opioid craving the author hopes to contribute to an improved, neuroeconomics-informed assessment of this symptom and ultimately better treatment options for combating craving.

Investigating the Binding Activity and pH Dependence of the Multidrug Efflux Transporter EmrE
Chloe Morgan, Biochemistry
Sponsor: Professor Nate Traaseth, Chemistry

EmrE is a polytopic protein found in the membranes of bacteria. It facilitates bacterial antibiotic resistance by coupling the influx of two protons with the efflux of the drug target. EmrE is a functionally a homodimer, effluxing a wide variety of cationic hydrophobic molecules. Because of EmrE’s small size, it is the ideal protein of study in the small multidrug resistance (SMR) family of efflux pumps and, more generally, a good model for studying ion-coupled
transport. Despite its importance, there is a lack of specific structural details that are needed to understand the drug binding and efflux mechanism of EmrE. Through the use of nuclear magnetic resonance (NMR) spectroscopy, isothermal titration calorimetry (ITC), and fluorescence binding assays, information from structural and thermodynamic studies was correlated with the functional profile of EmrE in a living cell. Utilization of different ligands in binding assays allowed direct observation of the different strengths at which EmrE binds drug targets. By investigating the altered ability of mutants to transport classical EmrE substrates, as well as their conformational changes upon drug or proton binding, insight was gained into the mechanism of the protein. This, in turn, will contribute to knowledge on how bacteria achieve antimicrobial resistance.

**Zinc Finger-DNA Binding Analysis under Geometrical Change**

*April Mueller, Biochemistry*

*Sponsor: Professor Marcus Noyes, Biochemistry and Molecular Pharmacology, NYU School of Medicine*

Zinc fingers (ZFs) are common structural protein motifs essential in mediating interactions between DNA, proteins, and other molecules. The mechanism and ability of ZFs to bind specific DNA sequences is of great scientific interest due to the prevalence of ZF motifs in transcription factors in the human genome. This project furthers the understanding of the full binding capacity of ZF motifs, specifically how a change in the binding motif pair angle affects DNA binding ability. Three ZFs pairs with identical binding residues, but differing geometric angles, were tested using the Bacterial-1-Hybrid system where colony growth is dependent on positive ZF-DNA interaction. It was found that upon conformational change, ZF pairs were unable to provide sufficient DNA binding interaction. Thus, the orientation of a ZF pair is integral to the function of the protein, and upon change of interaction angle with the DNA, the function is disrupted. This geometric specificity is being further investigated by screening a library of ZF binding residues for their ability to interact with a known DNA sequence under differing conformations. Overall, this work will reveal a more complete understanding of how ZFs bind to DNA. It is hoped that this library may aid in elucidating DNA binding sites for newly discovered zinc finger based proteins, or allow engineering of new ZFs to bind to specific target sites in gene therapy applications.

**Functionalized Colloidal Microcapsules**

*Zaeem Nazir, Biochemistry*

*Sponsor: Professor Stefano Sacanna, Chemistry*

Recently, the Sacanna lab has achieved the synthesis of colloidal microcapsules via the self-inflation of 3-(trimethoxysilylpropyl) methacrylate (TPM) emulsion droplets. By applying the procedures and principles from understanding TPM inflation, it is possible to synthesize, in high yield, colloidal microcapsules with an occlusion in the wall specifically designed to trap charged nanoparticles inside. This is done by growing the TPM emulsion on a sacrificial template—hematite cubes—that can be removed post polymerization without destroying the colloidal system. Achieving a reproducible high yield synthesis for this is a novel accomplishment in colloidal chemistry and is one of the first colloidal systems of this scale designed to capture and selectively release charged particles.

**The Relationship between Swallowing Screening and Sarcopenia in Healthy Seniors**

*Mehek Noorani, Communicative Sciences and Disorders*

*Sponsor: Professor Sonja Molfenter, Communicative Sciences and Disorders, Steinhardt School of Culture, Education, and Human Development*

A significant proportion of healthy, community-dwelling seniors (>65) experiences swallowing problems (dysphagia). These are presumed to result from natural decreased strength and coordination of muscles (sarcopenia) in the oral-pharyngeal mechanism. Existing methods for dysphagia screening may not distinguish normal age-related changes from disordered swallowing. This project compared how 50 healthy seniors performed on two swallowing screening protocols with their performance on two surrogate measures of sarcopenia. It was predicted that individuals who failed swallow screening tasks would also display significantly worse sarcopenia. Screening tools included a validated self-report dysphagia questionnaire (Belafsky et al., 2010) and the 90-milliliter Water Swallow Task (WST) (Suiter et al., 2014). Sarcopenia was captured at the oropharyngeal level (tongue strength measures on the Iowa Oral Performance Instrument) and the global level (grip strength measures on the Jamar Plus Hand Dynamometer). One-way ANOVAs compared screening outcomes with sarcopenia. Effect size was calculated with Cohen’s D and two-tailed p-values <0.05 were considered significant. Participants who failed the 90-milliliter WST had significantly lower posterior tongue strength compared with those who passed with a strong effect (D = 0.76). All other relationships failed to achieve statistical significance. Based on this sample, there appears to be a relationship between posterior tongue strength and performance on the 90-milliliter WST. A limitation of this work is the lack of comparison to gold-standard videofluoroscopic measures and a low distribution of individuals who failed swallow screening. The utility of strengthening posterior tongue for prevention of dysphagia in healthy aging adults should be the focus of future study.
Self-Assembled Three-Turn Tensegrity Triangle Using A-Form DNA

Anthony Osuala, Chemistry
Sponsor: Professor Nadrian Seeman, Chemistry

DNA can self-assemble into a three-dimensional structure called a “tensegrity triangle” through Watson-Crick base pairing. These subunits can connect to each other via sticky ended cohesion, where complementary overhangs are located at the very ends of the structure. When DNA takes on its double helical shape, the helices can exist as an A-form, B-form, or Z-form double helix, depending on its environment and chemical modulations. In this experiment the double helix is forced into an A-form shape by using a form with 2′-fluorinated nucleotides in order to maximize the rigidity of the structure and, hopefully, to improve the overall resolution of the resulting crystal. In previous literature, it is known fluorinating nucleic acids increases the stability of the resulting duplex based on thermal melting point data. So far, there is evidence the structure can exist under low magnesium conditions at neutral pH. Crystals were obtained for this structure in such conditions and are due for further diffraction analysis.

Saccade Preparation Automatically Enhances High Spatial Frequency Information

Jasmine Pan, East Asian Studies, Psychology
Sponsor: Professor Marisa Carrasco, Psychology

To explore a visual scene, human observers make a series of large rapid eye movements called saccades to bring objects of interest into the fovea, where visual resolution is the highest. Visual information at the saccade target is enhanced just before the eyes begin to move, a phenomenon often referred to as presaccadic enhancement or presaccadic attention. A recent study demonstrated that saccade preparation leads to an enhancement of high spatial frequency information of the saccade target. This experiment investigates whether this enhancement is a mandatory process or a process that only occurs when it is beneficial to the task at hand. With a visual masking procedure, observers were asked to discriminate a peripheral visual target embedded in noise masks filtered in different spatial frequencies. It was found that when a visual target was paired with a high spatial frequency noise mask, visual performance was impaired by saccade preparation. The results indicate saccade preparation enhances high spatial frequency in a mandatory fashion, as this enhancement leads to a stronger masking effect generated by the high spatial frequency mask, thus impairing performance on the target. This effect may support transsaccadic integration and to facilitate a percept of a stable visual world, by reshaping the representation of the saccade target to be more fovea-like just before the eyes move.

Pupil Size as an Index of Voluntary Temporal Attention

Jacob Parker, Neural Science
Sponsors: Professor Marisa Carrasco, Psychology; Dr. Rachel Denison, Psychology, Neural Science

The brain uses attentional processes to efficiently allocate limited cognitive resources. Temporal attention is the prioritization of sensory information at specific points in time. Pupil size is linked to arousal state and can be an indicator of cognitive processes. This study investigated whether pupil size is modulated when voluntarily attending to points in time. Humans performed orientation judgments in which two visual targets appeared in succession at a single spatial location, 250ms apart. Observers were cued to attend to the first, second, or both targets. Following the targets, a response cue indicated which target to report: the cued target’s orientation or the other target’s (valid/invalid attention, 75/25% probability, respectively). When both targets were cued (neutral attention, 20% of all trials), each target was equally likely to be probed. Temporal attention improved accuracy. Changes in pupil size were modeled with a linear model that estimated the strength and timing of pupil responses to the events in the task, such as the cues and targets. The author also characterized the effects of the temporal cue, cue validity, and accuracy on pupil dynamics and found pupil effects related to stimulus anticipation and expectation violation, suggesting they can index arousal and attentional states.

Characterizing the Interactions between the Phosphotyrosine-Binding Domain of Fibroblast Receptor Substrate 2 (FRS2) and the Juxta-Membrane Domain of Fibroblast Growth Factor Receptor 2 (FGFR2)

Nihal Patel, Biochemistry
Sponsor: Professor Nate Traaseth, Chemistry

Fibroblast Receptor Substrate 2 (FRS2) is an adaptor protein that binds to the juxta-membrane domain of Fibroblast Growth Factor Receptor 2 (FGFR2), a receptor tyrosine kinase in mammalian cells. The fibroblast growth factor receptor (FGFR) signaling cascade is involved in normal fibroblast development; mutations in this pathway are associated with bone diseases and tumorigenesis (Su, Nan, et al., 2014; Lin, Chamberlain, et al., 2014). Phosphorylation of tyrosines on FRS2 by activated FGFR2 results in the activation of MAPK signaling within the cell. Despite the importance of FRS2 in MAPK signaling in FGFR pathways, adaptor proteins are not well studied in signaling cascades. Current information about FRS2 suggests that the PTB domain binds through a novel intermolecular beta-sheet mechanism, rather than through canonical binding to a phosphotyrosine residue on FGFR2. However, results from NMR chemical shift perturbation experiments have shown that the phosphorylation state of Y466 on FGFR2 plays a
larger role in binding the PTB domain of FRS2. The author is currently working on getting SPR data to quantify the effect of the phosphorylation state of Y466 on the binding affinity of PTB to FGFR2.

**Morphological and Spine Changes in Primary Cells of the Dorsal Hippocampus after Neurodevelopment Insult**

*Alejandra Patino, Neural Science*

*Sponsor: Dr. Kally O’Reilly, Neural Science*

In schizophrenia, patients exhibit impairments related to hippocampus dysfunction. Because schizophrenia is thought to arise from abnormal brain development, this study aimed to characterize the structural abnormalities associated with dorsal hippocampus (dHPC) dysfunction. A model of neurodevelopmental insult was used in which rats were exposed to a mitotoxin, methyldiazoxymethanol acetate (MAM) during late gestation when HPC is undergoing major neurogenesis. MAM disrupts cell proliferation and adult offspring have reduced HPC area and memory deficits. The author examined dHPC neuronal morphology and connectivity with the main cortical inputs and assessed neuronal morphology in Golgi impregnated tissue and quantified dendritic length/branching of primary cells in the dentate gyrus and CA1 sub-regions of the dHPC. The results showed no differences in dendritic length/branching of dentate gyrus neurons. However, in MAM rats, the primary cells of dentate gyrus contained more total spines. The CA1 layer is compressed in MAM rats and has reduced dendritic branching. The pattern of cortical inputs to dHPC was not different in MAM rats, assessed by injection of the retrograde tracer fluorogold. These findings suggest that in the reduced HPC area of MAM rats, the observed morphological differences may alter the ability of primary cells to receive neuronal input.

**Characterization and In Vivo Evaluation of Oncogenic G12C Mutant K-Ras Covalent Inhibitors**

*Catherine Pratt, Global Public Health/Prehealth*

*Sponsor: Professor Paramjit Arora, Chemistry*

Protein-protein interactions (PPIs) regulate many fundamental biological processes, yet mutations lead to diseased states that have proven difficult to inhibit. Previous work shows that synthetic scaffolds can mimic the geometry of protein interface residues and function as potential PPI inhibitors. The hydrogen bond surrogate (HBS) is an α-helical scaffold developed by the Arora lab to target PPIs (Chapman, 2004). HBSs can become targeted covalent inhibitors (TCIs) through constrained peptidomimetic sequences modified with an electrophilic moiety specific to nucleophilic residues in proximity to the binding site (Zhao, 2014). Oncogenic K-Ras is a commonly mutated member of the GTPase family responsible for mediating multiple cancer cell pathways (Winter, 2016). K-Ras (G12C) is an ideal system for testing TCI designs, as the cysteine mutation is characteristic of only oncogenic Ras. Reported here is progress on an ongoing project towards characterization of the covalent linkage site and evaluation of the *in vivo* efficacy of K-Ras (G12C) inhibitors. Covalent labeling of H-Ras with a modified HBS inhibitor was visualized by MALDI-TOF mass spectrometry. For, *in vivo* efficacy, MTT cell viability assays were performed in H358 (G12C) lung cancer and T24 (G12V) bladder cancer cells. The covalent labeling studies indicate significant labeling of the desired cysteine using HBS inhibitors modified with reactive electrophiles. The cell viability assays also indicate effective and specific HBS inhibitors for the K-Ras (G12C) mutant cell line. This project will require additional future work, specifically cell viability assays in other G12C mutant lines and covalent labeling studies with other cysteine-bearing proteins.

**Resonant Pressure-Driven Equilibrium Currents in and near Small Magnetic Islands**

*Dhanush Radhakrishnan, Mathematics*

*Sponsor: Professor Allan Reiman, Astrophysical Sciences, Princeton University*

In general, 3D MHD equilibria in toroidal plasmas do not result in nested pressure surfaces. Instead, islands and chaotic regions appear in the equilibrium. Near small magnetic islands, the pressure varies within the flux surfaces, which has a significant effect on the pressure-driven current, introducing singularities. Previously, the MHD equilibrium current near a magnetic island was calculated, including the effect of “stellarator symmetry,” wherein the singular components of the pressure-driven current vanish (Reiman, 2016). Here the author first solves for pressure in a cylindrical plasma from the heat diffusion equation, after adding a helical perturbation. Then the author numerically calculates the corresponding Pfirsch-Schluter current. At the small island limit, the author compares the pressure-driven current with the previously calculated solution and, far from the island, recovers the solution for nested flux surfaces. Lastly, the author computes the current for a toroidal plasma for symmetric and non-symmetric geometries.

**Characterization of the Autism Spectrum Disorder-Associated Isoleucine to Valine Mutation in Human Eukaryotic Initiation Factor 2**

*Julia Ramadhar, Biology*

*Sponsor: Professor Eric Klann, Neural Science*

Autism Spectrum Disorder (ASD) is a heritable neurodevelopmental condition, presenting with restricted or repetitive behaviors and social-language deficits. ASD has a largely unknown etiology, but genetic studies indicate a
complex and heterogeneous genetic landscape. Currently, studies focus on de novo mutations, while inherited single nucleotide variants (SNVs) are much more frequent, but less studied. Many studies have linked dysregulated mRNA translation and ASD phenotypes. Therefore, the author searched the Simons Simplex Collection, a database of exome sequencing data from >2600 families with one child on the spectrum, for de novo and inherited SNVs in genes encoding proteins responsible for regulating protein synthesis. An inherited SNV in the EIF2S1 gene was identified, which encodes the alpha subunit (eIF2α) of the translation regulator complex human eukaryotic initiation factor 2 (eIF2). The single-base change results in an amino acid change—iseoleucine to valine—at position 42 in the protein (eIF2αI42V). It was hypothesized that this ASD-associated SNV would impact eIF2α structure and function—altering global protein synthesis and potentially increasing the risk of developing ASD. To test this, the author engineered a recombinant EIF2S1 gene containing the ASD-associated SNV, and performed in vitro assays to determine its effect on global protein synthesis. Here, it is demonstrated that the eIF2αI42V mutant decreases robustness of cellular stress response and alters eIF2 complex structure. The in vitro studies indicate partial eIF2αI42V phosphorylation and decreased global mRNA translation when compared to wild type eIF2α. Protein synthesis homeostasis is altered with the ASD-associated eIF2αI42V mutation, supporting the proposed link between aberrant mRNA translation and ASD, and possibly implicating both the eIF2αI42V mutation and EIF2S1 gene in conferring ASD risk. This further highlights the need for more studies on translation regulation in connection with atypical neurodevelopment, and these findings could help pave the way for future, novel, ASD therapies.

Testing of Innate Immunity Stimulation as a Method to Ameliorate AD Pathology in Nonhuman Primates
Margish Ramani, Neural Science
Sponsor: Professor Henrieta Scholtzova, Neurology, NYU School of Medicine

Alzheimer’s Disease (AD) is the most common cause of dementia characterized by the presence of parenchymal amyloid-β (Aβ) plaques, cerebral amyloid angiopathy (CAA) and neurofibrillary tangles. Genome-wide association studies have demonstrated the importance of macrophage and microglia—the primary innate immune cells of the brain—in AD pathogenesis (Karch et al., 2014). Prior work has shown that stimulation of innate immunity with CpG ODN can reduce plaque pathologies without causing toxicity in mouse models based on cytokines, the molecules inciting an immune response (Scholtzova et al., 2009). Long-term safety of a well-characterized immunotherapeutic drug, TLR9 agonist CpG ODN 2006 (cytosine-phosphate-guanine oligodeoxynucleotides) is assessed in aged squirrel monkeys (SQMs) using peripheral cytokine concentrations. SQMs are small New World primates with cerebrovascular and immune systems similar to those in humans. An important feature is that cerebral amyloid deposition in SQMs has a predilection for abundant CAA and low levels of parenchymal Aβ deposition, supporting SQM as a translational model for Alzheimer’s Disease. Hence, these exciting non-human primate data indicate that long-term treatment with TLR9 agonist CpG ODN results in amelioration of CAA and cognitive improvements in aged SQMs without inducing adverse events. Overall, these extensive preclinical research findings suggest that this innovative immunomodulation is effective at reducing all cardinal AD related pathologies without toxicity in multiple experimental models of AD. This study supports the viability of CpG ODN 2006 as a cure for Alzheimer’s Disease and would have a significant chance of achieving clinical efficacy.

CollectiveTeach: A Platform for Integrating Web-Based Educational Content into Lesson Plans
Rishabh Ranawat, Computer Science, Mathematics
Sponsor: Professor Lakshminarayan Subramanian, Computer Science

The lack of sufficient and necessary educational resources is a well-known problem. Introducing computers into classrooms has the potential to provide an optimal solution to this problem. Unfortunately, educators have only a few tools for making productive use of online content within inquiry-based frameworks for teaching and learning. This problem is worse in developing regions where lower levels of technological literacy present severe challenges to maximize the productivity of available resources. Inspired by the 5E learning model and the rise in openly available educational resources, this project aims to design and develop a crowd sourced learning web platform, CollectiveTeach, for educators in developing nations. The platform enables teachers to curate the most relevant and resourceful crowd sourced lesson plans by searching through the vast myriad of resources across the web. In order to curate such lesson plans, techniques were implemented such as searching and indexing documents, relevant query formulation, automated filtering, and summarization of generated results. The initial user study for the platform was performed by a cohort of 19 teachers in Ghana, and the feedback was incorporated into the improved version of the platform. The current prototype, CollectiveTeach, was evaluated for the undergraduate computer science curriculum by domain experts. The platform received an approximately 75% usefulness score across 18 user plans that were generated.
The Effects of a Semester of Aerobic Exercise on Fitness, Cognition, and Mood in College Students

Marissa Raskin, Neural Science, Spanish
Sponsors: Professor Wendy Suzuki, Neural Science; Dr. Julia Basso, Neural Science

Long-term aerobic exercise enhances mood state and improves a range of cognitive functions including attention, information processing speed and both short- and long-term memory. Though a recent study found that first-year medical school students who regularly exercised attained higher grades than those who remained sedentary, little has been done to assess whether long-term exercise in undergraduate students positively influences academic performance and learning and study strategies. Therefore, the present longitudinal study examined the effects of an exercise intervention on mood, cognitive function and academic performance in first-year college students. Thirteen healthy, sedentary students from NYU completed a cardiopulmonary fitness test (VO₂ max test), a battery of neuropsychological tasks and a series of self-reported mood and study strategies questionnaires at the beginning and end of one semester in which they maintained their sedentary lifestyles. At the beginning and end of the following semester, they repeated these tasks, but increased their exercise regimens to include three or more aerobic exercise sessions per week lasting 45 minutes or longer. Overall grade point average (GPA) was obtained for each semester as well. Compared to the sedentary semester, the exercise intervention significantly increased cardiopulmonary fitness, quality of life, and information processing speed as measured by the Eriksen Flanker Task. Changes in academic performance and learning and study strategies are currently being analyzed. These results suggest that even a single semester of exercise can improve cardiopulmonary fitness, cognition, and mood in previously sedentary, first-year college students.

Molecular Recognition of Cell Adhesion Proteins: Does Water Help the Candida Fungal Pathogen Colonize a Host?

Sheila Sarkar, Science, Borough of Manhattan Community College, CUNY
Sponsor: Professor Lauren Wickstrum, Science, Borough of Manhattan Community College, CUNY

The Candida fungal pathogen is a newsworthy source of life threatening nosocomial infections, and its cell-adhesion proteins on its surface enable it to stick to and colonize a host. Understanding the mechanism behind this widespread adherence to host tissue is key to developing methods to prevent tissue invasion and infectious disease. X-ray structural data from a Candida protein-peptide complex suggests a network of water forms a bridge between the cell-adhesion protein of the pathogen and a host peptide. The goal of this work is to determine whether these water molecules influence the molecular recognition of cell adhesion proteins to their host cells. This hypothesis was investigated by performing all-atom molecular dynamics simulations of the ALS-9 protein-peptide complex in explicit solvent, allowing for water molecules to occupy the binding cavity. As expected, the author observed that the protein complex is stable in solution based on the structural fluctuations of the protein and ligand. Future work will compare the conformational dynamics of the ALS-9 protein-peptide complex in explicit solvent and implicit model where the peptide is expected to bind weakly without the specific solute-water interactions. It is hoped these results and previous studies generate alternative strategies for designing anti-fungal drugs.

Integration of i-Motif to 3-Turn and 4-Turn DNA Tensegrity Triangles

Rishi Sharma, Biochemistry
Sponsor: Professor Nadrian Seeman, Chemistry

DNA tensegrity triangles provide a method to create robust and topologically well-defined crystal nanostructures made of DNA (Zheng et al., 2009). The i-Motif is a non-traditional DNA conformation characterized by cytosine-ctyosine bonds (C-C-H') between parallel strands of DNA and is found with this type of bonding when placed at acidic pH. The premise of this work is to investigate the possibility of stably integrating an i-Motif sequence into DNA tensegrity triangles. Multiple models based were designed on both the 3-turn and 4-turn tensegrity triangles with varying attachments of the i-motif-forming strand. In these systems, the i-Motif strand is intended to remain elongated in basic pH, and fold upon itself into the i-Motif form at acidic pH. The experimental data show that the 4-turn tensegrity triangle with i-Motif is a better candidate than the 3-turn tensegrity triangle with i-Motif. Ultimately, the author crystallized the 4-turn model and studied it using x-ray diffraction. The 4-turn triangle with i-Motif showed slightly lower resolution than the unmodified 4-turn triangle. Additionally, one unit cell parameter and the volume were much larger than expected. It is hypothesized that the i-Motif is inducing strain on the helix and therefore is distorting these parameters of the unit cell. Further studies modifying the placement of the i-Motif could evaluate this hypothesis. While the aim of this research was to demonstrate the stable integration of i-Motif to DNA tensegrity triangles, the models created could be further developed to create a 3D DNA pH sensor. i-Motif’s small size, variable transition pH, and ability to function within a much more complex nanomachine could make it useful in Structural DNA Nanotechnology (Modi et al., 2013).
Investigating the Antiviral Potential of Serpins Using High-Content Microscopy
Clara Si, Biochemistry, Classical Civilization
Sponsors: Professor Meike Dittmann, Microbiology, NYU School of Medicine; Professor Charles Rice, Virology, The Rockefeller University

As obligate intracellular parasites, viruses rely on the machinery of host cells to produce progeny virus particles. Many require proteases to cleave their surface proteins for infectivity. Previous studies have shown that the innate immune response exploits this protease dependence to inhibit viruses: the human gene SERPINE1 encodes for a serine protease inhibitor (serpin) that blocks the protease-driven step of influenza A virus maturation, rendering it non-infectious (Dittmann, Hoffmann, et al., 2015). With thirty other human serpins not yet studied in the context of non-infectious (Dittmann, Hoffmann, et al., 2015). With thirty other human serpins not yet studied in the context of antiviral defense, this project aims to characterize the role of serpins during protease-dependent virus life cycles. A human SERPIN expression library was generated and used to assemble lentiviral particles. A multi-cycle screen has been established to assess antiviral potential: transduced primary normal human bronchial epithelial (NHBE) cells expressing red fluorescent protein (RFP) are infected with virus. The cells are fixed at two time points, and stained for virus antigen (GFP). By means of high-content microscopy, antiviral potential may be evaluated by a quantification of virus spread over time. Uncovering antiviral functions for other human serpins could elucidate innate protection mechanisms, and ultimately be applied to novel antiviral therapy development.

Compacting DNA: Identifying Proteins Involved in Dosage Compensation in C. elegans
Connor Smith, Biology, Spanish
Sponsor: Professor Sevina Erkan, Biology

Regulation of chromosome structure through the process of dosage compensation is crucial for the development of a variety of organisms, and different species use different methods to equalize the amount of X chromosome expression between sexually dimorphic individuals. C. elegans hermaphrodites use a condensin, or chromosome-remodeling protein, known as the dosage compensation complex (DCC) to reduce the expression of each X chromosome by half. This project aims to discern which proteins associate with the DCC as it binds to rex (Recruitment on X) sites, from which spreading begins. The intention is to pull down proteins that bind to rex sites. Extra-chromosomal arrays with a rex site insertion will be pulled down via immuno-precipitation of dCas9. The process will be validated using proteins known to bind to dCas9 using a western blot. The proteins will then be sent for mass spectrometry analysis for identification.

Structural and Dynamic Analysis of Grb2
Joshua So, Chemistry
Sponsor: Professor Nate Traaseth, Chemistry

Studying the dynamics of secondary and adaptor proteins is important for understanding the various intracellular signaling pathways kinases initiate. Grb2 is an adaptor protein to fibroblast growth factor receptors (FGFR) that assists signaling pathways that FGFRs control. The relevance of studying Grb2 is to understand how it interacts with these kinases to control cellular replication. The objective of this research is to observe the binding patterns of Grb2 and FGFRs and observe the affinity and structural/dynamic changes within each protein by utilizing nuclear magnetic resonance (NMR) spectroscopy and isothermal titration calorimetry (ITC). The importance of studying this interaction is to further the knowledge of the physiological processes of FGFRs, which can lead to potential treatments against pathogenic behavior of mutated FGFRs.

Antibiotics, Gut Microbes, and Disease: Have the “Miracle Drugs” Gone Too Far?
Alexander Swan, Biology
Sponsor: Professor Martin Blaser, Microbiology and Translational Medicine, NYU School of Medicine

The gastrointestinal microbiome harbors protective species that promote host mucosal immunity and confer resistance to pathogens. Though antibiotics have saved countless lives, these “miracle drugs,” when misused or overused, perturb this indigenous ecosystem and potentially provoke susceptibility to enteric infections (Blaser, 2016). It was hypothesized that antibiotic treatment during early life—the critical period of host-microbiome development (Yatsunenko et al., 2012)—impairs the adult host’s ability to overcome pathogen-induced colitis. To test this, laboratory mice were treated with the antibiotic tylosin or amoxicillin from days 5–10 of life and were challenged with the murine-specific enteric bacterial pathogen Citrobacter rodentium 22 or 80 days thereafter. Computerized algorithms were developed to quantitatively assess colonic tissue for histopathological hallmarks of disease severity in a blinded fashion. The author observed more severe damage to colonic physiology—namely excessive epithelial regeneration, impaired mucosal barrier functions, and heightened inflammation—in mice exposed to antibiotics prior to experimental inoculation. Tissue injury was most profound in mice challenged 80 days after receiving tylosin as evidenced by abundant necrotic epithelial cells, depleting goblet cell populations, mucosal hyperplasia, and submucosal edema. These colonic defects were accompanied by accelerated weight loss and increased rectal bleeding. The consequences of early-life antibiotic treatment on the gut microbiome—decreased alpha-diversity and altered
species composition—persisted 80 days after cessation of antibiotics. Exposure to tylosin—perhaps owing to its greater antimicrobial spectrum (Nobel et al., 2015)—led to greater disease severity and microbiome perturbation than amoxicillin treatment. In summary, it was shown that early-life exposure to antibiotics provokes a state of susceptibility to enteric infections persisting well into adulthood. It was demonstrated that the commensal microbiome serves essential roles in maintaining host immune defenses. The findings illuminate the benigencies of host-microbiome symbiosis all too often underappreciated or overlooked in present-day medical practice.

**Coarticulation Seen in the Formant Transitions of Childhood Apraxia of Speech**

Keziah St. Louis, Communicative Sciences and Disorders  
Sponsor: Professor Maria Grigos, Communicative Sciences and Disorders, Steinhardt School of Culture, Education, and Human Development

Childhood apraxia of speech (CAS) is an impairment characterized by deficits in the motor planning or programming of speech movements. In effect, one of the primary features of CAS is difficulty transitioning between consonants and vowels during syllable and word production. While this difficulty has been widely discussed in literature, there is little evidence quantifying the transitions between consonant and vowel production in children with CAS. The purpose of this study was to measure the coartculatory transitions in consonant-vowel-consonant words using acoustic analysis in three groups of children: children with CAS, children with other speech sound disorders (SSD), and children with typically developing speech and language skills (TD). Second formant transitions were measured to study the degree of change in articulatory movement in vowel production. Results showed that children with CAS generally exhibited higher formant transition rates and higher variability compared to children in the SSD and TD groups. However, because the findings did not reach significance, conclusions cannot be drawn about the data’s relationship to speech-motor control in children with CAS.

**Variation in Sperm Morphology and Mating Choices in *Streblospio benedicti***

Dhriti Tandon, Biology  
Sponsors: Professor Matthew Rockman, Biology; Dr. Christina Zakas, Biology

Mating choice can be an important component of sexual selection and speciation. Mating preferences can occur at the level of gametes for organisms that do not copulate. *Streblospio benedicti* has two distinct life history strategies within a single species known as planktotrophy and lecithotrophy. Planktotrophic worms produce about a hundred small-sized eggs. Lecithotrophic worms produce about thirty large-sized eggs. It is unclear if this dimorphism is maintained, in part due to mating preference, where females prefer the male gametes of the same developmental type. To address this question, this study looks at preferred spermatophore choice in females and the morphological differences in the sperm structure produced by males of each mating type. Staining experiments confirm sperm can be divided into two parts: a thick “head” which consists of the nuclear DNA, mitochondria, and a DNA-free acrosomal structure at the tips and a thin “tail” part which is motile and DNA-free. Preliminary measurements of microscopic images show little variation in sperm measurements within an individual. Therefore, sperm size is fairly consistent for a single male. Much of the variation due to difference in developmental types is yet to be determined; however, the measurements reveal a statistically significant difference in sperm head to tail ratio between the planktotrophic and lecithotrophic males. This observation in a large sample size could provide an important cue for female mating choice: whether they prefer one sperm morphology to the other, which could potentially lead to assortative mating and even speciation.

**Thalmocortical Inputs in the Primary Visual Cortex**

Anthony Tao, Neural Science  
Sponsor: Professor Michael Hawken, Neural Science

Neural circuits refer to the pattern of connectivity between different types of neurons in cortical and subcortical regions of the brain which give rise to a certain function. Many behavioral, cognitive, and perceptual phenotypes observed in humans and represented in organisms have been effectively modeled by conceptual constructions of such circuits. Of particular interest is the neural circuit through which the thalamus, the subcortical structure that relays sensory information to the cortical domains of the cerebrum, functionally interacts with the primary sensory cortical areas. According to the traditional model of the circuit that processes thalamic information, which was developed in the context of the visual system, the excitatory postsynaptic potentials (EPSPs) that result from thalamic activation of primary visual cortex (V1) pyramidal cells are posited to be inherently weak and require a feedback amplification mechanism mediated by interconnected cortical cells to propagate the signal. Here, the author attempts to qualify this claim by focusing on three synaptic structures: the post-synaptic densities (PSDs), the vesicle clouds, and the mitochondria. Electron microscopy data was used to compare the surface areas of the PSDs between thalamocortical (TC) boutons and IC bouton. Furthermore, the author looks at 3D spatial relationships of vesicles to each other as well as to their cognate PSDs. Lastly, a dual
immunofluorescence procedure was used to characterize the relations of TC and IC boutons to mitochondria.

**Neuroanatomical Differences in the Ventral Hipposcampus in a MAM Model of Schizophrenia**

*Alexandria Tartt, Global Public Health/Prehealth Sponsor: Dr. Kally O’Reilly, Neural Science*

While the etiology of schizophrenia is likely a combination of genetic and environmental factors, schizophrenia is hypothesized to arise from abnormal brain development. Here, a model of neurodevelopmental insult was used in which fetal rats are exposed to the mitotoxin methyloxazymethanol acetate (MAM) during late gestation. MAM disrupts cell division in the developing cortex, the timing of which is similar to mid-gestation in humans. Gestational exposure to MAM results in ventral hippocampus (vHPC) dysfunction and hyperlocomotive behavior during adulthood. The study aimed to examine projections to vHPC and quantify branching of primary neurons within the dentate gyrus of vHPC. The retrograde tracer, fluorogold, was injected into vHPC to label cells that project to vHPC. The pattern of contralateral projections in vHPC appeared normal, although the density remains to be determined. The author also examined primary cell morphology in Golgi impregnated vHPC tissue. Preliminary analysis indicates that MAM rats have reduced dendritic length in vHPC. Together these may provide insight into vHPC dysfunction after abnormal development.

**Unique Neural Precursors in the Drosophila Brain Divide Symmetrically to Generate Two Identical Neurons**

*Christopher Torres, Biology Sponsor: Professor Claude Desplan, Biology*

The nervous system contains many cell types, which are in part specified to become a particular fate based on instructions from their parent stem cell. Mushroom body (MB) neurons in the *Drosophila* brain are formed from MB stem cells, termed neuroblasts. Studies have shown that MB neuroblasts asymmetrically divide to self-renew and to give rise to Ganglion Mother Cells (GMCs), which then undergo a final, symmetric division to produce two identical neurons. This project focused on determining the mechanisms that control the unusual, symmetric division of MB GMCs. To understand this mechanism, the author first studied components involved in asymmetric division. In order for stem cells to divide asymmetrically, they must establish cell polarity and then divide along that axis. One factor that is polarized prior to cell division is Numb, an inhibitor of the highly conserved Notch signaling pathway that is classically involved in binary cell fate decisions. It was hypothesized that MB GMCs achieve symmetric division by either not establishing cell polarity or that MB GMCs divide asymmetrically as normal but that MB neurons are independent/refractive to Notch signaling. Characterization of Notch activity reporters showed signaling in MB neuroblasts, whereas signaling in MB GMCs and neurons was absent. In addition, inhibiting and over-expressing Notch signaling lead to no visible phenotype, an unexpected result. This suggests that the generation of two identical neurons is independent of Notch signaling. To determine whether MB precursors establish cell polarity, the author characterized cell polarity markers. As expected, MB neuroblasts establish cell polarity. Additional studies are required to determine whether MB GMCs establish polarity and whether they divide along a polarity axis.

**Modeling the Effects of Ocean Acidification and Rise in Sea Surface Temperature in Coral Reefs in Panama**

*Emiliana Tupper Carabaño, Environmental Studies Sponsor: Professor Mary Killilea, Biology*

Recent studies quantifying the effects of climate change and anthropogenic carbon dioxide emissions on the oceans predict an unfavorable future for coral reefs. Ocean acidification—the decrease in ocean pH as a result of carbon dioxide absorption by the oceans—along with the rise of sea surface temperature are two of the main threats to coral reefs globally, both of which are expected to worsen through the course of the century. However, these effects are not uniformly distributed in the oceans nor do they affect all coral species similarly. Coral reefs of the Eastern Tropical Pacific survive in naturally lower pH waters and are exposed to steep temperature gradients, and therefore can provide insight on the possible future state of other reef systems. This study examines coral cover in the reefs of Coiba National Park in Panama. It integrates the current taxonomic and species-specific research with the regional and global trends of increased temperature and acidification to predict the change in cover of coral reefs of Coiba. This study presents the results of a survey conducted in January 2017 of 10 sites throughout the Coiba National Park that determined the mean percent coral cover, which already shows a decline in total cover compared to 2004. These data were also used with the Coral Mortality and Bleaching Output model (COMBO) to estimate the change in mean coral cover by the end of the century. The results from three IPCC emissions scenarios suggest that the reefs of Coiba will maintain their ecological function only under the lowest emissions scenario.

**Genes Involved in Foraging Response to Nitrate in Arabidopsis**

*Ritu Vadodaria, Biology Sponsor: Dr. Eléonore Bouguyon, Biology*

Nitrate (NO₃⁻) is a major nutrient for plants, as well as an important signaling molecule that is involved in plant
development, structure, metabolism, and gene expression. The root foraging response in particular is affected by heterogeneous nitrate exposure. A set of 60 genes was identified in a genome wide association study of 72 different Arabidopsis ecotypes as potentially involved in this response. Mutant lines of these genes in Arabidopsis thaliana were validated for genotype through PCR. Phenotypic validation of the lines was conducted using the horizontal split root system. Out of the currently validated lines, five show a trend in phenotype indicating they are involved in foraging in response to nitrate. Repetition is still needed to confirm these results, and more experiments have to be run. The genotyping and phenotyping process is still ongoing for about half of the lines.

Restoration of Auditory Perception after Developmental Hearing Loss
Derek Wang, Individualized Major
Sponsors: Dr. Melissa Caras, Neural Science; Professor Dan Sanes, Neural Science

Abnormal sensory input during early development can have long term effects on the central nervous system that persist even after normal sensory function is restored. For example, children with a history of otitis media, an infection of the middle ear that induces temporary hearing loss, display deficits in auditory processing, even if auditory thresholds are normal at the time of testing. Similarly, in Mongolian gerbils (Meriones unguiculatus), a brief period of earplug rearing disrupts cortical function and behavioral performance on an auditory detection task. Pharmacological restoration of inhibition during the period of early hearing loss can permanently rescue cellular and synaptic properties, but it is unknown whether a similar approach can rescue perceptual abilities. Here, this issue is addressed by administering zolpidem (a GABAA receptor agonist), SGRI (a GABA reuptake inhibitor) or saline to animals raised with bilateral earplugs. Animals were subsequently tested on a sound detection task well after the period of hearing loss and drug treatment. Consistent with previous literature, it was found that earplug rearing disrupted auditory perception in saline treated animals compared to normally reared controls. In contrast, perceptual performance of zolpidem and SGRI treated animals did not differ from the performance of normally reared animals. These results indicate that early restoration of inhibitory tone can rescue auditory perceptual skills and may be a viable intervention to prevent long-term auditory deficits in children with otitis-media induced hearing loss.

Investigating the Role of Nicotinic Acetylcholine Receptor Subunits in Homeostatic Sleep Regulation
Jason Yang, Computer Science
Sponsor: Professor Nicholas Stavroupolous, Neuroscience and Physiology, NYU School of Medicine

Sleep is a highly conserved behavior across species and has been suggested to have many functions ranging from memory consolidation to physical healing. Despite its importance, the comprehension of the function and underlying mechanisms of sleep is still lacking. The Stavroupolous lab aims to elucidate how animals control the duration and consolidation of sleep using fruit flies (Drosophila melanogaster) as a model organism. In a forward genetic screen, it was found that the down-regulation of nicotinic acetylcholine receptor (nAChR) subunits, Da1, Da4, and Dβ1, severely reduced sleep, suggesting these subunits are required in sleep-promoting neuronal circuits. The lab has also shown these three subunits function in the same neurons. Interestingly, the protein abundance of Da4 is correlated with sleep need (Shi et al., 2014). Given that Da1, Da4, and Dβ1 are required to maintain sleep, the dynamic
regulation of nAChR proteins may be critical for animals to adjust their sleep amounts depending on sleep history. The goal is to (1) test if Dα1 and Dβ1 proteins are regulated by sleep, (2) identify the nature of the regulation, and ultimately (3) elucidate the molecular basis of the dynamic regulation of nAChR subunits. In parallel with the ongoing investigation of the neuronal basis, it will be possible to shed light on the mechanisms of sleep regulation in fly brain, which will eventually lead to the understanding of the molecular mechanisms of sleep in humans.

The Effect of Conductive Hearing Loss on Temporal Expectation
Teren Yedikian, Neural Science, Psychology
Sponsors: Professor Dan Sanes, Neural Science; Dr. Melissa Caras, Neural Science

We use sensory cues to process the dynamic world around us throughout the day. However, when confronted with near-threshold stimuli (e.g., a whisper), it is advantageous to use previous experience to optimize signal detection. For example, temporal expectation, or the ability to predict when a near-threshold event will occur, can improve behavioral detection. Hearing loss during development is known to impair a broad range of perceptual skills, and some clinical findings suggest non-sensory mechanisms could contribute to these behavioral deficits. Therefore, this study asked whether development hearing loss could impair the ability to form or use temporal expectations. To explore this idea, normal hearing gerbils and those reared with hearing loss were tested on a sound detection task. It was found that both groups of animals could form temporal expectations, leading to superior sound detection at the expected time. These data suggest that hearing loss does not affect the ability to form temporal expectations about auditory stimuli.

Deciphering the Role of Adult-Born Neurons of the Dentate Gyrus in Male Mice
Angel Yu, Biology
Sponsor: Professor Andre Fenton, Neural Science

One of the most important functions of the adult mammalian brain is to store memory for learning and categorization. While the hippocampus has a huge capacity to store memories, it needs a way to distinctively categorize them so that information can be encoded, stored, and retrieved in a systematic manner. Because these memories and experiences are always interrelated, it is imperative to distinguish between very similar memories in order to contextualize many subtle differences. The dentate gyrus (DG) of the mammalian hippocampus is one of the few places where adult neurogenesis occurs, giving rise to new neurons in adulthood and is also thought to be an essential region involved in distinguishing between very similar memories. To elucidate a role of immature neurons in memory discrimination, they were inactivated using optogenetics while mice perform an object memory discrimination task. The amount of time mice spent with a novel object was compared to amount of time mice explored a constant object. Inactivation of new neurons produced a significant decline in memory discrimination task performance compared to controls, suggesting that DG immature neurons are involved in memory discrimination. Studying these neurons can provide understanding of a number of psychiatric diseases and cognitive functioning.

Sensing and Bet-Hedging Strategies in Fluctuating Environments
Lawrence Zeldin, Biology
Sponsor: Professor Edo Kussell, Biology

When faced with fluctuating conditions, a clonal population may adopt one of two strategies to remain optimally adapted to its environment. A sensing strategy entails that individual organisms respond upon sensing an environmental stimulus, such that the entire population switches its phenotype to better survive in the new environment. A bet-hedging strategy creates diversity in the population at all times through stochastic switching, keeping a portion of the population optimally suited to stressors before they are applied. While the former strategy allows all individual organisms to respond to a stimulus, there is a time-delay in response to novel stimuli. A bet-hedging strategy, on the other hand, always retains individuals sub-optimally suited to a given environment, but without a response delay upon a change in conditions. An E. coli based construct is already available that stochastically turns on and off expression of the tetracycline resistance gene TetA, through control by stochastic methylation of the agrn43 promoter driving T7 polymerase. This project focuses on the production of an E. coli system that produces TetA only when tetracycline is sensed. The production of this system would allow competition assays between the sensing and bet-hedging strains in an environment with fluctuating tetracycline concentrations. These assays will allow for the determination of parameters under which each strategy is preferred.

An Assessment of the Risk Factors Associated with Quality of Recovery from Concussion
Davena Zhang, Neural Science
Sponsor: Dr. Teena Shetty, Neurology, Hospital for Special Surgery

Concussions are a major public health concern. Current management guidelines include complete rest, followed by gradual return to activity. However, what physical and cognitive rest entails and its effects in the acute post-injury
period are vague. A retrospective study of 198 patients (aged 22.0 years ± 0.879) was done at the Hospital for Special Surgery to identify variables that may influence physical and cognitive activities. Patient self-report of medical history, injury conditions, and recovery activities were associated with their recovery quality using Chi square of independence tests and relative risks (RR) within 95% Confidence Intervals (CI). The current study suggests restrained physical activity may be beneficial for recovery, although inactivity within an acute post-injury period may be crucial for better recovery outcomes. High levels of cognitive activity increased risk of prolonged recovery and high symptom level. High degrees of physical activity decreased risk of poorer symptomology by 7.40%. Notably, history of concussion was not associated with recovery time or symptom level. Previous diagnosis of learning disorder increased recovery time and symptomology by 23.3% and 30.6%, respectively. History of depression was associated with greater symptomology and 19.9% increased risk in prolonged recovery. Females may be at higher risk for symptomatic recovery. They exhibited an 11.6% increased risk of developing a high level of symptoms. Injury conditions appear to be important in predicting concussion outcomes. Helmet use was associated with reduced symptoms, while injuries involving moving objects were associated with more protracted recovery. Alcohol, and other drug consumption, may further complicate recovery. Further research into risk factors for recovery is important to better inform patients on the best practices for safe return to activity after a concussion.

Self-Assembly of 3D DNA Crystals Using a Fused Two-Component System with a Connecting DNA Duplex
Matthew Zhao, Chemistry
Sponsor: Professor Nadrian Seeman, Chemistry

The self-assembly of three-dimensional crystals is one of the prominent achievements of structural DNA nanotechnology (Seeman, 1982; Zheng, Birktoft, et al., 2009). The
first successfully designed self-assembled 3-D DNA crystal was the two-turn tensegrity triangle (Zheng, Birktoft, et al., 2009; Liu, Wang, et al., 2004). This DNA crystal lattice was produced with a single tensegrity triangle motif. However, more recent experiments have used two different tensegrity triangle motifs to self-assemble into a single lattice with two molecules in the crystallographic asymmetric unit in an AB system (Wang, Sha, et al., 2010). The purpose of this work is to expand upon previous experiments, using a fused AB system, in which the two distinct tensegrity triangle motifs are combined into a single molecule. The two tensegrity triangles are connected through an un-nicked DNA double helix whose components are derived from both triangles. Furthermore, the two tensegrity triangle motifs are also connected through a second DNA duplex that is formed from single stranded overhangs that extend from the central strand of each respective triangle. It is expected that the fused molecules will arrange themselves into an alternating pattern via complementary sticky-ended cohesion, self-assembling into a crystalline lattice. Diffraction studies are underway to confirm this prediction.

Thermodynamic Characterization of the Molecular Brake and Pathological Mutations Associated with the FGFR2 Kinase Domain
Sijin Zheng, Biochemistry  
Sponsor: Professor Nate Traaseth, Chemistry

While Fibroblast Growth Factor Receptor (FGFR) gain-of-function mutations have been studied extensively through functional and structural (X-ray and NMR) techniques, there is little understanding of the thermodynamic properties associated with these mutants. Here, the author reports the thermodynamic characterization of pathological mutations associated with the FGFR2 kinase domain, focusing on the molecular brake mutants of the kinase. By means of differential scanning calorimetry, apparent melting temperatures, $T_m$ for three pathological brake mutants—E565A, N549K, K641R—and wild type FGFR2 were elucidated. In comparison, the molecular brake mutations lowered the $T_m$ of the kinase in comparison to wild type, which correlates with a decrease in kinase stability due mutation. This indicates that molecular brake mutations destabilize the kinase in order to achieve kinase activation. The results from this work provide new insight into understanding how pathological mutations activate FGFR kinase and indicate the importance of the molecular brake as a new possible drug target. Based on the similarity of the molecular brake shared among other receptor tyrosine kinases (RTKs), this mode of activation for molecular brake mutations could be applicable to other RTKs.

Towards an NMR Solution Structure of the C-Terminal Peptide from Fibroblast Growth Factor 23
Sijin Zheng, Biochemistry  
Sponsor: Professor Nathaniel Traaseth, Chemistry

Fibroblast growth factor 23 (FGF23) regulates the level of plasma phosphate to maintain homeostasis. FGF23 activity is regulated through cleavage into a C-terminal peptide and a N-terminal portion, where the C-terminal peptide can endogenously act as an antagonist against full length FGF23 activity. Previously there had been attempts to crystallize FGF23, but due to inherent flexibility of the 72-residue long C-terminal peptide tail, only the N-terminal portion was able to be crystallized. To expand upon the structural characterization of FGF23, this study utilizes a number of multi-dimensional nuclear magnetic resonance (NMR) techniques to elucidate a structure of the C-terminal peptide. The author reports the first backbone amide resonance assignment of the C-terminal peptide. NMR data and additional spectroscopic data indicate the peptide is primarily composed of a random coil secondary structure with the presence of a low percentage of $\alpha$-helical secondary structure. Upon elucidation of the structure of the C-terminal peptide, various structural and functional analogs can be developed as therapeutics to treat FGF23 associated pathologies.