ACKNOWLEDGMENTS

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* supported by Dean’s Undergraduate Research Fund  † winner of Phi Beta Kappa Albert Borgman Prize for Best Honors Thesis
INTRODUCTION:

Research as Educational Paradigm

Located at the heart of a premier research institution, the College of Arts and Science at New York University has the opportunity—and the responsibility—to involve undergraduates whenever possible in the production of knowledge. We do this by putting students in direct contact with the scholars on our faculty, active researchers who routinely teach undergraduate courses. We do this also by empowering our students to conduct their own inquiries, for a liberal arts education is not only about transmitting knowledge but also about teaching our students how to learn for themselves throughout their lives.

NYU’s College of Arts and Science has long been at the forefront of promoting undergraduate research. All of our majors, for instance, offer Honors tracks in which original inquiry is central. The College’s annual Undergraduate Research Conference was established over thirty years ago and now encompasses projects in all of the humanities, natural sciences, and social sciences, as well as in creative writing. In addition, the Dean’s Undergraduate Research Fund, created through the generosity of alumni, parents, and friends, provides students in the College with the 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.) Finally, student funding is also available, particularly in the sciences, from departmental resources as well as through external grants that the institution and individual faculty members have received to promote undergraduate research experiences.

The annual journal Inquiry showcases abstracts of selected student research. This issue contains abstracts of projects undertaken in the 2010–2011 academic year. For the most part these abstracts represent research that was presented at the College’s Undergraduate Research Conference held that spring. Some projects were supported by the Dean’s Undergraduate Research Fund, and several also took advantage of research opportunities presented to students who participated in NYU’s study abroad programs. But these abstracts represent only a small fraction of the research undertaken by College students, both as individuals and in groups, under the close mentorship of faculty.

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. Taken all together, the contents of this issue attest to 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.

G. Gabrielle Starr
Acting Dean, College of Arts and Science
Associate Professor of English
FACULTY PERSPECTIVE:

“BURN THIS”: Adventures and Accidents in the Archives
by Professor Bryan Waterman

Congratulations on the research projects you’ve presented today. I’m going to talk today about research in terms of my work as a literary historian, but I hope the points I make will be broadly applicable. So as I talk about my own scholarship, think about your own: especially the projects you’ve presented today—the culmination of significant time and intellectual labor.

One of the most exhilarating feelings possible for an historian comes when you open a file folder full of old letters and find one marked across the top: “BURN THIS.” Obviously someone didn’t do his or her job at some point in the past, and because of that failure, chances are you’re about to read something good.

I had one of those moments a few summers ago at the Huntington Library in Pasadena, in a collection known as the “Baldwin Family Papers.” These papers have been used over the last half-century primarily by biographers of an early American poet and diplomat named Joel Barlow. Very few people, even among those of us who study and teach 18th-century American literature, are into Barlow as a poet: his neo-Augustan verse, all heroic couplets in stale imitations of Alexander Pope, is about as compelling to most 21st-century readers as the back side of an old postage stamp.

I find Barlow’s correspondence and diplomatic career much more interesting. After gaining some celebrity following his Yale graduation for writing an epic poem to celebrate the American Revolution, Barlow moved to Europe to peddle land on the Ohio frontier to potential French immigrants and just happened to wind up with front-row seats for the French Revolution. He became a member of the National Convention, renounced his faith in Christianity, and swore allegiance to Thomas Jefferson’s democratic party. He refused to return to America until the rival party, the Federalists, were out of power.

Shuttling between London and Paris, Barlow befriended radical writers, including Thomas Paine and the feminist writer Mary Wollstonecraft. Barlow’s shady business schemes in post-revolutionary France made him extraordinarily wealthy; when he finally returned to the U.S. in 1805 he bought a well situated piece of property outside Washington D.C. The Barlows made their home a center of early D.C. high society until they returned to Paris in 1812 when Joel was named minister to France. In the winter of 1812 Joel followed Napoleon to Russia hoping to negotiate improved relations between France and America; he died of overexposure in a Polish village near Cracow and is still buried there.

Barlow’s story is interesting enough to merit a new retelling. But my interest in these papers at the Huntington had to do with fifteen or so letters written to him between 1779 and 1782—during the American Revolution—by another Connecticut poet, a single woman in her late twenties named Elizabeth Whitman. Whitman, who seems to have been romantically interested in Barlow until he married their mutual friend Ruth Baldwin, shared Barlow’s intellectual and artistic tastes. She read and commented on his work and, along with mutual friends of theirs such as a young Noah Webster, sought to help him secure teaching jobs and publishers for his epic.

We know much less about Whitman than about Barlow, though, because just as he was packing his bags to head for Europe in the late 1780s, she discovered she was pregnant. She left her home in Hartford, ostensibly to visit friends in Boston, but never arrived there; instead she went to Danvers (near Salem), took a room at the Old Bell Tavern under an assumed name, and died shortly after giving birth to a stillborn child. Her family learned about her fate and located her gravesite after Boston newspapers advertised her mysterious death. Ten years later, a minister’s wife in Boston wrote a novel based on her story. The Coquette became America’s first indigenous bestseller.

Elizabeth Whitman’s real story, which has never received the thorough treatment it deserves, will make up about a third of a book I’m just beginning to write. It’s tough going, because the sources are few, many of them apparently incinerated by their readers. In addition to a few poems that found their way into newspapers after her death, all we have are these fifteen letters at the Huntington and a few more copied into a notebook housed at the Massachusetts Historical Society before they were lost.

“BURN THIS”: for every letter that survives in the archives marked this way, many more were likely turned to ash long ago by people who carried out those instructions. How do you tell stories about evidence that no longer exists?

I’m not so interested in talking to you today about the specific content of this research—the knowledge this project will produce about the gendered dynamics of reading, writing, and sexuality in the Age of Revolutions. Rather, I want you to think about the routes these letters traveled before they ended up as sources for my research. They possibly crossed the Atlantic multiple times, or were packed away in storage somewhere in New England while the Barlows lived in Europe; they passed to other relatives for over a hundred years before someone finally had the idea to deposit them at the Huntington. If a handful of letters don’t feel like much for me to go on, it’s worth considering how lucky I am to have those letters at all.

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I’ll elaborate briefly on the role of contingency in the archive with which I’m working. I’ve come only gradually to realize how much of this project would be enabled by a relatively forgotten nineteenth-century author and moral reformer named Caroline Wells Healey Dall, who had the letters for decades, using them to write a small book in the 1870s about Elizabeth Whitman and hoping to convince someone to write a biography of Joel Barlow. Her motives weren’t compatible with mine: she hoped to prove Whitman had been secretly married and wanted Barlow to be more widely recognized for jingoistic reasons (the elevation of American literature on the world stage).

Dall had apparently succeeded in obtaining a cache of materials from the daughter of Barlow’s sister-in-law, Clara. Dall’s possession of these papers, initially out of interest in Barlow, reintroduced her to Elizabeth Whitman, whom she had only previously known as “Eliza Wharton,” the seduced heroine of The Coquette. The papers at her disposal also included letters written to Ruth Barlow by Mary Wollstonecraft, who spent most of the nineteenth century as a pariah, her reputation never having recovered after her own illegitimate pregnancies, scandalous marriage to a radical philosopher, and death in childbirth, in spite of the subsequent celebrity of her daughter, Mary Shelley, and the emergence of a new women’s rights movement in the mid-1800s.

Dall was intrigued by the Wollstonecraft letters, but she also had been convinced of the literary merit of another correspondence these family papers preserved, between Clara Baldwin Bomford and an American diplomat named George Erving. Erving had spent the first half of the nineteenth century abroad, mostly in Paris, and his letters offered delightful descriptions of his travels. He had met Clara when she lived in Paris with Joel and Ruth; Erving’s earliest letters in the collection, written to the Barlows, include hard evidence of his own antipathy toward Christianity, sentiments Joel shared. These were the smoking gun letters, the ones that needed to be kept from posterity.

These were the letters marked: “BURN THIS.” And Clara Baldwin Bomford was the culprit, the woman who had refused to do her duty. Decades later, when Erving had long since rediscovered his own faith, he continued to beg her to destroy their decades-long correspondence, but apparently Clara simply could not. When he died, Erving appointed a literary executor to reclaim the letters and ensure their destruction, but Clara had long since left D.C. and moved to Maine, where the papers remained protected long after her death, when Dall convinced Clara’s daughter to let her borrow them.

Here’s where things get even trickier. For roughly a decade after Dall published her book about Elizabeth Whitman, she stalled every time Clara’s daughter, Ruth Barlow Paine, asked to have them back. The reason? She knew that Erving’s literary executor was still on their trail and that he intended to have them burned. In late 1884 she reminded Clara’s daughter that she had returned much of the material she had borrowed, but explained her reluctance to give everything back. The letter reveals something of Dall’s pluck: In one postscript she writes: “I thought it would be better for me to keep the Erving letters till R.C.W. [the literary executor] died. I like them.”

Once Dall had returned everything, the collection was passed to Clara’s granddaughter, who gave them to her daughter, a woman named Ruth Simons who brought the collection to California in 1911, packed inside a portable writing desk Joel Barlow had taken to France a century earlier. After her death in 1934, her husband stored the desk and it contents in an attic, where it was discovered by a graduate student who took the Wollstonecraft letters to a Berkeley professor without the owners’ knowledge. They were published and turned over to Berkeley’s library. The owners promptly locked up the remainder of the papers in a bank vault, where they remained until a Barlow biographer caught wind of them and came sniffing around. He convinced the family to donate them to the Huntington.

This is the story I want you to think about. It’s a story about accidents and knowledge, about how much of what we know is the product of chance encounters that predate our existence. It’s also a warning about the partiality of our knowledge. The questions we ask are limited by the experiences and knowledge we have when we ask them.

Years from now, when you return to the research you’ve conducted for today’s presentations, you’ll marvel in two directions at once. First, you’ll be amazed that you had so much knowledge about a specific subject to write such sophisticated analyses and reports. Your voice will sound a little foreign to you, and you may even impress yourself. You’ll remember the thrill of first discovery or an important breakthrough after weeks of staring at a blank computer screen. But you’ll also see the places where you could have asked a different set of questions, drawn on other materials, used other sources. Maybe you’ll return to this work and revise it, or reframe it on new foundations. But if you’re really lucky, you’ll start to unravel the happy accidents that made today possible and brought you from this point into a world of ever widening perspectives.

Professor Waterman has been a member of NYU’s Department of English since 2001. Prior to that he taught in Harvard University’s concentration in History and Literature and at Boston University, where he earned his Ph.D. in American Studies. He specializes in early American and Atlantic World literatures and in the literary cultures of New York City. He is the author of Republic of Intellect: The Friendly Club of New York City and The Making of American Literature, and co-editor, with Professor Cyrus Patell, of The Cambridge Companion to the Literature of New York. His regular course offerings include “Writing New York” (also with Professor Cyrus Patell). He has also taught “The Port of New York” in the College’s Advanced Honors Seminar program. Professor Waterman is the Faculty Fellow at NYU’s Residential College at Broome Street.
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

**Goya’s Children**
*Lily Allen, Art History*
*Sponsor: Professor Edward J. Sullivan, Art History*

Eighteenth-century Spanish artist Francisco de Goya y Lucientes portrayed children frequently and in a variety of media throughout his 65 year career. Yet there is sparse discussion of this portion of his oeuvre among the scholars who study him. This begs the question: what is the significance of Goya’s depictions of children? To begin exploring answers, my study contextualizes Goya’s images of children within a lineage of Spanish depicters of children, the culture of the European Enlightenment (thought to be the period that witnessed the emergence of a “modern” conception of childhood), and the works of international contemporaries who portrayed children. Familiarization with the work of previous Spanish painters reveals the precedents established for the depiction of children in Spanish art, and how Goya’s own work upheld or undermined these standards. Consultation of Enlightenment texts (specifically John Locke’s *Some Thoughts Concerning Education*, Jean-Jacques Rousseau’s *Émile*, and Heinrich Pestalozzi’s *Letters on Early Education*) demonstrates the degree to which Goya’s images of children were influenced by new discourse surrounding childrearing and pedagogy. Finally, comparison of Goya with his international contemporaries exposes how his depictions of children were characteristic of, or innovative for, their time. I conclude that as Goya evolved as an artist, and his oeuvre became increasingly psychologically complex, so too did his representations of children. In his early work, Goya perpetuated the traditional portrayal of children as generic objects, existing as transmitters of aesthetic pleasure and adult, symbolic meaning. Yet Goya made strides to progress beyond the typical assumptions of his time, and give viewers a richer, more complex view of children. By the end of his career, he had transformed the child from manageable object, to individual subject with an interior life unknowable by adult audiences, giving more credence to his reputation as the first modern painter.

**Caught in California: Phonetic Conditioning of the Low Back Vowel in California English**
*Linden Bairey, Linguistics*
*Sponsor: Professor Gregory Guy, Linguistics*

The “caught/cot” merger is a familiar phenomenon in American English; speakers with this merger do not distinguish the mid-low back rounded vowel in *caught* from the low central unrounded vowel in *cot* and instead pronounce these words as homophones. Since merged speakers make no phonemic distinction in this region of the vowel space, their productions should be easily subject to phonetic influences from adjacent sounds without affecting the comprehensibility of their vowels. In an experimental phonetic study, native speakers of California English with the merger were recorded for acoustic analysis. The effects of surrounding consonants that varied both in place (bilabial, alveolar, and velar articulations) and in manner of articulation (oral stops, nasal stops, approximants, and lateral approximants) were examined. Statistical analysis of the frequency values of the first and second formants of the vowel revealed significant effects of laterals, rhotics, and nasals in the post-vocalic environment: vowels were fronted before
rhotics, raised before nasals, and retracted before laterals. We conclude that the quality of the merged low back vowel is measurably affected by certain post-vocalic consonants and its production ranges across the low back region of the vowel space in the speech of Californians.

**Imagining Latin America: The Visual Culture of Roosevelt's Good Neighbor Policy**  
**Brittany Barnard, Spanish**  
**Sponsor: Professor Jill Lane, Spanish and Portuguese**

In 1933, amidst impending world crisis, President Franklin Roosevelt introduced a new foreign policy, regarded as the “policy of the Good Neighbor,” with aims of building a unified partnership between North and South America. By instituting favorable changes in the diplomacy towards Latin America, Roosevelt created an anti-imperialistic and amiable pretense for the United States. Furthermore, to fully ensure hemispheric solidarity, Roosevelt established the Office of the Coordinator of Inter-American Affairs (OCIAA) in 1940 to promote cultural exchange between the Americas. In order to foster such widespread cultural interaction and awareness throughout the hemisphere, the OCIAA collaborated with mass-media outlets to create an agreeable image of Latin America within the United States and vice-versa. This study revisits the motives behind Roosevelt’s policy and the formation of the OCIAA, as well as critiques the visual media produced by the office. By analyzing various printed publications and motion pictures, I determine the ways in which the media of the OCIAA projected a hemispheric relationship based on commonalities between the Americas, yet reflected only ideologies of the United States. This approach ultimately characterized Latin America as a homogenous and marketable region, introducing the contemporary North American notion of Latin America as a commodity for United States consumption. The OCIAA may have helped to strengthen hemispheric awareness, the OCIAA’s disregard for Latin American cultural diversity was misguided and perhaps accountable for the ignorance and subsequent diplomatic tensions concerning the region during the latter part of the 20th century.

**Rocío Molina and Israel Galván: Redefining Flamenco Dance without Gender Distinctions**  
**Alice Blumenfeld, Comparative Literature**  
**Sponsor: Professor Maria de Lourdes Dávila, Spanish and Portuguese**

The expression of gender within a flamenco dancer’s style and technique has historically been an intrinsic part of flamenco’s aesthetic. Currently, Israel Galván and Rocío Molina are stretching and inverting, respectively, flamenco’s historical gender structure and making gender specific technique less of a defining characteristic in flamenco. Their styles, however, are not simply modern dance superimposed on flamenco; they have not stepped outside of flamenco’s framework. Instead, they have presented their own interpretations of the art form in such a way that gender falls outside their choreography’s categorization. My work explores the traditional gender structures of flamenco, beginning with its roots in gypsy culture. My analysis includes the manifestation of gendered techniques, attire, and style, and how dancers conform to audiences’ preconceived ideas, often based on stereotypes, of how masculinity/femininity will be expressed. Molina and Galván serve as specific examples of how gendered technique continues to evolve and is not always constrained by historical traditions; both artists have pushed flamenco and its gender definitions forward without breaking from flamenco’s structure. By looking at these dancers through a gender lens, flamenco’s broader ability to evolve without transforming into a different or new art form becomes clear.

**Unfinished Wars: The Continuing Relevance of Depictions of War in the Iliad and Mahabharata**  
**Arun Bodapati, Politics**  
**Sponsor: Professor Tom Gerety, Collegiate Seminar Program**

On the fourth page of *Culture and Imperialism*, Edward Said describes a view of literary tradition by T.S. Eliot “that, while it respects temporal succession, is not wholly commanded by it. Neither past nor present, any more than any poet or artist, has a complete meaning alone.” Though the epics remain respected, the many years that have passed since their composition seem to have diminished their relevance to the point that “epic” has become a descriptor of everyday occurrences. I argue that temporal succession does not render the depiction of war in the *Iliad* and *Mahabharata* obsolete. Through an analysis of a character from each of these works from his entrance to his funeral, the power of war to drive apart and bring together becomes patent. Though war develops technologically and tactically, these same themes continue to present themselves throughout literature on war. These epics, for addressing issues that remain unresolved, are critical parts of a tradition that provides insight into the human struggle that is war.
Subject and Imperative Agreement in Masarak
Ruth Brillman, Linguistics
Sponsor: Professor John Singler, Linguistics

Masarak (also known as Masalit, sometimes spelled Massaleit) is a highly endangered, previously undocumented Nilo-Saharan language spoken in Darfur. The language is characterized by complicated agreement patterns, and the imperative, prohibitive, and second person agreement systems are particularly complex. These systems exhibit a web of stem alternations and agreement allomorphy conditioned by varying factors, such as verb class, stem phonology, and grammatical properties such as aspect. This research provides a detailed outline of the morphology and morphophonology of Masarak’s imperative, prohibitive, and second person systems. It also discusses the morphological relationships between these systems within the language, as well as some of the more interesting components of Masarak agreement morphology, including syncretisms between participial and imperative verb forms and syncretisms between plural declarative verbs and singular imperative verbs in some classes (G-class), but not others (L-class). Finally, it situates Masarak within the larger imperative and prohibitive typologies cross-linguistically. The primary goal of this study is to provide a comprehensive description of the second person declarative, imperative and prohibitive systems of Masarak, thereby contributing to the documentation and preservation of the language.

Redefining Agustín Ibarrola: Three Studies in Wood
Kristen Brooks, Iberian Studies
Sponsor: Professor Jordana Mendelson, Spanish and Portuguese

Agustín Ibarrola (1930– ) is a Basque artist whose diverse projects have shifted profoundly over several decades and political regimes. Under the Franco dictatorship, the first half of Ibarrola’s artistic career was marked by participation in artistic collectives, politically defiant paintings, and wood engravings conveying communist-influenced social messages. While bringing attention to him and his stance against the dictatorship, none of these works brought Ibarrola the popular and national support that he sought. After Spain’s post-1975 transition to democracy, Ibarrola could finally create art in his homeland without fear of artistic or political persecution, yet his work became less overtly political. He embarked on more meditative processes related to the land, materials, national identity, and freedom, and became actively involved in Basque anti-terrorist, democratic organizations. Two of Ibarrola’s post-dictatorship works, the railroad-tie series (1986) and “Forest of Oma” (1983), masterfully exemplify the artist’s shift from political activist-artist to lucid chronicler of Basque history. These works provide a useful lens through which to understand the complicated history of the Basque Country, while at the same time providing insights into Ibarrola’s artistic and political evolution. Indeed, study of his later works allows us to better appreciate his earlier militant wood engravings. If Ibarrola is to secure the funding currently sought for his artistic foundation and continue his legacy, he must be redefined as much more than the activist-artist the Spanish government once condemned.

The Transmission of Tales: The Influence of Tablet XII of the Gilgamesh Epic on Ramayana Folklore
Simona Caplan, Religious Studies
Sponsor: Professor Daniel Fleming, Hebrew and Judaic Studies

In the 1980s, Professor Kirin Narayan heard a folklore story from a wandering ascetic in Western India. This tale, a part of the oral tradition surrounding the Ramayana Epic, includes numerous aspects inconsistent with Hindu theology and cosmology—namely the existence of the Netherworld and its relationship to death. The concept of the Netherworld would most likely have been born from an external culture that included such views of the afterlife, such as Mesopotamian mythology. Specifically, the correlation of numerous details between the Indian folklore tale and Tablet XII of the Gilgamesh Epic from Babylonia indicates a direct transmission between the two cultures and their literary stories. This study follows the historical development of Gilgamesh’s Tablet XII in Mesopotamia, the Ramayana and its surrounding folklore in India as passed through wandering ascetic movements and the Brahman class, and the possible moment of literary transmission during the Persian Empire. It also addresses the reasons why Brahmans and ascetics may have included a foreign story in their own folklore. More broadly, this study highlights connections between different ancient civilizations and the amount of influence foreign cultures had upon one another throughout history.

Encountering the Urban Sublime in New York City
Jenna Dodds, Metropolitan Studies
Sponsor: Professor Mary Louise Pratt, Social and Cultural Analysis and Spanish and Portuguese

Life in New York City is characterized by experiences of the urban sublime that rouse feelings of confusion, disorientation, anxiety, and fear within New Yorkers. Through examining the memoirs, photographs, and paintings of New Yorkers it becomes apparent that encounters with the urban sublime can result in varying degrees of
negative emotions. To account for these differences, I have categorized experiences of the urban sublime as being part of either the quotidian sublime or the ultimate sublime. In order to create a life in the city, New Yorkers must learn to manage the daily challenges of the city that trigger negative emotions. These overwhelming experiences that New Yorkers are able to become accustomed to I have labeled the quotidian sublime. There are rare occasions, however, in which the experiences of the urban sublime paralyze New Yorkers with fear and force them to question their own ability to survive in the city. These experiences that propel New Yorkers to recognize that they cannot fully control their lives in the city can be understood as the ultimate sublime. As a result of encountering the ultimate sublime, New Yorkers are forced to reconfigure their perception of the city and become unable to overcome experiences of the quotidian sublime without reflecting on the ultimate sublime.

Hearing Voices: A Study of Ovid’s Heroides versus Letters of Women in Greco-Roman Egypt

Lauren Drew, Classics and Classics-Fine Arts
Sponsor: Professor Raffaella Cribiore, Classics

During the first century A.D., Ovid wrote a collection of fictional love letters, The Heroides, posing as some of the well-known mythological women in the ancient world. Although it mimics the practice of letter writing, the collection is drastically different from actual letters of his day. Instead, The Heroides, when examined closely, proves to be an example of rhetorical exercises and the product of the rhetorical education men received in antiquity. They hardly reflect the rhetoric, tone, and style of actual women in the Greco-Roman world when writing to their loved ones. While Ovid’s women express their helplessness and loneliness, real women deal with practical matters in a proactive way. After studying the letters of women from Egypt, like those which belong to the collection, it becomes quite obvious that Ovid did not reflect on the purpose and audience of real letters, but rather was employing techniques and skills which were engrained in him as a young man.

Putting un servidor to Work: A Window into the Nature of Verbal Agreement in Spanish through Imposter Constructions

Rachel Dudley, Linguistics
Sponsor: Professor Chris Collins, Linguistics

A class of determiner phrases including “the undersigned” and “yours truly” refer to the speaker but do not demonstrate the first person feature values that are typically associated with that reference, as demonstrated by the difference in verbal agreement between “I am happy” and “Yours truly is happy.” Instead, the overt person marking of such phrases is third, leading to a disjunction between reference to the speaker and first person morphological form. Collins and Postal’s (2011) analysis of these “imposters,” named for their syntactic trickery, asserts that they contain an invisible first person element even though they only permit third person verbal agreement. The assertion that imposters uniformly determine third person verbal agreement, however, is hard to test in English because the first and third person plural verb forms are identical. My research takes advantage of the more transparent person inflection on Spanish verbs to elucidate the agreement possibilities of imposters. While singular imposters el abajo firmante (the undersigned) and un servidor (a servant) only allow third person verb forms like their English counterparts, the plural imposters los abajo firmantes (the undersigneds) and unos servidores (some servants) can license first person verb forms. My analysis of Spanish imposters explains this optional first person verbal agreement for plural imposters by claiming that the person marking in Spanish plural verb endings is not verbal inflection, as traditionally assumed, but instead a subject clitic that has been incorporated into the verb.

“Joy: I ate it.”: Solomon’s “Song of Songs” in James Joyce’s Ulysses

Abigail Dunn, English
Sponsor: Professor Abby Bender, Irish Studies

From the Bloom’s kitchen to the brothels of night-town, James Joyce’s Ulysses repeatedly figures Leopold Bloom as a lover of the body, and an individual well-versed in the body’s manifold pleasures. In the fever-dream convolutions of the “Circe” episode, as well as in other critical sexual moments, Joyce’s text focuses Bloom’s sensuality through a surprising, spiritually-informed lens: the Biblical love poem, “Song of Songs.” The “Song of Songs” body-cum-spirit theology offers an opportunity for transcendence within sensual pleasure, a facet of Bloom’s life that informs and shapes his entire existence. Bloom’s materialist perspective on sensuality, however, betrays the Song’s claim to religious sanction. This project explores the ways in which Joyce’s depiction of Bloom’s sensuality refines and liberates Solomon’s theology of the body from religious implications, as well as from gender-informed conceptions of marital ownership. As a proverbial Solomon without God, Bloom emanates a self-affirming form of sensuality that creates a space in which transcendence and physicality mesh and manifest a spiritually satisfying sexuality outside of the ancient temple of religiosity.
Agnolo Bronzino’s Portraits: Reverence, Rivalry, and the Paragone
Matthew Foster, Art History and French
Sponsor: Professor Dennis Geronimus, Art History

Agnolo Bronzino’s painted portraits of members of the Florentine elite exhibit a debt to the artist’s masters Jacopo da Pontormo, Michelangelo, and Raphael. While inscribed in the Florentine tradition, the likenesses appear lifeless and marmoreal, departing from the faith to unflinching reality seen in painted portraits by Raphael and Pontormo. The portraits also bear a relationship to sculpture in their adaptation of the pose of Michelangelo’s Effigy of Giuliano de’ Medici which would have been visible to artists after Michelangelo’s definitive departure from Florence in 1530. In ducal Florence, where Bronzino was official court painter to duke Cosimo I de’ Medici, the portraits display a certain reverence to Michelangelo. Furthermore, they present the established rivalry between the arts in the context of the paragone, the debate over whether painting or sculpture was nobler, on which Benedetto Varchi delivered a lecture and requested artists’ opinions at the Accademia Fiorentina where Bronzino was also a member, in 1547. This research sets out to define the precise relationship of the portraits to sculpture, artistic emulation, and the paragone within their courtly milieu.

“Nuestra voz tiene canto”: The History, Transformation, and Action of Ecuador’s Indigenous Movement
Lily Frusciante, Spanish
Sponsor: Professor Alexandra Falek, Spanish and Portuguese

In the last 20 years, Ecuador, a small South American country of nearly 14.5 million inhabitants, has experienced a mobilization of its indigenous population that has resulted in unprecedented political and social change. Historically, the isolated indigenous population was the target of much discrimination and exploitation. Economic structures such as the hacienda system as well as non-inclusive legislation permitted the creation and acceptance of stereotypes that painted the indigenous population as uncivilized, indolent, and often inhuman. From the time of the Spanish Conquest in 1532 to the late 20th century, Ecuador’s indigenous population lacked the political and social means necessary to reject these stereotypes, thus continuing in the state of poverty and exclusion that such stereotypes created. As this study proves, unique efforts made in the last two decades by the indigenous movement have allowed it, for the first time, to claim domestic and international recognition as a legitimate political actor. The most vocal, successful, and unique example of these efforts is La Confederación de Nacionalidades Indígenas del Ecuador (CONAIE). CONAIE’s strategy includes political protest, the creation of a political party, and a social-media campaign, and has resulted in constitutional amendments and legislation that explicitly protect indigenous interests. This study demonstrates that the indigenous population in Ecuador is no longer isolated or ignored. Rather, through the amplification of its interests and the restructuring of its organization it has brought about notable and lasting political and social change.

The Jewish Agricultural Impulse: The Case of the Argentine Colonies
Jennifer Furman, Comparative Literature and Spanish
Sponsor: Professor Ana Dopico, Spanish and Portuguese

Throughout the late 19th and early 20th centuries, Jewish farming communities were founded in countries such as the United States, Brazil, Canada, Argentina, and Palestine. The settlements served two ends—to provide refuge from persecution in Eastern Europe and to rejuvenate the Jewish people through the work of agriculture. With few exceptions, however, none of the colonies outside of Israel survived more than one generation. To approach the question of Jewish agriculture, this study explores the evolving representations of the “Diasporic homeland” in works of four authors writing on a successful Jewish agricultural project outside of Israel, the Jewish Colonization Association settlements in Argentina (1891–1973). I highlight the emergence of a series of binary oppositions—Promised Land and Egypt, Colony and City, Past and Present—that emerge as a dominant symbolic framework for writing the colonist experience. The doubles in each work point to what I argue poses a fundamental obstacle to Jewish farming outside of Israel—the mediation of a new Jewish identity and a non-Jewish nationality. In the case of Argentina, while the act of returning to the land affirmed a connection to a Jewish biblical past, that very same act was meant to reinvent the Jews as productive Argentines, casting the colonists between two nations and two traditions. The literature of the Argentine colonies exemplifies how the contradictory forces drawing the Jews back to the land are the same ones that can ultimately thwart their success.

“If I’d a knowed what a trouble it was to make a book I wouldn’t a tackled it”: The Problematic Voice of Huckleberry Finn
Sam Gold, English
Sponsor: Professor Peter Nicholls, English

This project assesses the different reactions within American writing to the narrative voice of Huckleberry
Finn. I focus on three main moments in the novel’s reception: its initial publication in 1885; its “hypercanonization” after World War II; and its acceptance as an innovative narrative model by the American modernists in the late 1920s. I argue that the modernists offer the most inclusive reading of Huck’s voice, which critical traditions represent only in fragments. I begin with a discussion of the novel’s contemporary reviews, which condemn Huckleberry Finn as vulgar and trashy, and are directed primarily at the novel’s half-illiterate narrator and what I call his anti-normative voice. By demonstrating that this reaction reiterates the dominant discourse’s objections to Huck within the novel, I argue that this is a rejection based on Huck’s narrative otherness that the text itself resists. Next, I evaluate the work of postwar American Studies critics, who initiate the novel’s hypercanonization, as suggesting an obverse misreading of Huck’s voice: by arguing for its role in establishing a nationalistic “vernacular” literary style that expresses egalitarian values, the critics Henry Nash Smith and Leo Marx identify with Huck’s voice too strongly and project their own democratic ideology onto him. Lastly, I offer a reading of William Faulkner’s The Sound and the Fury as indicative of the modernist reaction to the narrative tradition Huckleberry Finn initiates. I argue that by approaching the anti-normative narrator dialectically, Faulkner may provide an alternate tradition that simultaneously embraces the narrator’s otherness and his familiarity.

“The Unaided Effort”: The Possibility of Child-Authored Fiction
Eve Goldminz, English
Sponsor: Professor Patricia Crain, English

Examinations of the intersection of children and literature almost exclusively place children at the receiving end of the written word. Until very recently, these analyses have entirely overlooked the wealth of material written by young people. In order to begin to address this void in children’s literature studies, my project concentrates solely on juvenilia, defined in the Oxford English Dictionary as “literary or artistic works produced in the author’s youth.” I focus on Daisy Ashford and Barbara Newhall Follett, two renowned juvenile writers who did not become well known as authors in adulthood, a feature that designates them exclusively as child-authors. Published during the early 20th century’s enthusiasm for juvenilia, Ashford’s The Young Visitors, or, Mr Salteena’s Plan and Follett’s The House Without Windows provide a means to review long-standing assumptions about the experience of childhood. My consideration of a marginalized genre explores the limits of how we define literature, as well as juvenilia’s potential to indicate how the public legitimates written works.

La Lucha Continúa: Women in the Salvadoran Social Movement
Hilary Goodfriend, Latin American Studies
Sponsor: Professor Jill Lane, Spanish and Portuguese

This research broadly surveys women in the contemporary Salvadoran social movement, a progressive, self-defined sphere of civil society that is in many ways an extension of the popular struggles unaddressed by the 1992 Peace Accords that ended the nation’s 12-year civil war. My work is based on interviews I conducted in El Salvador over a period of three months in the fall of 2010 with women like Estela Ramirez, a labor union organizer, and Zenaidy Serrano, an anti-mining activist, among other community organizers and even political representatives. I study how these women articulate and mediate the struggle of their social and political organizations while simultaneously promoting their own rights and roles as women. I do so by examining the ideological and philosophical frames they employ to locate the interests and roles of women in the social movement; what they cite as the predominant challenges they face; how they contextualize their struggle historically; and the historical and political framework that led to the contemporary landscape of civil society in El Salvador, which remains deeply divided politically. Through this research, I found an often conflictive discourse dividing these women’s social and political selves in the face of a vastly disproportionate domestic burden and a discord surrounding the articulation of women’s equality and participation in the social movement and indeed all ambitions of society. I also found a strong sense of a national revolutionary narrative that creates an historic mandate to continue a women’s struggle in El Salvador.

The Problem of International Political Obligation and the Prospects for an International Natural Duty Theory
Aaron Henson, Philosophy
Sponsor: Professor Liam Murphy, NYU School of Law

The problem of political obligation has attracted considerable interest from political philosophers. This problem is understood as comprising several different, though related, questions: is there a moral requirement to comply with political and legal institutions? If so, who has this requirement, and to what extent? To answer this problem, John Rawls, in A Theory of Justice, offered a natural duty theory of political obligation. Roughly put, the theory holds that, given the natural duty to promote
justice, there is a duty to comply with just institutions. What success Rawls’ theory has in explaining the obligations citizens have to comply with their respective states remains a matter of disagreement. Curiously, less has been said about the plausibility of a natural duty theory in explaining one’s obligations to comply with international governmental institutions, like the UN. This research examines this possibility. I argue that, among alternative theories of international political obligation, a natural duty theory looks to be the most plausible. If we grant that there is a duty to minimize suffering of innocent persons, prevent international violent conflict, and mitigate the effects of market externalities like climate change, and if it can be shown that international institutions are necessary to achieve these ends, there is support for such a theory.

**Heroes and Helplessness: Questions of Free Will in the Iliad**

*Sabrina Janesick, Classical Civilization and English*

*Sponsor: Professor David Sider, Classics*

One of the many reasons that the Iliad is such an engrossing text is that there are a multitude of forces at play within the story. Not only are there individual characters fighting on both sides of the Trojan War; there are also gods who have taken sides, prophecies to be fulfilled, and the power of Zeus hovering above it all. The number of agents at work in the text has often led scholars to question the position of mortal man in the Homeric world. How much autonomy can a person have amidst all of these supernatural forces? In this study, I analyze all the situations wherein a character’s control over his actions or decisions is contested and the possibility exists that he is indeed helpless before a stronger power. I show that the only true limitation upon one’s free will within the world of the Iliad is one’s lack of physical and mental strength, and that the entire text points to the necessity of possessing such capabilities. The importance of the ideal warrior, who is always superior both mentally and physically, is the central meaning and argument of the text, and we see this ideal warrior represented in the character of Achilles.

**The Conservation Ideology of Bernhard Grzimek: Origins and Implications**

*Holly Jones, Environmental Studies and German*

*Sponsor: Professor Paul Buchholz, German*

German zoologist Bernhard Grzimek is considered one of the most influential representatives of species-driven wildlife conservation, which seeks to preserve individual animal species on protected land. In the 1960s, Grzimek rose to great popularity as a writer, filmmaker, and television host. He generated unprecedented interest in African wildlife and tourism, as well as awareness of potential threats to animals from post-colonial development. In recent decades, conservationists have begun to move away from species-driven ideologies like Grzimek’s, favoring land management strategies that prioritize entire ecosystems and benefit local communities through more direct involvement. By investigating the appeal that kept Grzimek’s species-driven ideology in place for so long, this research endeavors to shed light on the relationship between concepts of nature and the conservation priorities that they espouse. The first section describes the influence of 20th century German history and the beginning of African decolonization on the most important practical manifestation of Grzimek’s ideology: a territorial separation between humans and animals. The second section examines the implications of Grzimek’s anthropomorphism and his moral elevation of animals. The final section traces the development of Grzimek’s television career, analyzing the impact of mass media on widely held perceptions of nature as a tool for conservation.

**The Israeli Stalags of the 1960s: Mis-Representing the Holocaust**

*Josh Katz, Comparative Literature*

*Sponsor: Professor Joshua Lambert, Hebrew and Judaic Studies*

My research deals with the Israeli Stalag pocket-books of the 1960s. This particular brand of pulp fiction, part of a broader phenomenon of Israeli pulp literature, was about Nazi era prison camps (Stalags) run exclusively by female guards who torture their male American and British prisoners of war in cruel and sexually illicit ways. I am interested in these books not only because they are particularly idiosyncratic, but also because I see them as an interesting piece of early holocaust representation in Israel. This is specifically interesting with regard to the Stalags’ blatant avoidance of Jews in the false World War II context that they describe. The ways in which the Stalags distance themselves from their readership, by purporting to be translations of foreign works, by featuring language that sounds like the books were translations, and by constructing a holocaust era narrative devoid of Jews, all through the prism of obscenity, make the Stalags an intriguing case study as an early reaction to a traumatic past, explored through the nuances of their obscene content.
Language and Identity for Second Generation Caribbean American New Yorkers
Lindsay Kelley, Anthropology and Linguistics
Sponsor: Professor Renée Blake, Linguistics

Increasingly, sociolinguistic research has been concerned with addressing the previously underestimated variation within African American English. New work shows variation among social variables such as region, gender and class. This research examines another factor, speaker ethnicity. I examine production of three phonetic variables: post-vocalic r and the vowels in BOUGHT and BOAT. My findings show that for the first two variables, which are traditionally associated with New York City speech, African Americans and Caribbean Americans behave differently. Meanwhile, ethnicity is not significant for BOAT production; Caribbean Americans are not using the monophthongal variant associated with Caribbean Englishes. I conclude by discussing theories of ethnicity in relation to ethnographic data in which the speakers themselves discuss their identities. Caribbean Americans, in general, feel native compared to their parents but still foreign in relation to the greater African American community. My findings demonstrate how linguistic variation is meaningful in that Caribbean Americans seem to be using language to create and manage a distinct identity, differentiating themselves from both African American peers and older (immigrant) Caribbean Americans. Since the two groups are often linked racially, socially, and linguistically, this research motivates us to continue to question our notions of black identity and furthermore, African American English.

Korean Immigrants’ Place in the Discourse of Mestizaje: A History of Race-Class Dynamics and Asian Immigration in Yucatán, Mexico
Hahkyung D. Kim, Latin American Studies
Sponsor: Professor Juan de Dios Vázquez, Spanish and Portuguese

At the turn of the 20th century, a series of events led to an increase in East Asian immigration to Mexico, which complicated race-class dynamics in the state of Yucatán. These precipitating events included the aftermath of the Caste War, a rise of the henequen industry, Porfiriato’s modernizing impulses, and specific immigration policies. The account of the first Korean immigration to Yucatan in 1905 amid such complications demonstrates the contradiction between Mexico’s welcoming of East Asian immigrants and their later exclusion from the discourse of mestizaje. Forgotten by Korea due to political turmoil in East Asia and forgotten by Mexico due to their diminishing economic value and small size, the 1,033 Korean immigrant laborers were indeed without a place in terms of national and cultural identity in Mexico. That is, while Koreans inevitably mixed into Mexican society both biologically and culturally, Korean as an ethnicity was unable to become a part of what constitutes Mexicanidad. By looking into the (lack of) Mexican references to Korean immigrants in official government correspondences and Yucatecan print media from 1904 to 1909, I reinterpret the significance of Korean immigration from a Mexican perspective that suggests a passive exclusion of Korean identity and a passive inclusion of Korean individuals at the same time.

Extending the Narrative: Era Bell Thompson and Alternative Forms of Black Journalism
Kelsey Kline, English
Sponsor: Professor Jacqueline Goldsby, English

From 1949 through her semi-retirement in 1970, Era Bell Thompson worked as an editor for Ebony and other publications. Thompson, who took the position at Ebony to write and travel, became the first female African-American correspondent and the magazine’s first International Editor. She covered politics and culture in Australia and Brazil, and she was especially interested in Africa. Thompson first traveled to Africa in 1953; her adventures are chronicled in Africa, Land of my Fathers, her second book. She continued to track Africa’s decolonization for her African-American readers. In most scholarship, bourgeois journalism like Ebony’s is dismissed for the leftist politics that characterize most of black journalism’s history. Thompson was not a leftist. She had no affiliation with the Communist Party, and her politics are optimistic and patriotic. We should, however, be wary of reading Thompson as an extension of white, mainstream journalism. She presented her readers truthfully with what she saw and she was not shy about calling out the sloppy journalism of her peers, particularly in their coverage of African politics. As such, Thompson’s journalism suggests a broader and more varied understanding of black journalism in the 1950s and 1960s than current scholarship suggests.

Georges Canguilhem, the Pedagogy of Technique, and the 1968 Agrégation
Jacob Krell, History
Sponsor: Professor Stefanos Geroulanos, History

This research considers changes in intellectual approaches to technology in France from 1900 to 1970. I consider the place within this larger trajectory of Georges Canguilhem, the renowned historian and philosopher of science and pedagoge. Drawing upon material culled...
from Canguilhem’s archive, I offer a reading of his plans to create a new test subject in technique and technology for the 1968–1969 Agrégation examination in philosophy, contending that this document offers an excellent understanding of the status of technology in French thought, and of the intellectual options available to French thinkers in the wake of the protests of May 1968.

**Portraits of the White Uniform: Linguistic Play and Cultural Symbols in a Catalan Sports-Comedy Series**

*Karen M. Kuhn, Linguistics and Anthropology*

**Sponsors:** Professor Bambi Schieffelin, Anthropology, and Professor Sonia Das, Anthropology

As a strategy to achieve national unity, many Western European countries not only subscribed to but actively enforced an ideology of “one language, one nation.” As a result, many minority languages experienced significant linguistic and cultural suppression, and were thus diminished in terms of value, robustness, and numbers of speakers. In contrast to speakers of other minority languages throughout Europe who shifted to the dominant, state-regimented language, Catalan speakers maintained their language and their identities despite years of cultural and linguistic marginalization under Franco’s regime in Spain (1939–1975). Catalan remains the primary written and spoken language of Catalonia, and acts as an important symbol of Catalan identity. In addition to Catalan, affiliation with Barcelona’s football team, FC Barcelona, is marked as a symbol of national identity and political sentiments of nationalism. My research focuses on how these two elements, language and soccer, come together and are manifested in a popular Catalan comedy series; and in particular how the use of parody and stancetaking within parody are used to replicate and reinforce Catalan identity and solidarity. I analyze how this widely circulating parody draws on multiple language ideologies pertaining to “Catalan-ness” and the historical political tension between Catalonia and the Spanish state to create ingroup solidarity and simultaneously to exclude the dominant outgroup—Castilian speakers from other parts of Spain.

**Useless Fossil: Translation of Venedikt Erofeev’s Notebooks**

*Isabel Lane, Russian and Slavic Studies*

**Sponsor:** Ms. Irina Belodedova, Russian and Slavic Studies

The Soviet author Venedikt Erofeev (1938–1990) famously wrote only one novel, or “poem in prose” as he called it, in his lifetime. Although *Moscow-Petushki* remains his only major literary work, he did complete several shorter pieces and, from 1955 until the end of his life, kept extensive notebooks. These notes, not published in full until 2004, are by far the longest text written by Erofeev and are very much in line with the style of Erofeev’s “poem in prose”—full of both humor and sadness. The notes include dirty jokes, puns, quotations, philosophical musings, and numerous comments on literature and art. None of these notebooks had previously been translated into English, and in cooperation with Irina Belodedova, I have translated a selection of these notes, published under the title *Useless Fossil*, from the original Russian. The text presented many challenges in terms of content and style, as it made great use of Russian “mat,” or profanity, plays on words, and inverted quotations and references that require extensive knowledge of Russian culture and history. The translating of these notes has highlighted many difficulties of prose translation in general, and aims towards making these notebooks accessible to English speakers.

**Veronica Franco: In Defense of Women and in Defiance of Gender Identities**

*Meredith Larson, Italian and French*

**Sponsor:** Professor Jane Tylus, Italian and Comparative Literature

Veronica Franco (1546–1591), poet and courtesan, came to be well-known and respected for her beauty, artistic ability, and intellect in the male dominated society of Renaissance Venice. Throughout her life Franco defended herself as well as women in general from male attack and manipulation. Through bold textual performances in her poetry, *Terze Rime* (Poems in Terza Rima), and letters, *Lettere familiari a diversi* (Familiar Letters to Various People), as well as through a powerful self-defense while on trial for witchcraft in 1580, Franco presents an alternative and innovative recreation of both female and male gender identities. By using a variety of genres and styles that soften the boundaries between the private and public spheres, she creates a platform from which she can prove herself as an equal to her male contemporaries and present her own convictions. This required a careful balance between her personal desire for social advancement and recognition and the modesty and restraint a woman was expected to exhibit. Franco ultimately proved the hypocrisy that is at the root of masculine authority and the marginalization of women.
American Departmental Conflicts in the Drafting of Japan’s Postwar Constitution  
Scott Lawrence, History  
Sponsor: Professor Marilyn Young, History  
This research examines the squabbling between various U.S. government agencies during the revision and eventual drafting of Japan’s postwar constitution. I focus on the divides between the War Department, the State Department, and the occupation architecture under General Douglas MacArthur. I determine that the disagreements among these three agencies over the Japanese constitution are elements of larger arguments over the role of each agency and the international community in the occupation of postwar Japan.

Education and Integration: The Representation of School in Beur Literature  
Angela Lelo, French and History  
Sponsor: Professor Emmanuelle Ertel, French  
In the 1980s, Mitterrand’s administration passed legislation aimed at integrating immigrants and their children into French society. In certain ways, that legislation more pointedly targeted Maghrebi (North African) immigrants and their children—a population whose marginalization and stigmatization in French society could be traced back to the 1950s and 1960s when a large number of Maghrebi immigrants first settled in France. The 1980s socialist legislation carved out openings in society for the marginalized population and, in the process, helped to generate the rise of anti-immigrant, right-wing radicals. It is in this context that beur (second generation Maghrebi) literature emerged. The semi-autobiographical novels of Mehdi Charef, Azouz Begag, and Farida Belghoul offer critical reflections on the concept of integration, largely through their representation of French school. Specifically, these texts bring into question France’s ideological model of integration as well as its historic view of school as a principal site of integration into French society.

Aesthetics and Cultural Heritage: Egypt and the Bust of Nefertiti  
Grace Linden, Art History  
Sponsor: Professor Ann Macy Roth, Art History  
On December 6, 1912, the bust of Nefertiti was excavated by the Deutsche Orient-Gessellschaft in Tel el-Amarna from the workshop of the court sculptor Thutmose. After dividing the rest of the findings according to the governing laws, the bust was removed to Germany whereabouts, in 1920, it was donated to the Egyptian Museum of Berlin. It has been on permanent display ever since, and has thus become a celebrated piece within the German national collection. Because of its iconic status—this representation of Nefertiti is arguably the most famous of all Pharaonic artifacts—the bust is the central focus of the restitution debate, as Egypt continues to demand the repatriation of the piece. It is unlikely that the bust will ever be returned to Egypt; nevertheless, the bust provides insight into the reasons behind such debates. This research explores the idea of perception and the development of meaning to explain why certain objects are celebrated and desired, while others remain in obscurity. I argue that the Western construction of the Near and Far East has had lasting effects on our understanding of Egyptian Pharaonic art objects. The fight over the bust of Nefertiti illuminates the ways in which Western society has controlled the characterization of iconic antiquities, and thus defined the contexts—namely the type of museums—in which they are to be displayed.

Orthographically Speaking: The Phonetic Difference between <b> and <v> in Buenos Aires Spanish  
Kristina Lustig, Linguistics  
Sponsor: Professor Lisa Davidson, Linguistics  
Spanish traditionally lacks the phoneme /v/. As described by Rafael Lapesa and others, its nonexistence is rooted in historical shifts in pronunciation dating back to the 16th century. For example, instead of an underlying representation of /vaso/ in “vaso” (“glass”), it is generally assumed that the underlying representation is in fact /baso/, with the allophonic distribution following that of a bilabial voiced stop instead of the labiodental voiced fricative. Based on data collected from native speakers of Buenos Aires Spanish, however, orthographic <v> in Spanish is realized differently from underlying /b/, because the phonetic interpretation varies significantly. Furthermore, the allophonic interpretation of <v> also differs from that of /b/: word initially and word medially, it is realized as a fricative a significant proportion of the time. A statistical analysis using binomial logistic regression of tokens from both word lists and sentence lists from 16 different speakers demonstrated significant differences between the acoustic properties of <b> and <v>. Buenos Aires Spanish speakers do in fact differentiate between <b> and <v>.

Ad Imperium: I  
William Maddock, Classical Civilization  
Sponsor: Professor Michael Peachin, Classics  
In a polemic against Cullen Murphy’s Are We Rome? (2007), I identify in Part I of Ad Imperium three major trends common to both the Late Roman Republic and the contemporary United States, which Murphy has either
interpreted incorrectly or omitted from his work entirely. These issues are the professionalization of the military and its consequences; the augmentation of executive political power through the mobilization of the armed forces; and the use of private armies, with the practice’s implications upon troop loyalty and the political integrity of the state. Whereas Murphy either views these issues in relation to the United States’ connections with Imperial Rome or simply ignores them altogether, I make in Ad Imperium the new argument that these topics instead highlight the United States’ similarity of situation to the Late Roman Republic, particularly the years from Sulla to Augustus (roughly 90 B.C. to the latter’s accession after the Battle of Actium in 31 B.C.). Thus, Ad Imperium seeks to plot a new argument on the United States’ congruity with Rome, focusing on a time period some four centuries earlier than is argued by Murphy. Part II, being less polemical in nature and relying upon other core texts, will center on issues such as the undermining of the Roman Republican and contemporary American economic systems, primarily due to high concentration of wealth and increasing burden of debts both public and private; and the growing instability of the states’ political systems due to increased factionalism.

Prometheus Unleashed: Rethinking the Ontology of Dogs with Elizabeth Barrett Browning and Emily Dickinson
Matthew Margini, English
Sponsor: Professor Una Chaudhuri, English

What is a dog? The question is harder to answer than it seems: our canine companions have been and always will be difficult to define. Nonetheless, during the Victorian era, popular taxonomies constantly reiterated the idea that dogs had a fixed and definable inner essence. Meanwhile, breed authorities seemed to prove that canine nature was also plastic—re-definable according to human design. In this climate of absolute confidence about the human’s ability to establish and alter the nature of the canine, Elizabeth Barrett Browning wrote about Flush, her cocker spaniel. A few years later, across the Atlantic, Emily Dickinson wrote about Carlo, her Newfoundland. Where dogs were concerned, the poets were akin: both were isolated invalids who depended on their canine companions, and both, I argue, wrote against the grain. Drawing on the work of several theorists in the emerging field of animal studies, my project examines the ways in which both poets produce deliberately inconclusive representations of their pets. In Part One, I contend that the Flush expressed by Barrett Browning is suffused with poetic doubt—doubt as to whether she can ever recreate him, or commune with him, in language. In Part Two, I argue, conversely, that the Carlo expressed by Dickinson is suffused with poetic capability: she imagines him prowling, barely visible, in the corners of her verse, helping her see things anew. Over the course of the chapter, I show how Dickinson believed her poetry—not just her psychological well-being—depended on the “solidly liminal” animal at her feet. I conclude that both poets arrive at a kind of conceptual “muttness”: a way of seeing the dog that not only registers but revels in its resistance to classification.

Mutinous Melville
Alexandria Margolis, English
Sponsor: Professor Cyrus Patell, English

Herman Melville’s final work of literature, Billy Budd, Sailor (1924), illustrates an insight that he clarifies late in his life: somehow, the legal structures designed to ensure justice circumvent it. The classifications codified in the law prove flawed, or fail to account for the prejudiced assumptions that shape them. I read Moby-Dick (1851), “Bartleby, The Scrivener” (1853), “Benito Cereno” (1856), and Billy Budd, Sailor to trace the dramatization of Melville’s dissent against U.S. legal authority. It might seem odd that Melville explores the dimensions of this problem aboard ship, but the ship’s hierarchical organization reflects the state of Melville’s American society with surprising accuracy; his America was arranged according to a strict racial stratification. The ship elucidates the tension that occurs when a legal system is written to protect democratic values, like equality, but exists in an unequal society. Mutiny becomes a productive metaphor for Melville to imagine overturning this social context. Consistently, Melville’s characters who rise against hegemonic structures are punished for their transgression, illustrating the danger of rebellion. Melville himself was no stranger to these consequences. That Melville, a white male of privilege, would explore the potential and rationale for reprisal made him a “mutinous” writer, and for this mutiny he was “executed” by literary culture.

The Matter of Material: Chemistry, Alchemy, and Renaissance Art
Catherine Mastrangelo, Art History
Sponsor: Professor Dennis Geronimus, Art History

The nitty-gritty reality of the Renaissance art studio required significant manual labor and chemical knowledge. Craft manuals indicate that master artists were involved in the production of materials from support to varnish, yet artists rejected the association with materials because the process of production limited their art to
manual labor. An analysis of modern conservation texts identifies numerous artistic materials containing toxic compounds, including highly poisonous arsenic, mercury, and lead. The identification of toxins has implications for workshop practices as well as artists’ health. Most importantly, these toxins were rarely recognized by contemporaries, suggesting a significant gap in Renaissance material knowledge. Artists did not describe chemistry in modern terms, as the knowledge of materials derived from primarily experiential, rather than theoretical, truth. The processes to create manufactured materials, including, particularly, the red pigment vermilion, led some artists to explore alchemy, displaying an interest in chemistry beyond the required knowledge for production. Artists’ deep interest in their materials can also be seen in depictions of techniques in Francesco I’s Studiolo in Palazzo Vecchio and in the iconography of other commissions. Although Renaissance artists’ chemical knowledge was limited, their almost metaphysical connection to materials provided them with a distinct brand of knowledge and became incorporated in the way they thought about making art.

Strategies of Survival: Lithuanian Jews and the Holocaust
Taly Matityahu, History
Sponsor: Professor David Engel, Hebrew and Judaic Studies

Approximately 95 percent of the prewar Jewish population of Lithuania died during the Holocaust, the highest percentage in any Nazi-occupied territory. The vast majority of Lithuanian Jews were murdered between the start of the German invasion of the Soviet Union in June 1941 and December 1941. Jews who survived the initial massacres were herded into four main ghettos in Vilnius, Kaunas, Siauliai, and Svenčionys. While much research has been conducted on these ghettos, there is little information on the lives and deaths of those in smaller towns and villages, where most Lithuanian Jews were killed. This study seeks to understand how Lithuanian Jews from these smaller towns and villages responded to the genocide given their geographic, economic, social, and ethnic circumstances. Using a collection of survivors’ testimonies recorded by a survivor immediately after the war, in addition to video testimonials, memoirs, diaries, and secondary sources, I examined factors that influenced Lithuanian Jews’ survival strategies. Focusing on four Lithuanian towns, I demonstrate the roles that leadership, neighbors, rebel movements, and partisan movements played in developing survival strategies.

“Making This Text the Bliss It Works to Be”: Self-Translation in the Work of Nicole Brossard
Shannon Mich, Comparative Literature
Sponsor: Professor Richard Sieburth, Comparative Literature and French

Since the Quiet Revolution and the rise of nationalism reaffirmed the role of the Québécois French language in national identity, Montreal-born poet Nicole Brossard and a group of feminist French-English translators have used translation as a generative metaphor for the experiences of women in patriarchal societies. Brossard manipulates grammatical features of French that mark for gender in order to initiate dialogue about the ways that language reproduces asymmetrical gender relationships. Through collaborative translation projects with English translators such as Susanne de Lotbinière-Harwood, Brossard opens this discussion to Anglophone as well as Francophone readers, writers, and critics. Brossard and her translators reject the traditional subjugation of translators to authors and instead describe their processes as the work of a network of creative agents. Although the majority of the translations of Brossard’s work were created via a collaborative process, Brossard has also translated several of her own texts during the past two decades. Self-translation, often marginalized within translation studies, exacerbates the traditional theoretical problems associated with the relationship between a text and its translation. By analyzing the select few self-translated poems in Brossard’s œuvre, I orient these self-translational experiments within her larger project of destabilizing linguistic binaries and “[reinventing] the world through language.”

A Clash of Interests: West German Environmental Debates and the Automobile, 1980–1989
Raphael Orlove, History
Sponsor: Professor Mary Nolan, History

My research addresses the social, political, and environmental forces in West Germany that swiftly set in motion an unprecedented volume of automotive emissions legislation and led the nation to take on the role of leader in European-wide air pollution regulation in the early to mid 1980’s. Present in the few years of regulatory turnaround were two major shifts in the federal government: nationwide alarm over the devastation of West Germany’s forests, and an about-face by the country’s carmakers. These elements coalesced and played out on the international stage in a process highly relevant to today’s climate of environmental politics.
Indefinite Transit: A Multi-Media Adventure
Andrea F. Pagliai, Journalism and Comparative Literature
Sponsor: Professor Jason Mark Samuels, Journalism

2011, present day: As publishing mediums continue to change, newspapers and TV networks are losing headway to an easily accessible and free publishing platform: the Semantic web. This form of dissemination encourages young people to travel and explore more easily than ever before. Travelers turn not to guide books, but rather to Internet and mobile resources. But, can a web-based travel show make money, attract an audience, and produce insightful, quality travel journalism? My research-based entrepreneurial experiment, “Indefinite Transit,” answers this by developing a travel show and a sister website. Think Anthony Bourdain’s “no reservations” meets Lonely Planet, hosted by me. The pilot city is New York. Blog posts and webisodes explore the city through interaction with “neighborhood insiders” and are aimed towards locals and travelers alike, looking for what is cool, new, and unusual to do. Through regular posting and social-media advertising, I grew a steady following over eight months, in anticipation of the full site launch in May 2011. I track the traffic of each post in an effort to determine what kinds of multi-media packages succeed, possible monetization strategies, and future content. My research is ongoing. This collaborative process of producing strong, curated content will evolve with the on-going collaboration, post-graduation.

The Language of Conceptual Art in Buenos Aires: Mass Media Art, Oscar Masotta, and Anti-Happenings
Carolyn Park, Art History
Sponsor: Professor Julia E. Robinson, Art History, and Professor Edward J. Sullivan, Art History

Regarded as precursors of conceptual art in Buenos Aires, Roberto Jacoby, Eduardo Costa, and Raúl Escari introduced “Mass Media Art” as a reaction to the international dissemination of Allan Kaprow’s performance art, coined “Happenings.” Harnessing mass media as a political medium with the potential to expand the notion of art in the midst of its critical dematerialization, these artists aligned themselves with the theorist Oscar Masotta to inaugurate a new mode of aesthetic theory and criticism. Their collaborative efforts proposed an important operational model that aligned these figures with three established foundations for conceptual art in New York: John Cage’s compositional methods, the Fluxus score, and the structuralist analysis of language. Bridging together the recent revisions of conceptual art in New York and Buenos Aires, this study provides a critical analysis of their limited oeuvre to underscore the dialogue between these two cities, demonstrating not only the unique conditions of Argentine art in 1966, but also substantiating the international dissemination of John Cage’s influence.

Breuer and Brutalism: A Case to Preserve the Atlanta Central Public Library
Brendan Pettersen, Urban Planning and Architecture Studies
Sponsor: Professor Jon Ritter, Urban Planning and Architecture Studies

Marcel Breuer’s final built work, the Atlanta Central Public Library, is in danger of demolition. Completed in 1980, the library is an outstanding example of brutalism—a postwar architectural style whose characteristics include exposed raw materials, heavy massing, and monumental scale. Brutalism was conceived primarily as a response to the lightness and immateriality of International Style buildings. Since its introduction in the 1950s, however, brutalist architecture has endured hatred, neglect, and destruction. The oeuvres of many influential architects who practiced in this style—including Breuer and Paul Rudolph—are rapidly disappearing. In the Atlanta Central Public Library’s case, the issue of public apathy towards concrete architecture is compounded by the city’s poor preservation track record and the current trend to build new, often extravagant downtown libraries. Fulton County Commissioner Robb Pitts plans to sell the existing Central Branch to developers, then use the resulting funds to construct a “world class” replacement building in nearby Centennial Olympic Park. Through my thesis, I intend to help save the Central Library by proving its design merit, using historical analysis to promote awareness of brutalism’s importance, and demonstrating that not only is Commissioner Pitts’ proposal largely based on short-term interests, but the existing building can be adapted to meet the library’s changing needs.
From Erzberger to Brüning: The Evolution of the German Catholic Center Party in the Weimar Republic
Stephanie Piper, History and Politics
Sponsor: Professor Mary Nolan, History

During the period of Germany’s Weimar Republic (1919–1933), the Center Party, which represented the interests of Germany’s sizable Catholic minority, maintained an influential presence in the German government. The Center supported republican government in 1919, but in 1930 Center politician Heinrich Brüning presided over Germany’s transition from a parliamentary rule to rule by authoritarian decree. My research examines how the ideology of the Center changed from 1920 to 1930 in order to place Brüning’s actions into context and to examine the changing political preferences of part of Germany’s voting population. I used the Center’s stance toward women’s rights, organized labor, democratic government, and the emerging National Socialist party as measures of the party’s ideology. In order to track any changes in the Center’s ideology, I analyze propaganda from the parliamentary elections of 1920, 1924, and 1930 that appeared in the Berlin newspaper Germania. I also examine essays on politics and economics from Catholic magazines Hochland and Stimmen der Zeit that elaborated on the issues included in the Center’s platform. I have found that the Center never fully embraced democracy even in 1920 and steadily and slowly grew more conservative and right-wing as the Weimar period progressed. Though they appear to be a sudden break from the Center’s pro-republican stance of 1920, Brüning’s actions show remarkable continuity in relation to its core identity as a Christian party of the people which had from its founding held, at best, an ambivalent attitude toward democracy.

Future Selves and the Threat of Death
Benjamin Pratt, Philosophy
Sponsor: Professor David Velleman, Philosophy

What has, in Eastern traditions, been called Anatta, or the doctrine of “no self” has more recently been taken seriously by a number of influential Western philosophers. Buddhist teachings claim the self to be an illusory source of suffering while analytic philosophers have offered that the belief in an enduring self is born out of the Cartesianism that modern science firmly rejects. Both schools of thought agree that there lies nothing beyond some combination of experience and reification; and yet, despite strong metaphysical argumentation and empirical grounding coming from these traditions, most of us are convinced we are essentially enduring selves over and above our brain and body. Two contemporary analytic philosophers, Derek Parfit and Mark Johnston, both advocate this metaphysical doctrine of Anatta. However, each has a very different view on precisely the way in which such a radical thesis should inform our practical lives. What they do converge on is the fact that Anatta should weaken our self-interest across time. I address how their reductionist accounts of personhood should affect our future directed self-concern, especially with respect to the prospect of our own deaths.

Dissecting the Cultural Imaginary: An Examination of Spanish Artists in 1920s New York
Grace Pryor, Romance Languages
Sponsor: Professor James Fernandez, Spanish and Portuguese

In the early 20th century, a widespread vogue for all things Spanish took over New York City. Increased ease of travel and fellowships made it possible for Spanish writers and artists to discover New York at the very moment that it was becoming a worldwide epicenter of culture. I aim to examine what they discovered, through first-hand accounts and personal reports, and what this tells us about both Spain and New York at the turn of the century. More specifically, if the “cultural imaginary” is how people see themselves and make sense of the world around them in a given time and place, how do travelling Spanish artists define their cultural imaginary in New York City in the early 20th century?

The Myth of the Grand Alliance: Anglo-American Tensions During World War II
Raphael Rabinowitz, History and Chemistry
Sponsor: Professor Marilyn Young, History

Anglo-American meta-narratives portray World War II as a struggle to secure world freedom against Nazi aggression: two preeminent Western democracies uniting to defeat Fascism as a result of their interwoven language, histories, and institutions. In his 1946 “Sinews of Peace Address” at Westminster College, former Prime Minister Winston Churchill coined the term “Special Relationship” to describe the unique diplomatic ties that connect the two powers. But while military cooperation between the two nations ultimately resulted in victory at war’s end, political and economic tensions constantly threatened the formation of a uniform bilateral model of international relations after it. The key dispute centered on the future of the European colonial system in light of the promises made by both signatories of the Atlantic Charter. While the U.S. favored the proliferation of independence movements within colonies desiring self-government, Britain’s primary postwar objective was the preservation of the
Empire. Each policy fit the two nations’ broader imperial histories, as well as their respective ideologies around trade protectionism and international trusteeship. The research methodology utilized was a textual analysis of primary source correspondences between members of the State Department, Foreign Office, and Colonial Office, obtained through visits to the Churchill Archives, British National Archives, and American National Archives at College Park. Ultimately, the rivalry that emerged over postwar planning undermined the simplistic conclusions of sentimental historiographies of the Alliance, like Churchill’s.

**Reaching the Right Audience: Programming Priorities in American Regional Art Museums**
*David Rowe, Art History*  
*Sponsor: Professor Elizabeth Mansfield, Art History*

The proper role of an art museum is to provide educational experiences which positively impact the lives of its audience. It is crucial that a given museum make strides to create programming which will meet the needs of its local community. The programming choices made by museum staff can reveal an institution’s priorities as well as the institution’s intended audience. This study aims to understand how the choices made by art museums across the U.S. impact their local audiences. Historically, arts institutions in this nation’s art centers, most notably New York, have exerted a great deal of influence on the behavior of regional museums. When a museum simply defers to the example of New York-based institutions in determining its programming, there is a chance that its programs will be poorly tailored to meet local needs and will instead be aimed at raising the museum’s art world profile. Having visited a number of regional U.S. museums, and taking note of instances which highlight this tension, I hope to draw attention to the need for museums to insure that their programming decisions are ultimately driven by a desire to meaningfully impact their audiences rather than to conform to some “New York standard.”

**Morphological Exceptions across Verbal Aspects in Polish**
*Amanda Rysling, Linguistics*  
*Sponsor: Professor Maria Gouskova, Linguistics*

Every language contains some elements that are exceptional with respect to a majority pattern. Often, such exceptional items display regular subpatterns, suggesting that they are subject to processes not at work in the rest of a language. In the present investigation, I address the exceptional appearance and disappearance (alternations) of vowels in a set of verbs in Polish. Previous analyses have relied on marking each alternating vowel as exceptional at the level of a speaker’s underlying representation of it. This has led to a theory with the power to over-generate significantly, because there is no principled way of determining which vowels should and should not be marked. This has also led to a theory that does not capture generalizations about when and where such alternating vowels occur. I offer a re-analysis of these alternations that encodes their exceptional behavior as a property of the verb roots, not the alternating vowels themselves. I argue that these verb roots are indexed to prosodic constraints that motivate vowel realization in the locus of primary stress. This approach captures the pattern of vowel realization and eliminates the need for arbitrary marking of certain vowels over others, resulting in a simpler theory.

**The Connection to Shinto: Hiroshi Sugimoto’s Work on the Island of Naoshima**
*Ko Sadakuni, Art History*  
*Sponsor: Professor Shelley Rice, Art History*

Japanese artist Hiroshi Sugimoto (1948–) is best known for his many photographic series that started in 1975. Many Western scholars have analyzed Sugimoto’s work through Western lenses, which are not always appropriate to apply to artists originating from non-Western societies. Thus, it is enlightening to analyze his art through Shinto, the native religion of Japan, as it is an inescapable part of Japanese culture and society. On the surface, his iconic *Seascapes* (1980–2002) series alludes to the minimalist and conceptual realms of art since each photograph abides by the same compositional rule. While each sea is visually the same, once named, it becomes charged with layers of history. For some, like Sugimoto, this history includes the myths belonging to Shinto folklore. By carrying out the seascapes in such an algorithmic manner, the artist also likens his work to the Shinto aesthetic that emphasizes the immersion of symmetry and proportionality into nature. This is manifested in Sugimoto’s reconstruction of Naoshima’s Shinto shrine, *Appropriate Proportion* (2002), which has been created in a simple, age-old style of shrine architecture. Although there have been disputes regarding the shrine’s function, Sugimoto has established a clear connection to Shinto through the focus on materials, proportion, and style, all of which were executed in deference to the religion’s tradition.
Representations of Dance in Renaissance Art: Moral Dimensions of Dance in Movement  
*Deepika Setty, Art History and Journalism*  
*Sponsor: Professor Dennis Geronimus, Art History*

Several examples of Renaissance art show the body in graceful flourishes, at times even when such motion is not necessarily needed for the action involved. A study of the dance culture of the time reveals social stratification as an important factor in such aesthetic decisions. In Italy, the 15th century marks an important milestone in dance, as dance instructors began to document choreographies and theoretical ideas about technique, deportment, and music in treatises. The treatises served as guidebooks on dance for members of the courts of ruling families so that their motions could be distinguished from those of the lower classes. The earliest surviving treatise dates to around 1455, and is believed to be the work of Domenico da Piacenza, Knight of the Golden Spur. Domenico’s students, Antonio Cornazano and Guglielmo Ebreo da Pesaro, produced treatises as well. These three dance students, Antonio Cornazano and Guglielmo Ebreo da Pesaro, produced treatises as well. These three dance masters intended to elevate the status of dance by drawing links between classical theories and dance principles. Bodily movement was particularly important for women, for whom the qualities of leggiadria, a term that connotes undulating motion, and vaghezza, or charm, were desirable. The sense of elegance and refinement with which the treatises instructed elite members of the court to comport themselves were consciously considered in visual representations, and for certain ends. During this time, artists also consulted ancient art for inspiration. Antonio del Pollaiuolo’s “Dancing Nudes” fresco is a prime example of the convergence of inspiration from ancient art and quattrocento dance culture and beliefs on bodily motion.

Movin’ On Up: Conceptualizing and Negotiating the American Ideal in Carlos Bulosan’s *America is in the Heart* and Jack Kerouac’s *On the Road*  
*Katharina Smundak, English*  
*Sponsor: Professor Jini Kim Watson, English*

Jack Kerouac’s *On the Road* (1957) and Carlos Bulosan’s *America is in the Heart* (1946) are ostensibly very different works. Nevertheless, they are united in their project as they both imagine a national ideal through the Other and through an aesthetic treatment of the American land and landscape. Bulosan’s Allos negotiates the divide between the ideal and the reality by dissociating the two completely. Kerouac’s Sal, on the other hand, sees contemporary U.S. society as superficial and inauthentic and looks to the margins to recover the “real” America. Analogous attitudes inform their treatment of land and landscape since the characters’ interpretations of the land depends on their radically differing subject positions. Allos’ appreciation of land comes from his valorization of labor as an aesthetic endeavor. The American is redefined as the laborer; consequently, land is the point of access to the center. In contrast, Sal enters the margins on the road while still understanding the nation through the lens of the dominant national myth. Nevertheless, despite the characters’ opposed positions, in the aftermath of the publication of their works, both Kerouac and Bulosan find themselves occupying similar spaces in the literary margins.

Willem de Kooning: Understanding the Woman Series  
*Joey Steigelman, Art History*  
*Sponsor: Professor Jeanne Fox-Friedman, Paul McGhee Division, NYU*

Between 1950 and 1953, abstract expressionist artist Willem de Kooning (1904–1997) created a series of six paintings of women. Characterized by their violent brushwork and menacing female portrayal, the works were condemned by critics for allegedly representing the artist’s misogynistic views. The enormous size and fierce facial expression of the Woman in the series make her an intimidating sight; she is not the demure nude that epitomizes feminine representation in western art history. That the series is antifeminist, however, is an opinion that I oppose. This study examines the vast array of artwork that influenced the Woman series, including the work of de Kooning’s artistic predecessors and contemporaries. De Kooning’s private relationships and personal statements are also taken into account. Rather than a misogynistic statement, my research suggests that the Woman series is a testament to de Kooning’s firm admiration of the female gender.

Cervantes’* Arte moderno: Theatrical Origins of the Modern Novel*  
*Matthew Tanico, Spanish and Italian*  
*Sponsor: Professor Georgina Dopico-Black, Spanish and Portuguese*

Miguel de Cervantes’s *Don Quixote* (1605–1615) is considered the first modern novel and has influenced authors including Nabokov, Borges, Flaubert, Faulkner, and many others. While the myriad of influences on the content of *Don Quixote* have been and continue to be studied, there is one aspect of Cervantes’s own career as writer that is often disregarded and underestimated as a possible influence: his failed career as a playwright. The *Ocho comedias y ocho entremeses nuevos, nunca representados* (1615) (*Eight Comedies and Eight New Interludes, Never Acted*), a set of plays and interludes that
Cervantes published after they were rejected from being put on the stage, provide the basis for this analysis of Cervantes’s writing style. By contextualizing Cervantes’s work within the phenomenon that theater had become in Spain during the 16th and early 17th centuries, I suggest that Don Quijote be read in regard to the plays and interludes of the Ocho comedias y ocho entremeses in order to see the influences that Cervantes’s desire for a career in the theater had on his non-dramatic prose writing. This study goes on to focus on one interlude in particular, El viejo celoso (“The Jealous Old Man”), examining the self-awareness in the text of contemporary theater. I then analyze the interpolated novella El curioso impertinente and its surrounding narrative in Don Quijote, suggesting that the interpolated text becomes analogous to a literary entremés.

“Tutto”: The Might of Music in Joyce’s “Sirens” through Reinterpreting, Rereading, and Recording
Alex Tatusian, English
Sponsor: Professor Abby Bender, Irish Studies

“Tutto” is a creative and scholarly reinterpretation of the “Sirens” episode in James Joyce’s Ulysses—the style, structure, and content of which are drawn from the language and history of music. The project, through research into previous analyses of music and intertextuality in Ulysses, purports that the prevailing reading of “Sirens” (by Brian Cosgrove, Zack Bowen, and others as parodic or antisentimental toward Bloom) misses an honest, emotional celebration of music’s unspeakable grip. “Tutto”, the piece of music at the center of the project and an experiment in new kinds of criticism, reincarnates the effects of Ulysses’ music on Bloom through sampling, original content, looping, and a host of other technological plays on memory and psychology. The music is accompanied by a critical reading of music as the ultimate emotional signifier for Joyce, showing that it constitutes, I believe, a final eschewing of irony.

Milicianas and Madres: Representations and Roles of Women in an Illustrated Magazine of the Spanish Civil War
Lindsey Thomas, Spanish and Journalism
Sponsor: Professor Jordana Mendelson, Spanish and Portuguese

Ahora was an illustrated daily magazine that supported the Republican government during the Spanish Civil War (1936–1939). Like a growing number of magazines at the time, Ahora relied on photographic content just as much as text. Multiple messages could be transmitted simultaneously but, as was the case with the representation of women, image and text often presented conflicting messages. This study reconstructs the history and content of Ahora, through its wartime issues and editorial archives, in order to deconstruct the roles women played in the war and the way in which they were represented to readers. By tracing the use of female archetypes in Ahora, I discern two overarching representations. First, there is the smiling miliciana (militiawoman), exemplified by war martyr Lina Odena, whose enthusiasm was perhaps more crucial in supporting the war effort than her skills in combat. Second, the suffering madre (mother), symbolized by political leader Dolores Ibárruri, served as a role model for female readers by channeling traditional maternal and religious iconography. By showing how conventional femininity replaced more radical representations in Ahora within the first few months of war, I demonstrate that Spain’s shift toward traditional gender roles was evident well before Francisco Franco established his ultraconservative regime.

How Normative Expressivists can Abandon Non-Cognitivism (and their Contrived Quasi-Cognitivism)
Eric V. Tracy, Philosophy
Sponsor: Professor Paul Horwich, Philosophy

In response to the Frege-Geach problem, normative expressivists like Gibbard and Blackburn try to justify our cognitivist talk of “belief,” “truth,” “facts,” “inferences,” etc. by arguing that the non-cognitive mental states which normative sentences serve to express function as if they were genuine, truth-apt beliefs and as if they were used in genuine inferences, as well as in other contexts which seem to be belief-embedding. The immense burden these theorists take on warrants consideration of any alternatives. I will motivate an alternative reply to the Frege-Geach problem which is offered by Paul Horwich as a particular application of his broader views about meaning. Horwich denies that we need hold that all normative sentences are used only to express non-cognitive mental states, and contends that the fact that atomic normative sentences get their meaning from their non-belief-expressing role does not preclude them from expressing fully genuine beliefs. My primary aim will be to motivate this view from the perspective of the likes of Gibbard and Blackburn and from the perspective of normative realists like Derek Parfit. I will accomplish that second aim by showing how Horwich’s view about the meaning of normative sentences allows for a position about the metaphysical status of normative facts which is at least substantially similar to Parfit’s, while avoiding the extremely contrived cognitivism of Gibbard and Blackburn.
Unlocking the *Ferhọcọfa*: Discourses of Loyalty in the "Finn Episode"
Emile Young, English  
Sponsor: Professor Haruko Momma, English

This research examines, on a lexical and stylistic level, the complicated treatment of loyalty within the "Finn Episode" of Beowulf. Much scholarship reading the Episode as an example of "comitatus" loyalty has tripped over the ambiguity of the language in its rush to condemn or to discharge Hengest as an oath-breaker to Finn, the Frisian king. Yet a close examination reveals that Beowulf’s ambiguous language, even in the Episode’s uncontested lines (e.g. using *meþelstede*, “meeting-place,” to denote “battlefield”), demonstrates the use of wordplay to reveal hidden aspects of this seemingly straightforward issue. Furthermore, the poet’s use of the mind-as-container technique to depict virtue and vice in Beowulf adds weight to his two usages of the word *ferþ* ("mind") to frame the Episode, thus designating the Episode as another mind-as-container instance in which his audience must grapple with virtue or vice. The Beowulf poet does not present loyalty as a declaration in the form of the gnomic *mon sceal* ("one must") but instead reveals aspects of loyalty and associated problems. Perhaps, then, the ambiguities fueling conflicting interpretations are not arbitrary but are perpetrated by the poet and should be recognized as important in and of themselves.

*Cristero Narratives: Martyrdom and the State Formation in Post-Revolutionary Mexico*
Thomas Zuber, History and Medieval and Renaissance Studies  
Sponsor: Professor Gregory Grandin, History

The *cristero* revolt consumed Mexican political life throughout the late 1920s as the state attempted to consolidate a country torn by a decade of civil war. The conflict mobilized peasants (called *cristeros* for their cry: “Long Live Christ the King”) in Western Mexico and revealed persistent anxieties about the place of religion in Mexican politics. While the *cristero* movement was by no means unified, many groups mobilized using a language of martyrdom to project alternative notions of what it meant to be Mexican or simply to resist perceived threats of government policies to the cultural and social fabric of their communities. By studying the role of Catholic organizations in Mexico City, as well as popular culture as presented in *corridos*, narratives written by the *cristeros* themselves, I assess how a language and culture of "martyrdom" was instrumentalized to bolster their anti-governmental demands, specifically against the 1926 Calles Law, which attempted to curtail the domineering position of the Church in Mexican society. This language of martyrdom was used for different means by the different groups involved. Fundamentally, this appraisal of martyrdom may lead us to ponder to what degree *cristero* revolt was in fact “anti-revolutionary,” as so much of the historiography understands it, and how we define the Mexican Revolution and its aftermath.
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

Bacteria, Viruses, and Fear: Reconsidering Vectors of Communication through Cardiovascular Disease in Mayange, Rwanda
Nikita Agrawal, Anthropology
Sponsors: Professor Rayna Rapp, Anthropology, and Professor Rajesh Vedanthan, Mount Sinai School of Medicine

Medical attention has recently focused on the prevalence of non-communicable diseases (NCDs) in developing countries. I conducted semi-structured interviews with healthcare providers and villagers, and ethnographic observations in Mayange, Rwanda, where a cardiovascular disease project is being developed by Millennium Villages Project, The Earth Institute at Columbia University, and Mount Sinai School of Medicine. I analyzed local disease etiology for cardiovascular disease and assessed the various terms used to categorize cardiac conditions. I argue that translating between biomedicine and local understandings of cardiac conditions will require an appreciation of the range of illnesses experienced at the local level. The use of the terms “communicable” versus “non-communicable” must be reconsidered and take into account vectors of illness being experienced by locals. Traditional biomedical definitions of “communicable” versus “non-communicable” fail to consider the full spectrum of illness causation, which in turn fails to develop a complete representation of all individuals suffering from cardiovascular disease.

2.3 Million Scholars: Experiencing the Liberal Arts in Prison in the Era of Mass Incarceration
Jacob Alderdice, Metropolitan Studies
Sponsor: Professor Andrew Ross, Social and Cultural Analysis

Beginning in the mid-1970’s, the United States criminal justice and correctional system increasingly shed all notions of a rehabilitative ideal and shifted to a more punitive model. Principally through a complex mix of harsh policy measures, the American penal system became flawed and enormous, ballooning from a mid-1970’s population of approximately 300,000 to over 2.3 million today. In the course of this growth, Congress effectively ended prisoners’ access to higher education, often viewed as the most efficient weapon against recidivism, by denying Pell Grants to the incarcerated. This study focuses on three privately funded programs currently bringing college into prison: The Bard Prison Initiative, the Bedford Hills College Program, and the Wesleyan Center for Prison Education. Through in-depth interviews with 28 administrators, faculty, and graduates of these programs, I determine how the programs’
pedagogical missions compare to the classroom-in-prison experiences of students and teachers. By mapping the strictly academic space of the classroom and its effect on the students’ abilities to critically respond to their surroundings, I analyze why the scholarly focus of these programs wholly diverges from the punitive paradigm of the last three decades, and how they result in a more restorative correctional environment.

**Culture Adaptation and Influence on Psychological Adjustment among College Immigrant and International Students**  
*Tiffany Andersen, Psychology*
*Sponsor: Professor David Woltzky, Psychology*

While immigrants are the fastest growing subpopulation in the U.S., immigrant and international college students and their adjustment issues have been ignored on many campuses. This study examines how cultural adaptation impacts psychological adjustment, and whether stress and social support moderate the association. Sixty-eight international students were recruited for a one-time, web-based survey. Acculturation was assessed using the Abbreviated Multidimensional Acculturation Scale; stress was assessed by the Multidimensional Acculturative Stress Inventory; social support was assessed by the Perceived Social Support Scale for friends and family; and mental health was assessed by the Brief Symptom Inventory. Results showed that level of acculturation was not related to mental health adjustment and this association was neither moderated by stress nor social support. Instead, acculturative stress and social support were positively related to mental health problems. There was also an interaction effect between acculturative stress and social support on mental health adjustment. High stress and low support had the worst mental health adjustment. Results suggest that helping international and immigrant students cope with acculturative stress and build social networks might improve their mental health adjustment.

**Global Warming and its Effects on Wine Production**  
*Lara Antoy, Math and Economics*
*Sponsor: Professor Karl Storchmann, Economics*

We seek to define a relationship between temperature and profit from wine production in order to evaluate how global warming will affect the wine business, whose estimated annual revenue is $30 billion in the U.S. alone. We expect to find that profits will increase with temperature to a certain point and then begin to decrease which could significantly shift where wine is produced as the climate warms. As global warming raises the temperature, it may become profitable for northern regions to begin or increase wine production and southern regions, such as the south of France, to slow or cease production. We will look at the costs and revenues of a sample of agricultural holdings from over 60 regions of the E.U. for a period of 20 years, and the corresponding annual average temperature. From this data we can extrapolate profits and regress temperature on profits. Since we expect temperature to increase profits to a certain point, but beyond that point have a negative effect on profits, the relationship between temperature and profits should be modeled by a logarithmic function of second degree. We expect the Stata coefficient to take care of fixed effects, such as the amount of wine produced and the type of grapes used, and allow us to normalize profits for all the regions. By maximizing the function produced by the regression we can determine the ideal temperature for wine production if profit is the goal.

**Debt to the Father: Socioeconomic Status and Education Attainment in Rural Tanzania**  
*Mohammad Barkeshli, Economics*
*Sponsor: Professor Erin Godfrey, Steinhardt School of Culture, Education, and Human Development*

This study investigates the effect of maternal or paternal education levels and the socioeconomic status of families on the level of education attained by the children in rural Tanzanian households. The survey was conducted in Tanzania’s southern-central region, in the surrounding villages of Ifakara, in the Kilombero District of the Morogoro Region. Aside from finding that home conditions such as assets and house structures have a significant correlation with whther or not a child is attending school, the study also finds that the amount of debt that a family owes has a strong correlation with children’s attendance, drop-out rate, delay in education, and long-term school abandonment. Also, not finishing primary school correlates strongly with gender, which may partly explain why only five percent of girls in Tanzania go on to secondary school. Also of interest is the finding that finishing primary school, staying in school, and being at the right level at the right age, has a lot to do with the role of the father in the family: the education level attained by the father, the social status of the father, and whether or not he is alive. This seems contrary to the widespread belief in the existing literature that the education attainment of children has more to do with the status of the mother in the household, and calls for further investigation of these relationships, especially in rural and more traditional societies.
Development of Human Brachiation: Effects of Single Limb Support
Danielle F. Bendicksen, Anthropology, and Lok Yu Gladys Chan, Psychology and East Asian Studies
Sponsor: Professor Karen Adolph, Psychology and Neuroscience

We examined the development of human brachiation—locomotion by swinging arm-to-arm under a superstrate. Forty-five children brachiated across adjustable money bars; six came for weekly sessions. As in bipedal locomotion (walking, running, hopping, skipping), participants used a variety of gaits with unique biomechanical constraints, such as cruising, hopping, and spinning. The most common gaits were marking time, where each bar is grasped twice in succession, and alternation, where each bar is grasped only once. The more advanced gaits observed in brachiation required participants to spend more time supporting the body by one limb. A subset of children brachiating across gaps of varying sizes confirmed these differences: when spanning larger gaps, they increased their time in single-limb support. The children’s ability to spend time in single support also increased over the course of the study. These findings suggest that, as in the development of walking, a limiting factor in learning to brachiate is the ability to support the body by one limb.

Sequential Search: A Direct Test
Monica Bhole, Economics and Mathematics
Sponsor: Professor Andrew Caplin, Economics

I study how decisions are made when we search options in a no recall environment. Such an environment is one in which a decision maker can see only one option at a time, and must accept or reject that option. Once a decision is made, the subject cannot go back to past options. In my experiment, there are three total rounds and decision makers face sets of options called trials. In the first and third rounds subjects face 25 trials, each of which has 11 possible options. The second round contains 50 trials each with six possible options. All options are randomly generated values. The first option of each set could take the value 50, 60 or 70. Each subsequent option in a set is a randomly generated number from 0 to 100. Higher numbers correspond to larger payoffs. Subjects view one option at a time and must accept or reject the option they view. Decisions are final, consistent with the no recall environment. The Expected Utility Hypothesis describes an optimal search strategy of diminishing reservation that should be followed in such an environment. Through the experiment described, we can understand whether the optimal strategy is followed. I determine that the optimal strategy of diminishing reservation does not best describe the behavior of my participants.
Transference and Regulatory Strategy: Regulating Specific Significant Others
Nikolas Block, Psychology
Sponsor: Professor Susan Andersen, Psychology

The social cognitive-model of transference states that individuals store significant other representations in memory and when meeting a new person that minimally resembles a significant other, the significant-other representation is activated. Through this activation, the representation acts as a means to evaluate the new person, and the individual applies traits of his or her significant other to the new person, as well as engages in behaviors with the new person specific to interaction with the significant other. Regulatory strategies, such as an implementation intention—a specific IF-THEN goal-pursuit strategy—may be used to globally regulate significant-other representation activation. The present study intends to determine whether an implementation intention may be designed to regulate a specific significant-other representation, as opposed to the global regulation of all significant-other representations. By having participants describe a problematic and non-problematic significant other, a new implementation intention (focusing on regulating the problematic significant other) was found to regulate transference of the problematic significant other, while still allowing for the transference of a non-problematic significant other.

Homosexual Self-Harm: The Link to Mental Health Services
Anthony Bracco, Silver School of Social Work
Sponsor: Dr. Andrea McKenzie, Expository Writing

Suicide rates in LGBT communities are 25 times higher than in non-LGBT communities, and the rate continues to increase annually. Self-harm (intention to directly harm one’s body) and self-destruction (indirectly harming one’s body, i.e. smoking) rates are elevated in this community as well. Discrimination has been identified as one cause; however, other factors may be affecting this community. Does the lack of proper health insurance, improper marital rights, and economic gaps in homosexual vs. heterosexual men and women affect LGBT suicide rates? These factors could prevent the LGBT community from receiving adequate mental health care. Through a small-scale survey, I determine the percentage of mental health counselors that accept private insurance, along with new clients. I also explore the issue of LGBT awareness on college campuses. My research indicates a greater need for LGBT mental health services, as well as greater awareness on college campuses of the LGBT community.

No Child(care Provider) Left Behind
Michael Broschart, Sociology
Sponsor: Professor Ruth Horowitz, Sociology

Many professions have undergone processes of professionalization. The goal of this project is to understand how this process of professionalization has come to shape the career decisions of preschool teachers. I aim to understand how individuals will be affected by the movement to professionalize childcare, and how this change for the individual affects the profession as a whole. In-depth interviews with New York City preschool teachers open a unique window into the issue, and allow for the creation of a dialogue that showcases how this issue affects not only those involved directly, but also the entire system of United States childcare.

Postcanine Megadonty in Anthropoid Primates
M. Loring Burgess, Anthropology
Sponsor: Professor Terry Harrison, Anthropology

There are general rules governing how tooth size scales with body mass across broad taxonomic groups, an association that may have important implications for interpreting body size and dietary adaptation in fossil species. However, these “best fit” relationships do not hold true for individual species, which may have relatively small or large teeth. This study examines postcanine tooth size across anthropoid primates by quantifying the relative degree of megadonty (disproportionately bigger teeth than would be expected for a given body size). These data are used to show how megadonty varies across taxonomic subgroupings and between sexes within species, as well as the relationship between measures of postcanine megadonty, the contribution that individual teeth make to the overall postcanine tooth area, and the relationship of megadonty to diet. The results show that the taxonomic level at which analyses are performed has an effect on the degree of megadonty in a given taxon, and that there is no discernable relationship between megadonty and dietary behavior. Additional research is needed, but these preliminary findings suggest that the phylogenetic and paleobiological implications of megadonty in fossil primates, including hominins, may be more difficult to interpret than previously considered.

Les Enfants Francophones: An Exploration of the Trend toward Early-Childhood French Instruction in New York City
Monica Burton, Journalism and French
Sponsor: Professor Brooke Kroeger, Journalism

In New York City, parents want their children to speak French. A 2008 study by the Center for Applied
Linguistics showed a 16 percent decrease in French instruction at the elementary school level and an 18 percent decrease in French instruction at the secondary school level throughout the United States since 1997, while Spanish classes were offered more frequently in elementary schools and Mandarin and Arabic instruction became more available at both school levels. In Manhattan and its neighboring boroughs, however, French language instruction is experiencing a Renaissance. Not only is the shift apparent to some extent in public schools, where advocacy groups have helped institute elementary school level dual language programs, but more notably in the burgeoning number of Manhattan’s private elementary and preschools, sought after by families with a French heritage, who enroll their children to preserve that cultural connection, and by families sans French background, who see bilingual education as a way to gain cultural capital for their children. This study of the schools and families that contribute to the popularity of French in New York reveals that French education requires advocacy from those with both the desire for French instruction for their children and the means to support it. The language is able to thrive in New York because of a large Francophone population and a prominent Francophile population, able to support the cost of French private schools and willing to lobby for French in the city’s public schools.

Sharing and Caring: How Moms Respond to Infant Object Shares

Emma Celano, Psychology
Sponsor: Professor Karen Adolph, Psychology and Neural Science

Maternal responsiveness is a central characteristic of parenting that fosters important developmental outcomes in infants across many domains including social, cognitive, and linguistic. A previous study found that infants share objects with their mothers by either remaining in one place and offering the object or approaching mothers with the object to share. I examined the frequency of mothers’ responses to infant object sharing and asked whether the quality of verbal input varies with infants’ actions. By sharing objects in different ways, infants create unique opportunities to learn from the rich input of mothers’ responses.

Modeling Obstacle-Avoidance Reaches with Statistical Decision Theory

Megan Chambard, Psychology
Sponsor: Professor Michael Landy, Psychology

Being able to quickly reach around a water glass without knocking it down and similar movements of obstacle avoidance are central to humans’ ability to interface with the world. A better understanding of the cognitive process behind obstacle-avoidance reaches would impact treatments of patients with deficits in motor abilities and have applications in robotics. Several models of the cognitive processes behind obstacle-avoidance reaches have been proposed, but none take into account the costs and benefits of reach outcome from the standpoint of statistical decision theory. We propose that humans plan movements by taking into account the probability of incurring costs and obtaining rewards so as to maximize expected gain. Our research proposes a reach-planning model based on motor error to predict the probability, given a specific reach plan, of hitting the obstacle and target. We determine motor uncertainty near the obstacle and at the target as a function of the reach plan (in particular, as a function of the degree to which the participant tries to avoid hitting the obstacle). Based on these uncertainty values, we determine the optimal reach plan maximizing expected gain. Results show that subjects do not choose the optimal reach path. Rather, subjects choose paths that pass too close to the obstacle for obstacles that require large path compensation, and too far for obstacles that should not impede movement.

Younger and Older Adults Scale Actions to Dynamic Body Properties

Angela Char, Psychology and Cinema Studies and Arhanti Sadanand, Psychology
Sponsor: Professor Karen Adolph, Psychology and Neural Science

Navigating a narrow space can involve gauging the body’s dynamic compressibility (e.g., through a narrow doorway) or ability to keep balance (along a narrow ledge). Younger (20-30 years) and older adults (60+) were tested on a raised walkway in doorway and ledge conditions. Participants in both age groups spontaneously adopted body-compression and balance-control strategies suited to each condition. Decisions about possibilities for action were generally accurate in both age
groups—scaling attempts to body size, compressibility, and balance—but participants were more conservative in the ledge condition compared with the doorway condition. That the two age groups made comparably accurate decisions is an indication that older adults do not necessarily suffer a decreased ability to distinguish between safe and unsafe actions. That older adults also spontaneously adopted appropriate crossing strategies indicates a preserved ability to act accurately on those judgments. More conservative judgments in the ledge condition suggest that both age groups considered falling a greater penalty for error than entrapment.

**Developmental Change in Mother and Child Interactions**

*Jessica Chung, Psychology*

*Sponsor: Professor Catherine Tamis-LeMonda, Steinhardt School of Culture, Education, and Human Development*

This study examines mothers’ teaching activities and types of verbal feedback to their children’s performance on an assembly block task in addition to the ways that mothers’ responses change developmentally. Participants were 270 ethnically diverse (African American, Chinese, Dominican, Mexican), low-income dyads from an urban center. Dyads were video recorded during a five minute break between pre and post-block task assessments. Videos of mothers’ responses to children’s performance during the break were analyzed and compared between four and five year olds. Ongoing analyses revealed cultural, gender, and developmental differences in the ways that mothers involved their children in the assembly task, as well as in the types of feedback they provided their children.

**Why are Managed Care Plans Less Expensive?: Risk Selection, Utilization, or Reimbursement?**

*Joseph Michael Colucci, Economics*

*Sponsor: Professor Kevin Thom, Economics*

I revisit the question of why health management organizations offer cheaper health insurance than non-HMO plans. My analysis is based on Polsky and Nicholson’s paper from 2004, and decomposes lower health spending into three components: risk selection, utilization, and reimbursements. I found no significant utilization effects, suggesting that lower spending is driven by differences in patient populations and payments to health care providers, and not by any difference in medical practice between HMO and non-HMO doctors. My methodology involved constructing resource usage estimates, based on weights estimated from the 1996-2003 Medical Expenditure Panel Survey and medical service use data from the Community Tracking Study Household Survey. The weights were necessary because the prices patients and health plans pay for medical care are not easily determined or compared. The method of determining utilization effects used a sample of people not offered a choice of health plan type to remove selection problems, and found no significant utilization differences. However, there was a large selection effect (the difference in expected patient costs for HMO and non-HMO patients based on their demographic, socioeconomic, and health characteristics), and a large reimbursement effect (the difference in payments based on the HMO and non-HMO resource weight estimates).

**Crisis Film: Historical Representations of Gays and AIDS in Cinema**

*Nik Dragovic, Sociology*

*Sponsor: Professor Ruth Horowitz, Sociology*

The AIDS crisis of the 1980s and 1990s confronted the medical profession with an unprecedented epidemiological challenge, and introduced a contentious and loaded issue to American political and social arenas. The varying orientations toward the outbreak manifested in various media forms, and the AIDS film was born as a way to express and promote these attitudes. A subset of this breakout genre was that which explored the disease in the context of the gay culture just then breaking into the mainstream. This study takes a content analysis approach to analyze how these films depicted their subjects in this critical period, as well as their consequences. By viewing a selection of releases from the height of the crisis, I unpack theme and character development as well as historical context to achieve sociological insight into this media sphere. I posit that the overriding depictions of gays in these films served to help extract them from subcultural isolation and normalize their plight to help foster mainstream understanding. In addition, by providing models of behavior through narration, the films encouraged wider audiences to treat AIDS and its associated conflicts with acceptance.

**Special Education: Lessons from a Classroom for Students with Disabilities**

*Michele Dugan, Anthropology*

*Sponsor: Professor Bambi Schieffelin, Anthropology*

Classrooms are important arenas in which worldviews and social identities are produced, reproduced, and negotiated through interactions between teachers, students and peers. This research contributes to the growing body of ethnographic studies of communicative practices in educational settings by examining the linguistic strategies used to facilitate and evaluate students’ verbal
participation in a special needs classroom. Informed by previous studies of language use in classrooms and using methods influenced by ethnomethodology and conversation analysis, I focus on how students’ participation is elicited and framed, and what discursive techniques the teacher uses to engage the students. The particular special education classroom that was studied offers a unique space that recognizes and emphasizes students’ individual differences and makes an explicit effort to accommodate and support them. Guiding my observations was the desire to identify the discursive strategies used to accommodate students’ learning differences, sets of cultural competencies, and varying communicative practices. I find that strategies such as introductions, transitions, flexible scaffolding, and positive framing of verbal participation make up a set of speaking practices that recognizes multiple styles of communicating, caters to several different learning styles, and rewards self-awareness and self-advocacy on the part of the students. I argue that the discursive strategies employed in the special education classroom offer a model of communicative practices that can be replicated in other classrooms with similar success.

Francesca Eick, History
Sponsor: Professor Richard Hull, History

In 1948, the Nationalist Party took power and instituted a program of apartheid or “separateness” that reinforced and intensified already present racial divisions in South Africa. Six years later, in 1954, The Federation of South African Women formed as the only multi-racial national women’s organization in South Africa of its time. The purpose of this work is twofold. First, I attempt to piece together the largely unheard story of the Federation’s short life, from 1954 to around 1962, using the archival papers of the Federation. Second, I analyze the importance and meaning of the Federation’s work through the three interconnected lenses of multiracialism, women organizing, and feminism. The Federation, from its inception, was avowedly multiracial, which openly defied apartheid regulations and challenged a predominantly ethnically-defined anti-apartheid movement. The Federation’s struggles with organizational independence illuminated the gendered power structures within the national liberation movement. Finally, the extent to which the Federation could be framed as a “feminist” organization is indicative of both the limits and aspirations of women in 1950s South African society. I conclude that while the Federation eventually focused on the national liberation movement at the expense of programs to further women’s rights, its clear and focused language demanding equality for women in all spheres was revolutionary and laid the foundation for South African women’s future efforts. This examination of the Federation of South African Women fills a gap in the history of the anti-apartheid movement and offers a more nuanced story of the social structures of the South African short lived “glorious era of resistance.”

Meaning from Sound: Inferring Spatial Distance from Different Vowels in Words
Michael Feder, Psychology
Sponsor: Professor Yaacov Trope, Psychology

In Romeo and Juliet, Shakespeare suggested that “a rose by any other name would smell as sweet.” Research in the tradition of sound symbolism, however, supports the presence of intuitive associations between the sounds contained in words and the objects to which they refer. One major line of work has investigated properties of vowel sounds, distinguishing between those produced in the front of the mouth (the ee in green) versus the back (the u in blue). All else equal, people infer that objects with names including front vowel sounds are more sharp, hard, and angular, among others. Importantly, the visual perception of such features varies with geographical space: That which looks sharp and angular when up close may seem blurred and rounded from a distance. Accordingly, I predict that back (versus front) vowels will show an association with greater spatial distance. Study 1 finds that people infer a city named with a back vowel to be spatially further away. Using a foreign language paradigm, Study 2 shows that people are more likely to use a word including a back vowel to describe a spatially distant target. These results suggest that subtle linguistic cues influence the mental representation of geographical location.

Do Social Communicative Cues Induce Infants’ A-not-B error?
Stephanie Fernandez, Psychology
Sponsor: Professor Athena Vouloumanos, Psychology

Young infants, after consistently finding an object in the same location (A), will continue searching in the same place despite seeing the object moved to a new location (B). An explanation for this perseverative search error suggests that the communicative signals involved in the task lead infants to assume that the location of the object is a generalizable property they are being taught, as opposed to an episodic occurrence. Will eliminating all social-communicative cues by using a mechanical version
of the task allow infants to attend to the spatio-temporal properties of the object and thus eliminate the perseverative search error? I presented ten month-old infants with (1) a Social condition in which an experimenter presented the A-not-B task while using ostensive communicative cues, such as eye gaze and infant-directed speech; and (2) a Mechanical condition in which an experimenter presented the A-not-B task from behind a mechanical apparatus, hidden from the infant. I hypothesized that infants would make significantly fewer incorrect reaches in the Mechanical condition than in the Social condition. These results would suggest that infants optimize their mental resources by using ostensive communicative cues to learn about the most enduring and generalizable aspects of their environment.

Starving in Silence: Men Battling Eating Disorders
Ava Feuer, Journalism and English and American Literature
Sponsor: Professor Brooke Kroeger, Journalism

This long-form feature explores male eating disorders and the issues surrounding these diseases. One in four anorexics and bulimics is male, and 40 percent of those who suffer from binge eating disorders are male. Hospitalizations of men with eating disorders increased 37 percent from 1999-2000 to 2005-2006. This work deciphers the statistics, questioning whether there is indeed a rise in eating disorders among men, or whether more men are simply coming forward and seeking treatment. It seeks to explain the most prominent theories among experts, namely those that blame the media and those that hold feminism responsible. By comparing the stories of several men who have grappled with eating disorders, it presents the unique ways in which men experience eating disorders—through physical illness, compulsive behavior, excessive exercise, emotional suffering, ignorance, and shame. As the piece follows these men through their treatments, it investigates what remedies are most effective, and if it is indeed possible to recover from an eating disorder. Finally, the work looks to the future, focusing upon the power of sharing stories, education, innovative models of treatment, and legal advancement on both the state and federal level in reducing eating disorders among men. As it assigns names and faces to a population rarely addressed in eating disorder coverage, it seeks public attention for the disease.

Girls and Attention Deficit Hyperactivity Disorder in the Classroom
Emily Gang, Steinhardt School of Culture, Education, and Human Development
Sponsor: Dr. Andrea McKenzie, Expository Writing

Every elementary school classroom in America houses between one and three children with ADHD. Fifty to 75 percent of girls are undiagnosed in childhood, and girls who are identified with ADHD are diagnosed, on average, five years later than boys. This delay is detrimental to girls’ academic performance in school. To find out why this gender gap in ADHD identification exists, I investigated ADHD diagnoses and the way the three ADHD subtypes present in boys and girls. I interviewed teachers to find out what type of training they received to help them recognize the signs of ADHD, and how they deal with ADHD in their classrooms. I found that boys are twice as likely to be identified with ADHD earlier because they display primarily hyperactivity and impulsiveness. In contrast, girls are diagnosed much later because they display primarily inattentiveness, a symptom of a different ADHD subtype. Also, teachers have not been trained to recognize these differences. To decrease the number of girls with ADHD who are overlooked in the classroom, I created an active learning teacher training course to help teachers better recognize the three ADHD subtypes and their subsequent symptoms in both genders.

Developmental Links between Perception and Motor Action
Katrina Garland, Psychology
Sponsor: Professor Karen Adolph, Psychology and Neural Science

Do infants perceive possibilities for action on possible and impossible gaps and tailor their exploratory behavior accordingly? We tested nine month-old infants with varied amounts of crawling experience on a raised, adjustable gaps apparatus. We varied the width of the gap from 0 to 80 cm, and infants decided whether or not to cross the gap. We also observed infants’ exploration of the gap and their latency to cross. Infants adjusted their behavior based on the size of the gap; as the gap size increased, infants’ exploratory touching and latency to cross also increased. Infants’ age and crawling experience did not seem to significantly affect their ability to perceive whether a gap is safe to cross. Findings from this study will provide important information about how infants’ perception of possibilities for action affects their exploration and decisions for motor action.
Days of Our Lives: Opportunities for Learning about Language, Objects, and Locomotion
Katrina Garland, Psychology, and Jennifer Kung, Psychology
Sponsor: Professor Karen Adolph, Psychology and Neural Science

Infants learn at a remarkable rate. Laboratory studies typically focus on learning in a single domain. However, everyday opportunities for learning may involve multiple domains and inputs may be interleaved or simultaneous. In an intensive case study, we documented the temporal distribution of real-world opportunities for learning about language, objects, and locomotion based on videotapes of one infant’s entire day, one day per month, for his first 18 months. Inputs were indeed interleaved and concurrent, with language from caregivers of shortest durations and most frequent, interactions with objects of longest durations and least frequent, and self-produced locomotion in between. We found that active locomotion increased with age. We did not, however, find an increase in object interactions or language from caregivers as age increased. There was also a significant amount of time during which none of the three inputs we examined (language, contact with objects, and active locomotion) were present.

Motivated Visual Bias of Tempting Romantic Alternatives
Thomas Geib, Psychology
Sponsor: Professor Emily Balcetis, Psychology

Happy romantic relationships are marked by positive illusions about one’s partner. People who are satisfied with and committed to their current romantic relationships tend to physically perceive their partners as being more physically attractive compared to either the partners themselves or compared to independent raters’ perceptions. These positive illusions serve as a glue that helps to keep relationships together. But while one may perceive one’s partner as more physically attractive than he or she actually is, if one meets someone else who is both available for a relationship and more objectively attractive than even one’s overestimation of one’s partner, what keeps one from being tempted away by this new person? With this research, I test whether people unconsciously hold negative illusions about this new person’s attractiveness, physically misperceiving him or her as uglier than independent raters would. I demonstrate that people defend against attractive alternatives to their romantic partners by applying negative illusions to these individuals, but only do so when that alternative person is single, and thus represents a clear temptation.

Human Rights Violations and Terrorist Activities
Raphael Giannini, Politics
Sponsor: Professor Michael Gilligan, Politics, and Professor Abdul Noury, Politics

If the ultimate goal is to curb the frequency of terrorist attacks, what kind of human rights regime should a country pursue? The prevailing theory suggests that, when measured independently, respect for both physical integrity rights and political rights should reduce the frequency of terrorist activities, although there are still sound theories that suggest that a less forgiving regime is better suited to deal with the terrorist problem. This study contends that a respect for human rights in a given country should result in a decrease in terrorist activities, and tests this hypothesis by measuring the effect of political rights in conjunction with physical integrity rights on terrorism. Furthermore, this study contends that when measured together, the relationship between physical integrity rights and terrorism will be weaker and the relationship between political rights and terrorism will be stronger than when measured separately. Findings were ultimately mixed, with physical integrity rights behaving as expected, and political rights exhibiting a more complicated relationship.

The Socioecological Impacts of Refugee Camps: The Case Study of Liberia, 1990–2010
Emily Gilbert, Environmental Studies
Sponsor: Professor Anne Rademacher, Social and Cultural Analysis and Environmental Studies

Refugee crises can occur rapidly, necessitating the expedient implementation of essential infrastructure and basic services. The process of creating refugee settlements involves the integration of a complex array of factors, with potentially competing interests from national governments, international and bilateral agencies, and local communities. Recent policy from the United Nations, notably the High Commissioner of Refugees (UNHCR) and the United Nations Environmental Program (UNEP), has promoted a more holistic approach to settlement policy, encouraging the settlement to function within the existing sociopolitical framework, while simultaneously seeking to avoid environmental degradation. However, this integration proves problematic with regards to the temporary definition of refugee camps, which artificially restricts a settlement’s access to permanency and tenure. This definition is the product of international and domestic factors, and is deeply ingrained in humanitarian aid policy, making its elimination difficult. The lack of permanent demarcation and agency thus perpetuates an imbalanced relationship.
between refugees and their socioecological system. I define a socioecological system as a system in which the biological interactions between living organisms and their non-living, physical environment is directly impacted by the state of the socioeconomic system, which, in turn, has evolved in tandem with its surrounding ecosystems. This research utilizes the evolution and eventual resolution of the Liberian Civil Wars (1989–1996 and 1999–2003) to illuminate the multifarious interactions surrounding the policy and implementation of refugee settlements. Using UN-published literature and media, data of refugee settlements, and an independent geospatial analysis, I determine that the temporal definition of refugee camps in international policy, in conjunction with the lack of socioecological integration, impedes an environmentally sustainable projection for refugee settlement.

**Depression as a Predictor of Alcohol Outcomes**

*Jesse Glaze, Psychology*

*Sponsor: Professor Patrick Shrout, Psychology*

National epidemiological studies have found that depression and alcohol use disorders often co-occur. We used a mixed-model analysis to examine the relationship between alcohol use and depression in urban college students. We analyzed data from a survey of over 1,000 college students at NYU and Columbia given every two months for one academic year. The independent variable was level of depression as measured by the Center for Epidemiological Studies depression scale. Dependent variables include frequency of alcohol consumption, quantity of alcohol typically consumed in one session, frequency of binge-drinking behavior, mean score on the Rutgers Alcohol Problem Index, and mean response to stress-relief items on Simpson, Arroyo, Miller and Little’s Desired Effects of Drinking scale. Students with higher depression reported more alcohol problems and stress-relief reasons for drinking. Binge drinking, amount of drinking, and frequency of drinking were not different between depressed and non-depressed students. The data suggest that depression may be a risk factor for problems with alcohol, possibly as a result of drinking alcohol with the purpose of relieving stress. However, these differences are not visible in the basic aspects of drinking behavior (frequency and amount).

**Refining the Kot Diji Ceramic Chronology and Degree of Inter-site Interaction in the Indus River Valley**

*Megan Golightly, Anthropology*

*Sponsor: Professor Rita Wright, Anthropology*

The Indus civilization, along with Egypt and Mesopotamia, was one of the first three states to develop during the third millennium B.C.E. and, of those three states, the least understood. One of the questions that has yet to be answered surrounds the period prior to the Urban period. Known as Early Harappan (2600–2400 B.C.E.), this period features a ceramic style called Kot Diji. A selection of 64 ceramic shards identified as Kot Diji from the site of Harappa was the focus of this study, which included comparison to ceramics from the site of Rehman Dheri and the site eponymously named Kot Diji. Using the results from published excavation reports in conjunction with my primary research, I determined the degree of measurable similarity which led me to make informed predictions about the interaction among the studied sites. The data suggest a statistical correlation beyond the visual similarities of particular types, namely black on red jars that made up two thirds of the sample. This was further broken down into three subcategories and two sizes. A comparative study using four shards from Rehman Dheri shows that there is indeed a shared typology of size and shape between the site assemblages. However there seems to be a difference in technology used to produce the slips between the sites. Further research and larger samples are needed to strengthen these hypotheses and conclusions.

**Neglect Severity and Relationship Quality in Maltreated Foster Siblings**

*Lauren Gonzales, Psychology*

*Sponsor: Professor Oriana Linares, Mount Sinai School of Medicine*

Siblings placed together in foster care can serve as a much needed support system for each other throughout the transition process. Those children however, who enter the foster system as a result of abuse and neglect in their previous homes are considered at risk for modeling negative social behaviors that transfer to the sibling relationship. In this study, we focus on the consequences of neglectful environments for foster children who have experienced neglect, using a combination of subtype and severity ratings to find an overall index of neglect severity for each sibling pair. We then examine the relationship between severity of neglect experienced and overall quality of the sibling relationship. It is hypothesized that higher ratings of neglect severity will result in lower sibling relationship quality, demonstrating implications for the importance of specialized treatment options for maltreatment history in this vulnerable population.
Reminders of a fearful experience can evoke fear even in the absence of any imminent threat. Persistent fear can be maladaptive, and thus it is important to discover techniques that reduce it. Two such laboratory methods are passively extinguishing the association between a conditioned stimulus and a stressor or exerting control to avoid a stressor. Research has shown that rodents who experience control over a stressor show a diminished conditioned fear response during subsequent fear conditioning. Control appears to confer resilience in the later aversive situation. Here, we directly compare the efficacy of extinction and avoidance in reducing fear expression. On day one, both an extinction and an avoidance group undergo fear conditioning. Next, the extinction group passively observes that the stimulus is no longer reinforced with shock. The avoidance group will learn to avoid shocks, thus diminishing fear expression. Both groups will be tested for any return of the fear response the next day. Our study is unique in that the effects of prior controllability are being assessed on the same fear-eliciting stimulus that was previously avoidable, while previous research has only demonstrated the fear-mitigating effects of controllability in a novel context. Counterintuitively, our results show that the avoidance group displays a reduced fear response on the second day even though participants no longer have control. We hypothesize that control-induced inhibition of the amygdala, via the vmPFC, reduces fear expression. Additionally, the avoidance group exhibits less of a fear response than the extinction group when tested on the second day, suggesting that prior control may be more effective than extinction at preventing the recovery of fear.

American Stereotypes in French Cinema: A Vital Role in Reaffirming National Identity
Kristina Grosspietsch, Anthropology
Sponsor: Professor Susan Rogers, Anthropology

For over two centuries, French and American societies have amassed a set of stereotypes about the other, both positive and negative. My project focuses on a repertoire of conventional images that France has affiliated with the United States. Starting with widely read accounts of travel in the US by French authors, I systematically collected a set of images that were recurrent in these texts, images that seemed to hold a multitude of meanings and were deeply entrenched in French common knowledge. I then investigated French cinema, specifically films made between 1945 and 1975, to see if these symbols were present in other areas of mass media. When used, these established images were often juxtaposed with a French counterpart. I argue, then, that these images serve not only as publicly accepted symbols for America, but as tools for French society to continually redefine its national identity. In fact, I contend that these images that seemingly serve only to depict or generalize America, are often a celebration or critique about French society itself.

The Variation of Asylum Recognition Rates among European Union Member States
Negin Hadaghian, Politics
Sponsor: Professor Abdul Noury, Politics

Since the Tampere Council of 1999 and the development of the Common European Asylum system in 2001, the harmonization of national laws on asylum has been pushed to the forefront of the European Union’s political agenda. Although within the EU the imperative for deeper cooperation is present, the variance between asylum recognition rates among the 27 E.U. member states is consistently on the rise. This has led to what many refer to as the “asylum lottery,” in which an asylum seeker’s chances of being granted refugee status differ dramatically from country to country. This study examines country-specific economic and political factors that may be driving this divergence of asylum recognition rates in the EU. By regressing recognition rates with political factors, such as the prevalence of the extreme right and the force of a member state in the European Parliament, along with economic factors, such as GDP and unemployment rates, I establish that economic factors are the greatest determinants behind the disharmony of asylum recognition rates and this “lottery” phenomenon that the EU is trying so desperately to remedy.

How Understanding Land-Use Values in New York City through the Community Garden Conflict Lends Perspective to the City’s Approach towards Alleviating the Food Desert Crisis
Sarah Henderson, Environmental Studies
Sponsor: Dr. Julianne Lutz Warren, Liberal Studies Program

In 1999, Mayor Rudolph Giuliani auctioned off 114 community gardens in New York City to developers without the consent of gardeners, local community boards, or the New York State Government. This bold action exemplified his ideology regarding urban restoration: “welcome to the era after communism.” I analyze how the disparate values of city government officials involved with the development of community garden properties and citizens engaged in the counter-cultural discourse that fought for the non-monetized/commoditized value
of urban public land for social engagement and general welfare have resulted in the current state of garden regulation. Through the values intrinsic to land-planning and land-use policy decisions, I demonstrate how New York City’s current food-system planning has been limited; it continues to operate within a similar value framework to address the food desert crisis, and does not explore the potential contribution of urban agricultural efforts. I suggest that New York City allot permanent ownership of the land to community gardens. This would lay to rest the decade-long fight for community gardens’ right to land, and entrench gardens as an integral component to food systems planning to alleviate the food desert crisis.

My Roof, My Rules: Paternalism in Homeless Shelters
Sophia House, Economics
Sponsor: Professor Elizabeth F. Cohen, Robert F. Wagner School of Public Service

Homeless shelters often require their clients to wake up at 6am, to sober up, and to shower before spending the night in a shelter bed. In fact, some of the rules common in homeless shelters—for instance, “no fighting” and “lights out at nine”—sound a lot like the house rules a parent might impose upon a child. But to what extent do these interventions achieve their desired ends, and what effect do they have on the dignity and personhood of people experiencing homelessness? This project was undertaken to examine the reasons that homeless people might have for avoiding using homeless shelters. I argue that many shelter policies are paternalistic and may be subjected to criticism on the basis of Children’s criteria in Who Should Decide? Furthermore, I call for greater attention to dignity and personhood within the analysis of social policy, and question the effectiveness of paternalistic interventions as measures to end homelessness. I end my discussion with an exploration of alternative models of social services.

A National Language? Bilingual Ballots and the Voting Rights Act
Brenda Hwang, Politics
Sponsor: Professor Rebecca Morton, Politics

The nation’s changing demographics present new challenges to ensuring an equal voice for linguistic minorities who have yet to be fully integrated into the American political system. As a result, protecting the rights of these citizens requires examining the effectiveness of language provisions under Section 203 of the Voting Rights Act of 1865. Although the VRA has been instrumental in giving a vote to previously disenfranchised groups, it is unknown how this provision has shaped the behavior of these voters, namely Asian Americans. Known as the fastest growing minority group in the United States, Asian Americans have faced numerous difficulties in achieving equal representation, including their immigrant status, diverse nationalities and cultural backgrounds, and lack of overall group cohesion. The ongoing debate about language assistance reflects the potential challenges faced by minorities who are at risk for exclusion from the U.S. political system. In this research I examine the opposition to language assistance and the consideration of other public policies that protect minorities’ access to the polls.

Gay Rights: HIV/AIDS Prevention and Treatment Spending Determinant
Christopher Johnson, International Relations
Sponsor: Professor Peter Rosendorff, Politics

The increasing urgency and global monetary commitment to HIV/AIDS in the developing world invites research on the institutions that influence development health aid allocation. I examine the importance of gay rights in this decision-making process for foreign donors and domestic budgetary actors. I use standard OLS regression to determine the effect of gay rights on national spending on HIV/AIDS prevention and treatment programs in the developing world by three funding categories: internationally sourced, domestically sourced, and the combination of the two factors. Legality of same-sex activity has a significant and positive relationship with domestically sourced spending. The age of consent has a significant negative relationship with internationally sourced spending. These findings offer both domestic budgetary actors and international donors more relevant information in making their funding decisions. It also offers another mechanism for greater coordination of efforts between LGBT and HIV/AIDS activists.

Chinese Orphanage Care of Preschool Children with Disabilities
Lee Helen Johnson, Social and Cultural Analysis
Sponsor: Professor Joanna Waley-Cohen, History

There has been little academic study of orphanage care in China within the last decade and even less on the current care of disabled children who make up an increasing percentage in Chinese orphanages. The abandonment of healthy female infants, widespread in the 1990s in the wake of China’s One Child Policy, has rapidly declined in response to massive economic development and lower fertility. I spent June and July 2010 investigating how the Hefei Orphanage, as a case study, has evolved in response to rapid socioeconomic changes and global forces brought in through NGO programs and private donations. Today,
the majority of children in Chinese orphanages (including the Hefei Orphanage) are disabled physically or cognitively. Through participant observation, I spent time in the classrooms of these children (ages 2–7) researching the facilities, demographic of disability within the classes, and methods and curricula used for teaching. I studied the ways in which the community within the orphanage reflects a holistic approach to treating and accommodating physical and cognitive impairments. Through observation of how classrooms and foster families collaborate to support children, this research investigates issues of disability and child development within the context of Chinese orphanages.

**Contagion in Two-Tiered Banking Structures: A Network Analysis**

Rupal Kamdar, Economics and Mathematics  
Sponsor: Professor Douglas Gale, Economics

This paper assesses the impact of the structure of a banking system on the propagation of contagion. Network analysis is used to construct theoretical two-tiered banking structures, that is, financial systems with a few highly connected institutions and several less connected institutions. Each system is defined by a set of parameters including concentration (number of institutions), connectivity (the likelihood a bank has a credit link with another bank), and capitalization (amount of capital held against liabilities). Varying each parameter individually, then applying an idiosyncratic shock to one bank at a time and averaging how many institutions fail, we evaluate the effects of structural parameters on spillover defaults.

**Student Movements and Public versus Private Universities in Greece**

Nicole Electra Karatzas, Hellenic Studies  
Sponsor: Professor Liana Theodoratou, Hellenic Studies

The right to free and quality education is a time honored one in Greece. Article 2 of the Maastricht Treaty of 1991 declares that the movement of goods, services and persons must be free and unrestricted throughout all member states of the European Union. This means that member states such as Greece must recognize and allow private universities to operate within the country. However, the Greek Constitution strictly prohibits the legalization of private universities, creating an exclusively public character of higher education in the country. A sizable portion of the Greek public has fought privatization at the university level. This is due to the fact that many Greeks are opposed to the idea of exposing traditional, public Greek universities to competition from private universities. Leading the opposition against the legalization of private universities are students, who have been some of the country’s loudest protestors on all things political since the Greek Civil War (1944–1949). The Greek public is concerned that a drop in the quality of public education will follow the establishment of private universities. And despite any arguments in favor of healthy competition within the market of education, the opposition cannot imagine a Greece in which public and private universities can harmoniously coexist. I examine what seems to be a uniquely Greek phenomenon: a Greek student body and academia that strongly oppose any threat to the public education system, and the assurance of quality and free education to all of Greece’s citizens.

**When Money Matters: Foreign Direct Investment and Institutional Instability**

Yasmin Karimi, Politics  
Sponsor: Professor Abdul Noury, Politics

We recently witnessed an unprecedented destabilization in the Middle East and North Africa, resulting in riots, protests, and uprisings that have shocked many of the most stable regimes in the region. While causes of instability are often attributed to economic development or regime type, neither of these factors successfully predicted the current crisis. In order to understand what leads to the unanticipated collapse of seemingly stable governments, it is necessary to examine the possible negative impacts of foreign economic intervention on institutional stability on a broader, more global scale. Following prior models of foreign economic intervention on domestic stability, the study tests whether long-term Foreign Direct Investment inflows have an impact on government stability and...
conflict. Using cross-country time series data from the World Bank, the International Country Risk Guide, and Major Episodes of Political Violence, the study measures the effect of FDI on a country’s political risk and stability from 1960–2009. The results allow us to conclude that stability is not caused by a potential reverse causality between the variables and furthermore, that greater FDI reinforces stability. The implications of the study have an urgent relevance to current policy decisions, and suggest that crises may be averted through greater international economic integration.

What’s a Girl to do? How Transgender Women in New York City Overcome Barriers to Healthcare Services  
Jacob Kirkorowicz, Anthropology  
Sponsor: Professor Rayna Rapp, Anthropology

The spread of HIV/AIDS among sexual minority populations in New York City has declined since the 1990s due to new public health intervention models that emphasize community empowerment and culturally sensitive health education. Male to female transgender communities in New York City have been largely ignored and continue to experience a high prevalence of HIV/AIDS and other health crises. A combination of political structures and cultural prejudices make it difficult for transgender women to secure housing, employment, and health care. To understand the challenges that transgender women face in accessing health care and housing, I conducted ethnographic fieldwork at four transgender-focused health care and social advocacy organizations in Manhattan and Brooklyn. Staff members were asked to describe the challenges that their clients face, how their organization addresses these challenges, and their perception of the broader sociopolitical barriers to health care access. Through my ethnographic analysis I came to understand these organizations as channels through which transgender communities mobilize to understand and address community health crises. By giving transgender women the opportunity to become active in community life, these advocacy groups provide individuals with the skills and support to overcome socially constructed barriers to health care access.

The Effect of Empowerment on Recovery of Formerly Homeless Individuals Enrolled in the Peer Wellness Program  
Catharine E. Krebs, Psychology  
Sponsor: Ms. Ana Stefancic, Pathways to Housing

Pathways to Housing provides permanent housing and consumer-driven supports to homeless individuals with mental illness. Aligned with Pathways’ client-oriented model, Pathways’ Peer Wellness Program (PWP) offers wellness services that are delivered directly by fellow consumers who have completed peer specialist certification training. This research seeks to determine the efficacy of the PWP, including the relationship between empowerment and recovery of consumers of the PWP. In face-to-face interviews, participants were administered several measures of empowerment and recovery. Using linear regression analyses, we found empowerment to have a significant positive relationship (p < .05) with recovery and less frequent psychiatric symptoms. Participation in the PWP likely increases various aspects of empowerment such as hope, self-esteem, optimism, and social functioning, which in turn enhance recovery rates of formerly homeless individuals with psychiatric disabilities.

Can Appreciating Black Culture in the United States Alter Implicit Bias towards Barack Obama?  
Kyle Kozman, Psychology  
Sponsor: Professor Tessa West, Psychology

This study examined whether priming participants with racial information could alter their implicit biases towards members of a racial minority. Previous research has shown that participants will rate bi-racial targets more negatively if the target face has been altered to look more phenotypically Black (by altering facial features such as lip, nose and forehead size). The present study attempted to find conditions under which racial priming would cause a reverse in this bias, leading to higher ratings for a more phenotypically Black faces. We primed 68 participants with either a Motown, Election or Control task, then asked them to rate Barack Obama while exposing them to Afrocentric or Eurocentric images. We found an interaction effect such that high-prejudice individuals rated an Afrocentric Obama more positively when primed with Motown, while the opposite was true for low-prejudice individuals. These results could be used in future research on our ability to recognize and change our implicit negative biases towards African Americans, especially those in positions of power.

Conflicted: Press Freedom during Wartime  
Randy Kreider, International Relations and Journalism  
Sponsor: Professor Alastair Smith, Politics

During times of war, there have been many situations in which the need for military secrecy has trumped the need for a free press. Governments often argue that they need to restrict the publication of certain information for strategic or national security reasons. However, others argue that leaders, in the interest of political survival, are looking to cover up their battlefield blunders. While
there has been a good deal of discussion about the issue, there has been no major empirical research looking at the effect of conflict involvement on press freedom around the world. This study seeks to fill that gap by evaluating the effect of war on press freedom through linear regression analysis using data from the Freedom House Press Freedom index. The results suggest that while other factors, particularly regime type, play a much larger role in determining a country’s press freedom, there is still a statistically significant negative effect from conflict involvement. Further, the effect of conflict on press freedom is greater for major wars than for minor conflicts, for civil wars than for international wars, and perhaps most interestingly, is greater in democracies than in autocracies.

**Bridging the Gap: Sensitivity to Bridge Width and Gap Depth in Crawling Infants**
Jennifer Kung, Psychology
Sponsor: Professor Karen Adolph, Psychology and Neural Science

A bridge is a means for traversing a precipice. Previous research showed that walking infants gauge possibilities for locomotion over bridges based only on bridge width, not drop-off height, suggesting that they disregard consequences of falling from greater heights. Here, we tested 11-month-old crawling infants on bridges varying in width (2-60 cm) and drop-offs varying in height (17 and 71 cm). I coded whether infants attempted or avoided crossing, how infants explored the bridge and precipice, how infants modified their crawling gait to cross, and different ways that infants fell. Infants actively explored the obstacle by looking and touching, and accurately perceived possibilities for crawling: avoidance, latency, touching, and gait modifications increased on narrower bridges. Infants were generally careful about hand placement, and falls usually resulted when infants allowed a leg to slide off the bridge. Further analyses will examine whether crawlers, like walkers, disregard drop-off height, or become more reticent on higher drop-offs, suggesting that they take into account the different penalties for error.

**Psychopath Next Door: Psychopathic Roommates Influence Relationship Quality and Mental Health**
Nah Young (Grace) Lee, Psychology
Sponsor: Professor Patrick Shrout, Psychology

Psychopathy is the tendency to value one’s own well-being with no regard for the well-being of others. This study investigated how psychopathy of one college roommate affected relationship quality and mental well-being of the other roommate in roommate dyads. We hypothesized that those living with a psychopathic roommate would be associated with progressively lower relationship quality over the academic year. We also hypothesized that those exposed to psychopathic roommates would experience more psychological distress than those living with non-psychopathic roommates. We had 870 participants completing up to four assessments every two months from October to April. The Levenson Psychopathy Scale was used to measure primary and secondary psychopathy traits. As expected, the results from a multi-level analysis suggested that living with a roommate with high primary psychopathy did lead to poorer relationship quality over time, but we also found that roommates of persons with high primary psychopathy were initially well liked. Contrary to predictions, persons living with roommates with high psychopathy did not experience increased mental distress over the academic year.

**Functional Data Analysis of Economic Bubbles: Creating a Coherent Shape of Inflationary Phenomena**
Benjamin Levine, Economics
Sponsor: Professor James Ramsey, Economics

Throughout history, individuals and countries have lost fortunes due to anomalous spikes in prices and their subsequent, dramatic decline. How does one evaluate economic price bubbles comprehensively? Using functional data analysis, we can delineate a consistent dynamical process that drives prices during these periods of inflation and subsequent price collapse. Turning away from the influence of specific, theoretical, external factors and turning instead to the basic mathematical structure of bubbles allows for an analysis that is more applicable to a wide range of contexts. This research evaluates a set of historical bubble events that vary in context and circumstance. Using these data sets, we can complete a formal analysis of these anomalous price curves and define an underlying dynamical system that accounts for the shape and cadence of prices during a bubble. This analysis, in turn, can be used to predict whether prices will indeed result in an inflationary bubble. It can also be used to predict, with relative precision, when prices will hit a peak and begin a precipitous fall back to equilibrium.

**Ecological Consciousness: An Ethnographic Study of Social and Economic Phenomena in the East 92nd Street Greenmarket**
Johanna Lovecchio, Metropolitan Studies
Supervisor: Professor Caitlin Zaloom, Social and Cultural Analysis

This research explores the social and anthropological construction of ecological consciousness at the Greenmar-
market at 92nd Street in Manhattan, New York. Ecological consciousness results from the unique intimacy of interactions between sellers and buyers that take place at the market. This research is a result of careful observations of these interactions and physical movement at the market and the resulting social and economic phenomenon. The construction of ecological consciousness relies upon interactions that span cultural connections, social engagement between sellers and buyers, temporal references to seasonality, and linguistic particularities. The result of these unique relationships and interactions is a new set of criteria by which to understand food as a commodity that differs from the typical experience of the supermarket shopper. The formation of ecological consciousness at the Greenmarket challenges the normative understanding of the relationship between the urban and the “natural” worlds. The farmer’s market situates the city in terms of ecology and environment and redefines how we understand the two as interactive as opposed to irreconcilable.

Guatemalan Female Refugees: Crime, Persecution, and One Woman’s Quest for Asylum
Isabella Maier Moschen, Journalism and Latin American Studies
Sponsor: Professor Brooke Kroeger, Journalism

In 2006, a Guatemalan woman named Margarita fled her home country to escape a past of domestic abuse, attempted kidnapping, and perniciously ineffective law enforcement. With only her oldest son and a small suitcase, she left behind her five other children, all under the age of 20, to come to the United States. She believed her children would soon join her in New York. But five years and more than ten court appearances later, Margarita’s asylum status remains uncertain. Her five young children are still in Guatemala. Through the lens of one woman’s story, this journalistic endeavor explores how gender-based violence in Guatemala has created female refugees who challenge our traditional criteria for granting asylum. Although Margarita’s hearings were closed to the public and the transcripts are sealed, she gave me permission to attend and observe her recent court proceedings. Through interviews with immigration lawyers, human rights groups, Peace Corps volunteers stationed in Guatemala, psychologists and New York-based resettlement organizations, my research determines that despite equal rights on the books, Guatemala’s laws have failed to protect women from gender-based assault and persecution. When these women seek refuge in the United States, our judges, lawyers, and advocates strain to fully comprehend and accommodate their cases - with potentially grave consequences. My findings beg the question: is it time for our asylum laws to adapt?

Laura Marcucci, Silver School of Social Work
Sponsor: Dr. Andrea McKenzie, Expository Writing

Approximately 17.8 million citizens of Italian origin live in the US; the Italian community is one of the largest ethnic populations in America. Have family dynamics changed over the years to make the Italian-American family more “modern”? How and when did such changes occur? Through an analysis of secondary published research and interviews with Italian immigrants in the U.S., I discover that immigration patterns changed radically from the beginning of the century to the end: the focus of migration changed from being money-oriented to knowledge-oriented. In addition, a more modern and independent relationship developed between husband and wife, and family and extended family.

Between the Street and the Home: Tent Cities and Seattle’s Homeless
Hannah Murphy, Journalism and Sociology
Sponsor: Professor Frankie Edozien, Journalism

In 1990, Seattle saw its first tent city: a homeless encampment built on a vacant lot in an industrial district. Concerned for Seattle’s image, the mayor swiftly herded the campers into shelters and transitional housing, but the social and economic conditions in Seattle were left unchanged. So in 1998, “Tent City 2” was formed and, within weeks, met a similar fate. But the need for another option for homelessness remained. Finally, in the spring of 2000, the Seattle Housing and Resource Effort (SHARE) met with the mayor, and negotiated the groundwork for a semi-nomadic but permanent homeless encampment in Seattle: “Tent City 3.” Tent City 3 celebrated its tenth anniversary last summer, and is now accompanied by two other encampments around the city. Together, they house approximately 300 residents at any one time. This research investigates the tent cities’ unique approach to homelessness, and how they impact the greater homeless community in Seattle. I demonstrate how small, private organizations make seemingly negligible contributions to the challenges faced by Seattle’s homeless—contributions which, in fact, created a tightly woven network that eventually formed one of the most valuable resources for homeless communities in the United States.
A Toxic Inheritance: The Local Legacy of Agent Orange
Dyan Neary, Journalism
Sponsor: Professor Brooke Kroeger, Journalism

When the U.S. government dropped 350,000 tons of Agent Orange across the forests of Vietnam throughout the 1960s, it claimed the chemical defoliant would cause no harm to humans. Some soldiers even doused themselves in the herbicide to demonstrate to the Vietnamese how harmless it was. It is now accepted that a major byproduct of Agent Orange was dioxin, arguably the most toxic chemical known to man. While the Department of Veterans Affairs compensates the children of both male and female U.S. veterans for some health conditions, it has never officially acknowledged dioxin to be a teratogen, a disruptor of the development of a fetus. Over the past decade or so, and as recently as February 2011, new studies have indicated a link between dioxin exposure and reproductive problems, including birth defects. Animal and human studies have shown evidence of birth defects among offspring where only the male parent had dioxin exposure. Months of research and investigation, including interviews with dozens of top scientists, congress people, chemical manufacturers, medical geneticists and veteran families, culminated in my thesis in the form of a journalistic feature article. The piece presents new evidence that dioxin permanently alters the ovaries and sperm of those exposed for decades afterward and can even change the gene expression, potentially affecting descendants for generations. My thesis also demonstrates the flawed system by which doctors and genetics counselors assess high-risk pregnancies and children born with birth defects.

Preschoolers’ Explanations for Moral Actions in a Social Context
Tri Nguyen, Psychology
Sponsor: Professor Marjorie Rhodes, Psychology

This study investigates how children explain moral actions that occur in an inter-group context. Participants are presented with a story in which two novel groups are engaged in a competition, and then with scenarios in which one group member does either a helpful or harmful action to a member of the same group or to a member of the other group. Participants are then asked to explain why the agent engaged in the action. These explanations are then interpreted to be based on either social categories or individuals. This study is designed to test whether children refer to different causal mechanisms to explain helpful and harmful actions depending on the group membership of the agent and recipient.

A Sociolinguistic Investigation of Dual Language Education
Marian O’Neill, Spanish Language and Literature
Sponsor: Professor María de Lourdes Dávila, Spanish and Portuguese

I set out to investigate the Dual Language program offered in New York City public schools, particularly those schools which use two-way (bilingual) immersion programs, enrolling a balance of native English speakers and native speakers of the partner language. This research investigates the success of the dual language program with respect to the populations of the students who comprise the classrooms, as well as how the program benefits a range of participants. Factors of race, ethnicity, socioeconomic background and the education of the parents are considered when studying the classroom makeup. This project focuses on a second-grade, two-way Spanish immersion classroom at a New York City public school. I administered parental questionnaires and compared reading levels across the grade, with an interest in comparing this particular classroom to the General Education class and the Gifted and Talented class at the school. I establish that there is a link not only between academic success and biliteracy and bilingualism for all students, especially English Language Learners (ELLs), but that an equal balance of both language models is vital.

Racial Consciousness Education and Adolescence in America
Lilly Padia, Social and Cultural Analysis
Sponsor: Professor Mary Louise Pratt, Social and Cultural Analysis

Public secondary education in the United States inherently incorporates topics that relate to and implicate race. The U.S. has a history and legacy of racialized policies, practices, and institutions that render race an omnipresent dynamic in current society. However, race is a concept that is not often overtly discussed or addressed in a facilitated setting. A great deal of the literature and curricula that has been produced in the United States around racial consciousness and racial justice is geared towards college-educated or adult subjects. This study explores the importance of introducing education that explicitly raises racial awareness and consciousness at an earlier stage: during adolescence. Adolescence is a critical period for cognitive, emotional, and social development and a time during which identity formation is actively occurring. Facilitated discussions on racial issues and racial identities during adolescence can prepare individuals to be engaged and effective citizens by equipping them with tools for self-reflection, community analysis,
and broader systemic social understandings of race as they transition into adulthood.

**Self Representation of Women’s Gender/Sexual Identities in Grooming Behavior**  
*Katherine Pan, Sociology*  
*Sponsor: Professor Ruth Horowitz, Sociology*

The fact that few researchers have examined the widespread behavior of female body hair removal speaks to its acceptance as a commonplace action that goes unquestioned and seems almost trivial. It requires a certain amount of work for women to remove their hair even though the hairless, “feminine” look is supposedly something that comes “naturally” to women. Previous studies examining the female body hair ideal have been conducted on college-aged women in America, the United Kingdom, and Australia, have focused on large-scale statistical analyses, and have determined that the majority of these women removed their leg and armpit hair, and increasingly groomed their pubic hair as well. My research takes a more qualitative approach through in-depth interviews, in examining this paradox between natural adult bodily development and the varying levels of social acceptability of visible body hair on women. My findings corroborate past studies on frequency and method of female body hair grooming. Furthermore, I argue that though women use hygiene and personal aesthetic preference reasons to justify their grooming behavior, they are really more influenced by the desire to conform to a social norm and not be stigmatized by others for having visible body hair.

**Infants’ Understanding of Others as Multilingual**  
*Casey Pitts, Psychology*  
*Sponsor: Professor Athena Vouloumanos, Psychology*

Humans have the capacity to learn and speak more than one language; indeed, the majority of the world’s population is multilingual. Infants’ understanding of this capacity, however, is still unclear. Do young infants expect that an unfamiliar person could understand more than one language? Using a live-action presentation, 20-month-old monolingual English infants observed a silent actor separately receive information about the locations of hidden objects from two different actors in either English or Spanish. The silent actor then searched for the hidden object appropriately or inappropriately. If infants assume unfamiliar people can understand only one language, infants should look longer when the actor searched in the incorrect location, compared with the correct location. However, when the silent actor received information from speakers of two different languages, infants tended to look longer when the silent actor searched in the correct location in response to both languages. This suggests that monolingual infants expect unfamiliar people to understand only one language, though not necessarily the infants’ own. These results may have implications for infants’ understanding of language and their choice of conversational partners.

**Consuming Community: The Significance of Daily Food Practices to Community Belonging and Social Exclusion in a Gentrifying Neighborhood**  
*Anika Pyle, Metropolitan Studies*  
*Sponsor: Professor Thuy Linh Tu, Social and Cultural Analysis*

Food practices, the most intimate and quotidian of our consumptive practices, provide a potent lens through which to understand community imagination in gentrified neighborhoods. Residents moving into gentrifying areas do not automatically associate themselves as a community. Rather, these meanings are forged through social affiliation in shared public space. Using the unique case study of a small coffee shop in a gentrifying section of Williamsburg, Brooklyn, I elucidate how retail entrepreneurs and staff members create an environment supportive of incoming residents, vending instances of intimacy. I also show how patrons begin to feel legitimate belonging through relationships with baristas and other customers. Through meeting specific social and cultural needs, cafes like this one come to be seen as community spaces or as “bettering” the community. Yet these eateries, the food they serve, and the values they confer are connected to previously learned valuations associated with class, such as local food, organic, fair-trade practices, or more artisanal production techniques. Opportunities for community performance are tied to specific types of classified tastes and the acquisition of certain types of symbolic capital. This creates social inclusion and exclusion, realized through food practices, that becomes both agent and signifier of gentrification.
The western view of human rights emphasizes an individual’s right to be safe and free. However, post WWII, the international community began to question how to address collective rights. The modern nation-state often has multiple distinct ethnic, religious, and cultural populations, which in many instances divide into a majority population and numerous minority groups. If human rights protections are considered an important component in the foreign aid allocation process, are collective rights important as well? Using Official Development Assistance data from the Organization for Economic Cooperation and Development for G7 countries and minority group discrimination indexes from the Minorities at Risk project, I attempt to find a relationship between foreign aid minority rights treatment in recipient countries. I find that minority rights appear to be relatively insignificant in the aid process, although there is variation depending on the recipient countries’ region. Furthermore, minority rights may be considered more important in the decision to give aid rather than in the determination to give an amount of aid.

Barack Obama’s presidency provides a unique opportunity to study race’s effect on formation of public opinion of a president from a minority racial group. Previous research suggests that anxiety in interracial interactions has a number of negative effects, one of which is the potential to increase automatic stereotyping. The question remains as to whether interracial interaction anxiety increases Whites’ use of automatic stereotyping in subsequent evaluations of Blacks. We predicted that increasing the anxiety of an interracial interaction would increase differences based on Obama’s racial phenotypicality in evaluations of Obama. Our findings show that under conditions of low interracial interaction anxiety, the well-documented preference for Eurocentricity is replicated. Higher interracial interaction anxiety, however, predicts preference for Afrocentric faces over Eurocentric faces, possibly due to low-prejudice Whites’ motivation to compensate for appearances of prejudice in anxious interracial interactions. Since political attitudes affect political behavior, these findings have implications for voting tendencies, and show that the effects of interracial anxiety are complex and merit further study.

Despite the Internet’s ubiquity, it is not universally accessible to those with disabilities. In particular, for 15 million visually impaired Americans, this “great equalizer” can be challenging to navigate, even with specialized software. Depending on the degree of vision loss, users have either a screen magnifier, which enlarges the text, or a screen reader, which translates certain parts of HTML coding into speech or Braille. Thus, if a Web designer does not label images and links properly, the page can become a confusing maze. As another example, screen readers, incompatible with vibrant Flash sites, will translate a blank page. Just as brick-and-mortar public places must be accessible, so should equivalent virtual spaces. Lawsuits against public universities and companies, such as Target and Disney, have raised the issue’s profile, but until disability laws are revised to apply to the digital age, discrimination, albeit subtle, will continue on the Web. But beyond laws, companies must be thoroughly educated about the benefits of incorporating accessibility, such as improved search engine optimization for their sites. Through this two-pronged approach, all Web users can expect an accessible Internet.

What country conditions breed terrorism? Relative deprivation theory holds that instead of an absolute standard of deprivation, a gap between expected and achieved welfare leads men to political violence. My research examines whether levels of unemployment and higher education that reflect relative deprivation correspond with an increase in terrorist attacks. A recent surge in empirical studies of terrorism has shown that, contrary to popular belief, terrorists tend to be highly educated and from wealthier families than average. This study models relative deprivation by examining the effect of unemployment and tertiary education on levels of terrorism. I examine terrorist attacks from 1980 to 2008 across 56 countries to see whether the interaction effect of unemployment and higher education is positively correlated with an increase in the number of terrorist attacks. The results of my multivariate regression suggest that this interaction may be somewhat significant in countries where attacks have occurred. Additionally,
while unemployment and population size are strongly correlated with increased instances of terrorism, higher education alone has no significant relationship with a nation’s levels of terrorism. I discuss possible reasons for the significance of these indicators and the policy implications of my findings.

**Mothers with PTSD: The Mediating Effect of Parenting Stress on Child Maltreatment**

*Alexandra Rieck, Psychology*

*Sponsor: Professor Claude Chemtob, NYU School of Medicine*

A review of the literature reveals little investigation as to whether PTSD is associated with child maltreatment or the role of specific mediators between psychopathology and maltreatment risk. In the current study, we examine maternal PTSD and parenting stress as predictors of child maltreatment. Mothers receiving preventive services provided reports of their PTSD symptom severity, parenting stress, and their child’s maltreatment. Results suggested that both PTSD intensity and parenting stress were positively associated with child maltreatment, but were not significantly associated with one another.

**Legislating the Margins: Medicine, Law, and the Hegemony of the Normal in Sex Offender Legislation since 1990**

*Erika Ryan, Social and Cultural Analysis and Zoe Ginsburg, Social and Cultural Analysis and Metropolitan Studies*

*Sponsor: Professor Thuy Linh Tu, Social and Cultural Analysis*

We analyze how law, medicine and society intersect to regulate sexual deviance and police the boundaries of normalcy in the National Sex Offender Registry (SOR). Independently, law and medicine are producers of knowledge that society values as objective and neutral sources of “truth.” Working together in the SOR, these culturally privileged institutions form new power relations while reflecting, substantiating and sometimes subverting pre-existing socio-sexual norms. Medicine, which is used to determine tier and registration requirements, subsumes sexual violence into a narrative of pathology and ignores the element of personal choice in committing crimes by focusing on the “sexually violent predator,” or mentally ill people who commit acts of sexual violence against strangers. The law specifically targets and spectacularizes sexually violent predators, even though these crimes account for a small minority of the sexual violence in America. In this way, medicine and law articulate sexual violence as a problem of the individual perpetrator’s biology, and erroneously seek to prevent sex crimes by punishing and normalizing that individual, through the SOR. In short, the SOR fails to recognize that existing social hierarchies and unequal power relations are a root cause of sexual violence, which in turn precludes any possibility of reducing sex crimes by challenging the institutional inequities from which they stem.

**Entrapment or Falling: Infants’ Exploration of Action Possibilities**

*Arhanti Sadanand, Psychology, and Angela Char, Psychology*

*Sponsor: Professor Karen Adolph, Psychology and Neural Science*

Choosing actions adaptively involves sensitivity to the relevant perceptual information and appropriate weighting of the penalty for errors. We observed 17-month-old experienced walkers as they decided whether to walk through doorways of varied widths (errors resulted in entrapment) and along ledges of varying widths (errors resulted in falling). We then calculated the success threshold for each participant, or the smallest opening each infant could fit through on two-thirds of the trials. In the entrapment condition, infants attempted to walk through impossibly small openings, but in the falling condition, infants made accurate decisions, suggesting differential weighting of errors. However, infants in both groups turned sideways to fit through small openings and explored the openings more, using hands and feet, around their threshold, suggesting that infants accurately perceived their possibilities for action in both conditions.

**Revolution: Why Egypt? Why Now?**

*Deena A. Sami, Middle Eastern and Islamic Studies and Journalism*

*Sponsor: Professor Arang Keshavarzian, Middle Eastern and Islamic Studies*

After 18 days of protests, on February 11, 2011, Egyptian President Hosni Mubarak stepped down after an almost 30-year rule, leaving Egyptians throughout the country jubilant. Even though the Tunisian president resigned less than two weeks prior, the Egyptian Uprising took the world by surprise. Because of the events’ fluidity, commentators scrambled to explain the protests and their timing. Most arguments fell into four main categories: economic grievances, government weakness, civil society organization, and social media. While these four theories play a major role in explaining the events, they do not focus on the people and their changing perceptions towards police brutality—the main catalyst for the revolution, its continuation, and ultimate success. This
I performed interviews with two existing organizations for female African immigrants in NYC. I compared and analyzed this interview data, and found services for this population to be lacking. One organization, Sauti Yetu, has few in-depth programs that acculturate women to the U.S. and help relieve their trauma. Their program serves only 100 women and they admit only victims of human rights violations. African Services Committee, in contrast, serves all African immigrants, yet offers few services specific to women. Sauti Yetu should broaden its funding base to expand its services. The African Services Committee should provide services specific to women, such as women's health programs, violence outreach, and childcare.

The Effects of Armed Conflict, Terrorism, and Political Instability on International Tourism: A Cross-National Analysis
Michael Schaeppi, Politics
Sponsor: Professor Alastair Smith, Politics

The idea that conflict, terrorism, and instability have a negative effect on the number of tourists who frequent a country is widely held and often perceived as self-evident. It seems logical to assume that all-else-being-equal, an increase in the level of conflict, terrorism, or instability in a country will lead to a reduction in the number of tourists who frequent that country. Indeed, quantitative analyses have been done on the effects of conflict, terrorism, and instability on tourism within countries, and have shown that they negatively correlate with tourism levels. However, these analyses are based solely on case study and regional evidence. No one has yet conducted a global, cross-national analysis of the effects of armed conflict, terrorism, and political instability on tourist trends across countries and regions; that is the purpose of this analysis. This study finds that armed conflict and political instability have negative effects on international tourism levels, while autocracy in itself does not negatively affect international tourism to a country.

As Children Learn to Read, Eye and Ear Improve but Always Integrate Well
Wendy Schnebelen, Psychology
Sponsor: Professor Denis Pelli, Psychology

Dubois, Poeppel, and Pelli (submitted) found that adults summate words presented through eye and ear nearly perfectly. Is this ability to integrate words across senses learned through reading? Or is it already present when starting to read? If integration is learned, it should increase with exposure and ability, and should therefore correlate directly with chronological age and reading.
age. To assess this, five to ten year-olds identified words embedded in auditory and visual noise. The words were presented either to the visual system, via text, to the auditory system, via speech, or to both systems simultaneously, via text and speech. The simultaneous condition is called bimodal presentation. To estimate summation, we compared the independent unimodal thresholds to the bimodal audiovisual threshold. We find that while audio and visual thresholds improve with reading age, audiovisual summation is always nearly perfect. Eye and ear integrate well even in the youngest readers, regardless of reading experience.

The Future of Chimerica: Effects of Perceived Power Discrepancies on Willingness to Act Against an Out-Group
Bram Schumer, Psychology
Sponsor: Professor Jay Van Bavel, Psychology

This research investigated how perceived power discrepancies between in-groups and out-groups affect one’s willingness to act against an out-group. American participants’ perceptions of power were manipulated by simulated news articles about the relative strength or weakness of their in-group (America) compared to an out-group (China). Participants then had the option of acting against China by supporting a petition that imposed trade sanctions on Chinese goods, then rating their level of support for this petition. Participants also completed a money allocation task where they decided how much funding should go towards cyber security programs that defend America from Chinese cyber attacks, as well as attack China to prevent cyber attacks on America. As hypothesized, participants who perceived a power discrepancy were more willing to act against China by indicating higher levels of support for the anti-China petition, as well as allocating more money towards anti-China cyber security than participants who perceived no power discrepancy. These results were only found, however, when the direction of the power discrepancy favored China over the United States. The implications for models of intergroup conflict and international relations policies are discussed.

Nature’s Rights: Exploring Ecuadorian Environmental Attitudes
Laurel Schwab, Environmental Studies
Sponsor: Dr. Julianne Lutz Warren, Liberal Studies Program

On September 28, 2008, Ecuador approved a new constitution by a sizeable margin in a national referendum. The document acknowledges the fundamental rights of nature, making Ecuador the first nation in the world to do so. It may represent the beginning of a paradigm shift in the way humans approach the environment. The mainstream explanation for the granting of rights to nature is that Ecuador was motivated purely by economics; that is, the Ecuadorian government was supposedly using the rights of nature as a façade in order to gain back economic control from environmentally destructive foreign corporations. But bestowing fundamental rights on nature is much more than an economic answer to an economic problem. By studying historical, ecological, sociological, and ethnographic sources, I trace a more complete picture of the trajectory for nature’s rights, emphasizing its origins within Ecuador’s unique history and cultural attitudes toward nature. Fully exploring the trajectory of attitudes and events that led to the inclusion of nature’s rights in Ecuador’s constitution helps us understand the potential for this paradigm shift to occur globally. I argue that cultural and environmental attitudes are crucial factors in recognizing nature’s rights, and that communities can be motivated to make decisions based on more than economic gain or individual gratification. In countries whose environmental values are less salient or vibrant than Ecuador’s, an effort must be made by activists, citizens, and policymakers alike to unearth them.

Two Sides of the Same Coin: Human Rights of Host and Investor Countries as Determinants of Foreign Direct Investment
Chere See, International Relations
Sponsor: Professor Peter Rosendorff, Politics

The literature on the impact of human rights (HR) on foreign direct investment (FDI) is split. Some argue that host countries compete in a “race to the bottom” for investment from multi-national enterprises (MNEs), suggesting FDI goes to HR-poor countries; others suggest that respect for HR also facilitates growth of human capital, attracting FDI. Here I argue that the HR record of investor countries matters for patterns of FDI flows. FDI is attracted to hosts where HR are more similar to the investor country because HR preferences of MNE shareholders and executives are a function of national norms, consumer sanctions and shareholder discipline. OLS Regression of dyadic FDI inflows, controlled for country fixed effects, reveals that dyadic FDI flows are higher when the HR of the host and investor country are more similar. This selection effect suggests that transnational acculturation strategies to improve HR via FDI are ineffective, especially with the rise of the BRIC countries.
An Empirical Study on Immigration to the United States
Josh Sinha, Economics
Sponsor: Professor Bryan Graham, Economics

Immigration has been demonstrated to be primarily motivated, by the wage differentials between two different countries. Furthermore, if a country is far away from the host country and has a high GDP, it has been shown that there will be fewer immigrants from this country than those from a closer and less developed country. In a standard model demonstrating immigration between two countries the difference between the two countries’ per capita GDP and distance between the two countries are used. However many have argued that per capita GDP is not an appropriate indicator of the development of a country, and so the U.N. has developed the Human Development Index in response to this criticism. This research analyzes the number of temporary visas given out to 70 different countries from 1992 to 2007, and attempts to develop a causal relationship between the disparity of economic conditions, distance, human development, and education levels between the United States and these 70 countries.

Out of Sight, Out of Mind: Regulated Medical Waste in New York City
Ben Smith, Design and Architecture Studies and Economics
Sponsor: Professor Jon Ritter, Urban Design and Architecture Studies

Medical waste in the United States is a new phenomenon. Formally undefined for most of the nation’s history, medical waste became a footnote for environmentalists who sought a sweeping overhaul of policy concerning the industrial production of hazardous waste. It wasn’t until the late 1980s—when illegally dumped medical refuse beached on popular vacation destinations along the eastern seaboard outraged the public—that medical waste received national attention. Just another “day at the beach,” Joe Sharkey of the Times wrote about the summer of 1988, “with bloody syringes poking from the sand like dandelions beside hairy sludge balls.” This study examines regulated medical waste in New York City. I focus on the NYU Student Health Center’s medical waste practices—analyzing the specifics of the site and nature of the waste generated—to create a case study from which one is able to read current medical waste policy in New York City hospitals. Using GIS software I mapped medical waste streams and collected information such as: the composition of the waste stream, the tonnage produced, the carting services contracted, the method of treatment, and the location of disposal.

Lieutenant Smith is a Bitch: Gender Ambiguity, Female Identity, and the Performance of Masculinity in a Coed Military
Kayley Squire, Psychology and Linguistics
Sponsor: Professor Louise Vasvari, Linguistics

Through participant observation, I investigate gender roles in a coed military. I question how gender ambiguity, female identity, and the performance of masculinity play a role in the development of military leaders. My participant observations include my experiences in the Air Force Reserve Officer Training Corps, at Field Training, and at other military events. The data includes topics such as: naming conventions, gender-based identities, masculine talk/expression (or lack thereof), the concept of military bearing, fag discourse, and power/masculine discourse.

Sustainability in Eco-Cities: An Analysis of Masdar City, Abu Dhabi, and Portland, Oregon
Ashwini Srinivasamohan, Environmental Studies
Sponsor: Dr. Julianne Warren, Liberal Studies Program

Burgeoning population in urban centers coupled with dwindling natural resources have given rise to various proposals to make cities more sustainable in order to mitigate ecological impact and improve the quality of human lives. These proposals for different types of eco-cities include walled cities (e.g., tangibly bounded) and policy-driven initiatives (e.g., intangibly bounded). This study analyzes if and how eco-city boundaries in one example city of each of these two types affect two essential components of sustainability—ecological durability and livability. It does so with the aim of helping inform plans for other eco-cities. Drawing on previous research, policy documents, news articles, and interviews, I analyze the approach of Masdar City in the arid landscape of Abu Dhabi (a walled eco-city) and that of Portland in the temperate climate of Oregon (a policy-driven initiative). Taking into account their unique locations, Portland’s approach appears to promote more ecological durability than Masdar’s. Masdar emphasizes livability, but at the expense of ecological durability, making it less likely to be “sustainable.” This study raises further questions about how eco-cities need to take into account the capacities of the unique landscapes in which they are situated in order for them to be both ecologically durable and livable. The study also addresses ways in which urban templates may or may not be helpful.
The Masdar Plan: Abu Dhabi’s Struggle to Create a Sustainable City
Ashwini Srivinivasamohan, Environmental Studies, and David Payne, Environmental Studies
Sponsor: Professor Steven Soter, Environmental Studies

Masdar City, the multi-billion-dollar project to create a carbon-neutral and zero-waste city in the middle of the Abu Dhabi desert, has been the focus of scrutiny and praise since it was first announced in 2006; however, little academic research has been conducted to understand the implications of creating an entire city out of nothing in such geographically unfavorable conditions. In this work, we explore the following questions: 1) How and why has Abu Dhabi, with a deep-seated history of reliance on oil, planned to become a leader in renewable energy? 2) In what ways has the project been a success so far, and in what ways has it fallen short? 3) How can other cities, states, and countries learn from Masdar? As literature is limited on this topic, we conducted interviews to supplement information that has been made available through public media outlets and scholarly research. We conclude that the vision of Masdar City remains intact, yet there have been several important compromises. These largely stem from the failure to involve the public, without which the potential for sustained impact is limited.

Corrupt Minds, Animate Bodies: Queering Ren & Stimpy for the Child Spectator
Emily Stainkamp, Social and Cultural Analysis
Sponsor: Professor Judith Stacey, Anthropology

In 1991, The Ren & Stimpy Show changed the face of modern children’s animated television. With a thoroughly surreal aesthetic that overtly referenced animation’s golden age, Ren & Stimpy also resurrected an approach to children’s television that was less angst-ridden, moralistic, and family-appropriate. Ren & Stimpy was vile, violent, and sexual; its meditations on desire and gender performance are the focus of my study. Through close readings of the entire series, I inquire into the gendered and sexual world of early 1990s cartoon television, paying special attention to the limits of sexual discourse involving and regarding children. The complex web of interests that bears upon the content of children’s mass media is central to my analysis, which traces John Kricfalusi’s ouster from Nickelodeon in relation to the evolution of Ren & Stimpy’s portrayals of sex and gender. Were Ren and Stimpy queer figureheads for late 20th century children? What can they help us understand about mass mediated discourses of gender and sexuality—especially with regards to child spectators? My work turns to frameworks of queer and feminist spectatorship as it attempts to grapple with these questions.

Biased Distance Perception as a Means of Improving Goal-Directed Performance
Chadly Stern, Psychology
Sponsor: Professor Emily Balcetis, Psychology

Implementation intentions are if-then plans that take the form, “If situation X arises, then I will do Y”. Research has shown that forming implementation intentions (e.g., “If I feel anxious, then I will tell myself to relax”) shields goal striving from negative emotions, thereby improving performance on a physical task. However, researchers have not yet explored the underlying mechanisms causing this effect. We investigated visual perception as a possible mechanism. In the current experiment, participants either formed implementation intentions to regulate their negative emotions or completed a filler task before attempting to meet a specific performance goal on a golf-putting task. Results indicated that participants who formed implementation intentions saw the distance to the golf hole as shorter and had better putting performance relative to participants who only held a putting goal. Furthermore, perceived distance significantly mediated the relationship between the implementation intention condition and performance. We conclude that biased distance perception is a mechanism by which implementation intentions lead to improved performance. Although biased perception may lead to a skewed view of the world, misperceiving the obstacles that stand in the way of goal achievement may increase the chances of attaining that goal.

The Influence of Commonality in Power Discrepant Groups
Chadly Stern, Psychology
Sponsor: Professor Tessa West, Psychology

The literature on positive contact has been used as a compass to direct researchers toward the best means of attenuating intergroup tension. Although positive contact has beneficial outcomes, forming a common identity and ignoring differences can be detrimental for groups with unequal power. Specifically, groups that do not possess power come to have unrealistic expectations for an equal distribution of desirable resources. In the current study, participants were divided into two groups and assigned control over either a desirable (High Power) or neutral (No Power) resource, HP and NP. Groups then partook in an interaction while focusing on a specific intergroup topic: commonalities, power differences, or both commonalities and power differences. Groups decided how to allocate their resource and predicted how the other group would allocate. HP groups consistently discriminated in their resource allocation across discussion topics, and NP groups that partook in a discussion of intergroup dif-
ferences expected this discrimination. Discussing differences allows NP groups to recognize their disadvantaged position, but discussing commonalities leads to inaccurate predictions of how HP groups will allocate resources.

**Economic Voting: Economic Performance and Vote Choice in Latin America and the Caribbean**

Waleska Suero, Politics  
Sponsor: Professor Anna Harvey, Politics

For decades, political economists have researched the relationship between economic performance and vote choice in Western democracies. Overall, the literature reveals economic conditions influence voting behavior. In the 1980s and early 1990s, the transition to democracy across Latin America and the Caribbean provided a new platform for the study of economic voting in young democracies. However, limited data has challenged our understanding of economic voting in this particular region, as research demonstrates that economic voting is far from consistent. This study attempts to assess the relationship between economic performance and vote choice in the developing economies of Latin America and the Caribbean. The results indicate that economic conditions do impact vote choice, although, at times, the impact is negative.

**Understanding Conversations**

Catherine Tourangeau, Psychology, K. Alexandra Grazier G’Sell, Psychology, and Melody Chen, Psychology  
Sponsor: Professor Tom Tyler, Psychology, and graduate student in Tyler lab

This research examines the impact of fair treatment and procedures (i.e. “procedural justice”) upon the expression of sexist behaviors. The current study builds upon an initial “Negotiation Study” in which the impact of procedural justice was measured in a negotiation context. This study evaluates the impact of procedural justice in a cooperative context. In the current study, male and female participants are paired to complete a puzzle task and randomly assigned to one of three conditions: procedural justice, sexism, or control condition. In these conditions, researchers will examine the interactions between men and women, and determine whether the extent sexism disrupts these interactions, and whether applying procedural justice might overcome these disruptions to encourage a more productive team.
Valuations and Technology in the Dot-Com Bubble
Jonathan Trope, Economics
Sponsor: Professor Daniel Xu, Economics

The dot-com bubble of 1995 to 2000 was characterized by numerous public offerings of new Internet and software companies; the equity value of these companies skyrocketed to unprecedented levels before plummeting. The rising valuations signaled these firms to continue to provide increasing levels of technology, while arbitrageurs in the primary market speculated on the technology output of these firms. But was the technology output sufficient to justify speculation of valuations? I attempt to define the dot-com bubble as an unstable dynamical system in which demand for Internet-firm stock and supply of technology output fed into each other. I analyze the co-movement of Internet firm valuations and technology output over the dot-com bubble to test whether the supply of technology sustained increased demand for technology output that increased valuations. Next I analyze whether bidders in the takeover market, who as arbitrageurs acted to correct inefficiencies in pricing in target firms, identified opportunities in firms with high technological output.

System Failure: An Analysis of Flows of Electronic Waste in Ghana
Jessica Tsang, Urban Design and Architecture Studies
Sponsor: Professor Jon Ritter, Urban Design and Architecture Studies

Agbogbloshie Dump in Accra, Ghana, is a sprawling expanse of makeshift workshops and a dumping ground for electronic waste, including discarded computers, TVs, and refrigerators. The incoming flood of secondhand computers, intended to ‘bridge the digital divide,’ has resulted in a disproportionate burden of toxic waste on developing countries, where these machines are recycled informally to recover precious metals. This study analyzes the geographical distribution of e-waste recycling in Ghana by contemplating international, national, and local scales in order to identify spatial flows of electronics, people, money, and toxic chemicals. Sources including worker and expert interviews, site observations, journalistic reports, and historical studies informed the creation of original maps. Using Accra as a case study, this research observes established patterns of exclusion and the global flows that perpetuate them; furthermore, on a local level, it asks how pre-existing systems have absorbed and adapted the e-waste recycling industry—an integration seamless enough to conceal illicit trade. Mapping methodically crystallizes each step of the recycling process, revealing moral geographies of e-waste—places of inclusion, exclusion, and the boundaries between. The maps illustrate how global flows have become embedded in local, pre-existing systems. Thus, an intervention in these failing systems, which create opportunity out of a bargain between poison and poverty, must take place on a comprehensive scale—one that takes into account global, national, and local networks. More research is required to uncover the extensive links between e-waste recycling and other informal activities in order to create alternative livelihood strategies for workers. This study’s conclusions and suggestions for further research may guide future planning, policy, and legislation.

The Cretan Paradox: The Surprising Obesity Epidemic in Crete
Alina Tsouristakis, Hellenic Studies
Sponsor: Professor Liana Theodoratou, Hellenic Studies

Greece, especially the island of Crete, has what is often considered to be the healthiest diet in all of Europe, the Mediterranean Diet. Over the last 30 years, despite their healthy diet, Greece surprisingly has the third highest prevalence of obesity in Europe. Even more unexpected, Crete has the highest prevalence of obesity in all of Greece. Crete is unique in that the island is not greatly affected by the two most significant factors for obesity: increasing Western influences (such as fast-food, cheaper, calorie dense foods, etc.) and drastic economic disparities between groups. How can we explain the high prevalence of obesity in an area that is both free from the usual determinants of obesity and traditionally has one of the healthiest diets? Can the Cretan paradox help us reassess our understanding of obesity?

Woodworking Techniques Applied to Furniture in Ptolemaic Egypt
Mary Van Dempsey, Anthropology and Classical Civilization
Sponsor: Professor Pamela Crabtree, Anthropology

Some of the most ancient examples of wooden furniture survive from ancient Egypt, but after the elaborate tombs of the New Kingdom, there is sparse evidence from the Ptolemaic period. Although there are few tangible examples from this period, conclusions can be made about the woodworking of Ptolemaic Egypt by looking at methods used from the Predynastic period through Greek and Roman times in Egypt and comparing them to contemporary techniques seen throughout the Mediterranean. Woodworking practices and changes in furniture styles depicted throughout this span of history show continuities that would have carried into the Ptolemaic period. These techniques and consistencies, combined with extant examples will combine to suggest major styles and methods used in the creation of Ptolemaic...
wooden furniture. Studying the before and after, as well as contemporary methods from a broader geographical scale, will enable me to draw conclusions about the ways in which wooden furniture was constructed under the Ptolemies in Egypt.

**Behavioral Effects of Vowel Sound Influence on Spatial Distance Perception**
*Kayla Varcoe, Psychology*
*Sponsor: Professor Yaacov Trope, Psychology*

Research on sound symbolism suggests that the vowel sounds contained in words are used to infer properties about the targets to which they refer. Our lab group has considered the front-back distinction in vowel sounds, finding that those made in a relatively frontal part of the mouth (the ō in see) are associated with targets that are closer to oneself compared to those made further back (the ē in see). My project extends this line of research, investigating what the behavioral ramifications of vowel sounds are and whether they affect language-based judgments regarding distance perception. In the study, participants estimated a target with a front vowel sound name as significantly closer to them than a target with a name containing a back vowel sound. Distance perception was revealed through behavioral actions toward the object (e.g., under-tossing or over-throwing a beanbag). These results suggest that language subtly affects mental representation of distance.

**Spreading Ink: What the Tattoo Connotes Today**
*Jillian Voon, Journalism and Economics*
*Sponsor: Professor Brooke Kroeger, Journalism*

In the age of television series like *Miami Ink* and heavily tattooed celebrities like Angelina Jolie and Lil Wayne, the growing popularity of body art has helped the tattoo evolve from a countercultural symbol to one that is decidedly cool. Forty percent of Americans between the age of 26 and 40 now admit to having at least one piece of body art. As the tattoo industry expands into the fine art and commercial worlds, doctors and district attorneys have joined the drunks and drug addicts in tattooing their bodies to signify important junctures in their lives, mark their individuality or simply own a piece of art not easily stolen or lost. From the street to the workplace to the walls of a Chelsea gallery, ink is flowing fast into the mainstream. But despite its meteoric rise to popularity, has the tattoo really shed the negative stigmas it faced in the past?

**“Sexy-Brazilian-Dance-Fight”: Preconception and Brooklyn Habitus Shape Capoeira**
*Camilo Werlin-Martínez, Anthropology*
*Sponsor: Professor Aisha Khan, Anthropology*

Capoeira is a form of physical self expression, interaction, martial and performative art. Originating in Brazil, capoeira was created by Central West African slaves from older body techniques and rituals. Syncretic influence has turned it at different historical moments from a feared dance-fight of the dispossessed, imbuing its students with mythical power, to an instrument of political oppression, to an outlawed and dying art, and now a national cultural icon. It is received and practiced globally by peoples far removed from the culture of its inception. Contemporary research on capoeira outside of Brazil has generally sought to explain notions of authenticity, its commercialization or its application. This study expands our understanding of the plural capoeiras outside of Brazil through a close examination of a community of capoeiristas in the U.S. Using interviews and observation, I investigate intention among students here and the ways in which habitus interacts with the transmission of capoeira body techniques. Coming to capoeira with an intention, shaped by culture and preconceived notions, changes the art itself. I seek to show that the students at one academy, while learning capoeira, have in fact constructed its haptic and cultural space, creating capoeira in their own image in a sense.

**Understanding the Emergence and Importance of Social Inclusion in Development Initiatives: Lessons from Fundación Pro Vivienda Social**
*Eli Wilkins-Malloy, Latin American Studies*
*Sponsor: Professor Juan Eugenio Corradi, Sociology*

Over the years there have been numerous efforts put forward by governments, NGOs, and international, multilateral organizations to alleviate poverty. Traditionally, these initiatives have come either in the form of large-scale governmental or small-scale grassroots approaches to helping marginalized populations. However, strategies and concepts such as microfinance, business with the base of the pyramid (BoP), and inclusive business reflect a new type of development, utilizing two actors that previous approaches neglected: the private sector and the marginalized populations themselves. These types of projects provide a model in which both the business and community involved mutually benefit from a project’s success, in both economic and social terms. However, they are not solutions in themselves, but merely means to achieve an end. This thesis uses a case study of the organization Fundación Pro Vivienda Social (FPVS), an
NGO in Buenos Aires committed to home improvement, infrastructure development and community organization in the city’s outskirts, to show the potential for these types of development strategies. I analyze how this organization’s particular projects were able to achieve success, how the projects reflect a change in the status quo thinking in the development world, and how other organizations can learn from FPVS’s role as the intermediary between the private sector and marginalized community.

**Teaching Old Data New Tricks: Reintegrating Curated Zooarchaeological Material from the Western Swiss Lakes into the Modern Academic Discussion**

**Jesse Wolfhagen, Anthropology**

**Sponsor: Professor Pamela Crabtree, Anthropology**

A chronology of the Neolithic period (ca. 4300-2500 BCE) was created for the western Swiss lakes of Bienna and Neuchatetel, in order to determine when certain sites without chronological information were inhabited. The chronological determinations were based on comparisons of domestic animal use, based on the assumption that inhabitants of the Swiss lakes used domestic animals similarly to other, contemporaneous sites in the region. Based on this assumption, three Neolithic sites that had no chronological information associated with them were assigned into either the Early Neolithic or the Late Neolithic. Sites were also aggregated into several groups, based on either shoreline or the average steepness of the surrounding area, to eliminate noise in the relative abundances of domestic animals based on ecological or cultural factors. The strengths of these differences suggest that while Neolithic Swiss lake-dwellers used domestic animals more similarly to those in contemporaneous sites, they also tended to use domestic animals more similarly to sites on the same (western or eastern) shoreline as the site they inhabited. This may be due to ecological factors that would not correlate with the average steepness of the area around a site, but it may point to a cultural designation in the minds of Swiss lake-dwellers that was based on being on one side of a lake versus the other.

**The Merit Order Effect of Intermittent Renewables under a Dynamic Pricing Scheme: An Analysis of the German Power Market**

**Maria Woodman, Economics**

**Sponsor: Professor Dermot Gately, Economics**

The deregulation of the German power market in the late 1990s was undertaken in order to create the opportunity for market efficiency. This market change, however, has exacerbated wholesale price volatility. Concurrently, advances in renewable energy technology and increased pressure to mitigate carbon emissions have spurred increased interest in using intermittent renewables for electricity generation. Not surprisingly, one of the greatest concerns with the integration of renewables into the grid is the potential increase in the volatility of prices. Studies of methods to lower extremely high prices suggest that dynamic pricing may be part of the answer. However, the effect of dynamic pricing mechanisms on price volatility caused by intermittent renewables remains largely unknown, because in the case of renewables, dynamic pricing will affect both the high and low price extremes. This study serves as a preliminary attempt to evaluate the effects of diversifying fuel inputs to include intermittent renewables under a dynamic pricing scheme, specifically in the German market which allows negative prices. Using a set of hours from the year 2009, chosen to represent different levels of demand and wind in-feed, I compare price changes resulting from increases in wind in-feed and the implementations of dynamic pricing mechanisms. Based on these comparisons, I make recommendations for further research to define policy measures for the successful deployment of demand side management techniques such as dynamic pricing.

**Revisiting the Financial Crisis: The Effect of Credit Shocks on Bond Yields**

**Ram Yamarthy, Economics and Mathematics**

**Sponsor: Professor Thomas Sargent, Economics**

Traditional indicators such as real activity and inflation were insufficient to explain spikes in bond yields during the financial crisis. I discover the effect of credit indicators on bond yields by estimating a Gaussian six-factor affine model of term structure. My unique contribution to the model is a credit variable that I construct using a principal component analysis of notable credit indicators. After determining parameters for the model through a numerical optimization of a likelihood function, our model supports yield data for the past 20 years. Using impulse response functions, I find that positive credit movements raise interest rates at all maturities. Further, shocks to credit have a greater immediate impact while those of real activity are milder and more persistent. These findings suggest that credit disturbances might be of lesser importance in the long run in comparison to those of real activity.

**The Chinese Saving Puzzle and the One Child Policy**

**Zuo Yi, Economics**

**Sponsor: Professor Boyan Jovanovic, Economics**

China, one of the world’s largest and fastest growing economies, also has one of the highest household savings
In the world. Since 1978, China’s household saving-to-income ratio has reached an impressive level of nearly 30 percent. In 1979, the Chinese government also implemented the One Child Policy, which officially restricts the number of children a married urban couple can have to one. What is the role of the One Child Policy in China’s high savings rate puzzle? I will explore the relationship between fertility choice and household savings, attempting to determine the role of the One Child Policy in this matter through a simplified model developed from the overlapping generation model by Barro and Becker. I will use the Bellman equation and the Envelope theorem to show the strong correlation between fertility choice and household savings through their equal relationship with consumption growth.

A Little Bit Goes a Long Way: The Effects of Energy and Goal Motivation on Visual Perception
Sam Zhang, Psychology
Sponsor: Professor Emily Balcetis, Psychology

Constancy in visual perception is at best only half true and at worst deceptive. We don’t accurately see the world, only a filtered image of it. What ultimately determines what we perceive is contingent on both external stimuli and internal factors. For example, thirsty participants saw a glass of water as much closer to them than did satiated participants. Similarly, energized participants judged a distance as much shorter than did fatigued participants. Together, these findings show that both motivation towards a goal and energy levels have significant effects on distance perception. However, these two variables have never been studied acting in unison on a single participant. In order to better model human perception, the effects of both goal motivation and energy on distance perception and any possible interactions must be studied. We used a fitness paradigm to manipulate participants’ motivation towards actively attempting to be more fit. We also measured several indicators of overall fitness such as Body Mass Index and Waist Hip Ratio. We then recorded participants’ distance estimates towards a goal relevant object and analyzed their responses as a function of their motivation and their energy as measured by fitness. We hypothesized that when participants are low in motivation, they will see distances as shorter if they have high energy and as farther if they have low energy. However, when participants are high in motivation, they will see distances as shorter regardless of their energy. Our results validated this hypothesis, though only for male participants. This evidence suggests that motivation is capable of regulating fatigue through preconscious modulation of visual perception.

The Dynamic Formation of Limit Order Books and Market Fragmentation
Chen Zhao, Economics
Sponsor: Professor Boyan Jovanovic, Economics

The recent proliferation of trading venues raises researchers’ interest in how new exchanges could attract investors without charging lower fees or offering better services. Motivated by this, I study how investors favor different positions of price queues in competing markets when placing limit orders and in the meantime deduce the patterns in which limit order books are filled. I first look into a single pure limit order market and subsequently introduce a new identical exchange to compete with the incumbent. The Order Protection Rule, which ensures market orders are executed at the best price among all the exchanges, is assumed in the dual-market environment. The model shows that opposing queues at a same price in both markets coexist despite investors’ preference unless extreme. This is because new exchanges are naturally capable of offering queue positions generating higher order execution probability for investors that are originally left behind, so that they could, as pointed out in Foucault and Menkveld, “jump the queue.” The single-market model also implies that the head position of each queue has expected profit invariant to the distribution of liquidity demand. It follows that in the only market (i) the queue at either the best or the second best ask (bid) is likely to expect the very first limit order; and (ii) excluding the best ask (bid) one, queues with better (e.g. lower if it is an ask queue) prices tend to be triggered earlier.
Given finite resources, should we fund more research into the cause—and possibly, cure—of cancer, or build a space station? Can weather be predicted much more accurately than it is now? Is your water supply safe to drink? Is the human population changing the world climate? We all tend to take it for granted that science and technology increasingly play a role in our livelihood, our recreation, and our economic and even our physical survival. As in the humanities, many problems in applied science are so complex that they require collaborative research by scientists with diverse backgrounds and training. The purpose of education in our “postmodern” world is to allow one to navigate with insight and comfort in an increasingly math- and science-driven environment, to distinguish what is sense from what is nonsense, and to form a basis for sound decision-making.

—Neville Kallenbach, Professor of Chemistry

NATURAL SCIENCES

Isolation and Characterization of Potential New Lectins
Sarah Abbassi, Biochemistry
Sponsor: Professor Lara K. Mahal, Chemistry

Carbohydrates are essential biological molecules that are found in cells ranging from bacteria to mammals, and in large numbers on cell surfaces. Glycosylation is the process by which oligosaccharides (a type of carbohydrate) are attached to proteins or lipids. The products of glycosylation are important in many cellular functions, including cell communication, recognition, immune response, motility, and adhesion. Glycans (poly- or oligosaccharides) are structurally complex and are expressed as branched or linear structures. In order to study the structure and function of these essential molecules, lectins (carbohydrate-binding proteins of non-immunological origin) have been identified and utilized as tools to study the glycome of a cell. Many bacterial genomes contain lectins, which are intriguing as they are rarely post-translationally modified (unlike commercially available plant lectins) and can be recombinantly expressed. Previous research done in the Mahal lab has identified a panel of unidentified bacterial genes which could be lectins based on their genomic context and hypothetical protein structure. Among these genes are Rs2695, Rs2696, Rs4935, and Rs4938 from Ralstonia solanacearum. We have isolated proteins Rs2695, Rs2696, and Rs4938, and have found that proteins Rs2695 and Rs2696 bind with greatest affinity to rat thymus glycans, though this is not a definite characterization.

Using Near-Isogenic Lines to Identify Complex, Non-Additive Effects of Genetic Polymorphisms on Natural Flowering Time Variation
Shub Agrawal, Neural Science and Anthropology and Language
Sponsor: Professor Michael Purugganan, Biology

In quantitative genetics, genetic additivity means that the effects of polymorphic loci on a trait of interest are independent of the effects of other polymorphic loci on that same trait. But we know that this independence is often not the case. In the model plant Arabidopsis thaliana, for instance, we know that alleles at polymorphic sites in the FRIGIDA (FRI) and FLOWERING LOCUS C (FLC) genes affect flowering time, but only if certain combinations of alleles at FRI and FLC occur together.
This is an example of non-additivity, which is harder to identify than additivity by traditional quantitative genetic methods. Furthermore, non-additivity becomes more complex and more intractable as the number of loci under consideration becomes larger. Near isogenic lines (NILs) consist of introgression lines obtained through repeated backcrossing and genotyping. NIL populations consist of lines containing a single fragment from a donor parent into an otherwise homogenous genetic background. This allows one to isolate the effects of a specific region in the genome on the trait of interest, because the rest of the genomic background is invariant. In addition to testing for additive genetic effects, this also makes NILs ideal for determining the non-additive effects of genetic polymorphisms on a trait. In my research I use NILs as a means to isolate the effects of specific combinations of genetic polymorphisms on flowering time in Arabidopsis thaliana. I focus on polymorphisms within four genes that have already been shown to be involved with flowering time variation: FRIGIDA (FRI), FLOWERING LOCUS C (FLC), TERMINAL FLOWER 1 (TFL1) and CRYPTOCHROME 2 (CHY2). At these four loci, there are two alleles at FRI, FLC, TFL1, and there are three alleles at CHY2, resulting in 24 possible combinations. We have already constructed all 12 combinations in a FRI-deletion background and are now working to construct the remaining combinations in a FRI-positive background. We grew out the crossed progeny, segregating for all four polymorphic loci, and then collected seeds and DNA from these progeny. Currently, I am screening the DNA for the remaining NIL combinations. Once the full set of 24 NILs is complete, we will then perform controlled experiments that further our understanding of genetic additivity and non-additivity in the flowering time network.

Perceptions and Management of Hypertension in New York City
Serra Akyar, Anthropology and Chemistry
Sponsor: Professor Rayna Rapp, Anthropology

Hypertension, or high blood pressure, is a chronic condition that affects 74.5 million adults in the United States. It is commonly called the “silent killer” because it cannot be qualified by pain, regularly lacks signs or symptoms, and contributes to two of the top three main causes of death in the US: heart disease and stroke. Because of hypertension’s silent nature, blood pressure screening is an important preliminary step to determine if someone has hypertension. In this study, 25 participants were screened to check their blood pressure numbers and surveyed for their perceptions and methods of managing high blood pressure. We collected perceptions and management methods to assess the participants’ level of knowledge of hypertension. Screening revealed that 56 percent of participants presented normal blood pressure readings, 28 percent showed pre-hypertensive numbers, and 16 percent scored in the hypertensive range. Meanwhile, the participants’ responses revealed that hypertension is not well understood; confusion and a lack of knowledge regarding the biomedical definition of hypertension, its risk factors, and possible methods of management were prevalent across the sample pool. This study’s results suggest a need for New Yorkers to receive increased hypertension education and screening opportunities.

Modeling the TCR-CD3 Complex
Serra Akyar, Chemistry and Anthropology
Sponsors: Professor Timothy J. Cardozo, NYU School of Medicine

Modeling the T-Cell Receptor (TCR) complexed to the T-Cell Co-Receptors (CD3) is an important step toward understanding how the immune response is controlled through receptor signaling. Discovering how and why signals are transmitted can lead to improved research on autoimmune disorders, induction or prevention of immune response, and opportunities to use the immune signaling mechanism for better drug design. The goal of this project is to use molecular docking to predict how the TCR and CD3 proteins come together in a complex. To date, crystallization of the entire TCR-CD3 complex has not been described. The complex is 300kDa in size and may require a transmembrane region to orient correctly, making this complex a challenging structure to crystallize. Thus, in silico methods are a novel way to provide insight into this complex. We used Internal Coordinate Mechanics, a molecular docking software, to identify key protein-protein interactions involved in complex formation. We used energy score, geometric orientation, and location of glycosylation sites in our analysis. Further analysis both computationally and at the bench is necessary before conclusions about TCR and CD3 association can be made.

Shadow Enhancers and Promoter Choice: Regulatory Mechanisms of Gap Genes in Drosophila melanogaster
Theresa Apoznanski, Biology
Sponsor: Dr. Stephen Small, Biology

Localization of gene expression in an early embryo is controlled by highly specific regulatory regions in DNA that interact with basal promoters to activate transcription; however, the mechanisms that control an enhancer’s specificity and preference towards a promoter are unclear. This is especially important when a gene has multiple promoters and an enhancer appears to interact with only
one. Additionally, certain genes contain multiple enhancers that independently drive very similar expression patterns from a single promoter. The significance of having these seemingly redundant enhancers, called shadow enhancers, is not clear. The goal of this study is to better understand enhancer-promoter choice and the functions of shadow enhancers. We fused LacZ reporter genes to various regulatory elements of the *hunchback* (hb) and *orthodenticle* (otd) genes, and we analyzed the LacZ gene expression patterns in transgenic embryos using in situ hybridization. Preliminary data suggests that certain *hb* enhancers have the ability to interact with different *hb* promoters when the endogenous promoter is not present, whereas other *hb* enhancers are specific to their endogenous promoter only. Preliminary data pertaining to the shadow enhancer experiments suggest that individual enhancers drive a weaker, less expanded expression pattern compared to when they are combined, and produce a more robust, expanded pattern that is more similar to the endogenous one. We will perform further analysis using computer programs to more accurately quantify the expression patterns for statistical significance. The data from this experiment is crucial to better understand the limitations and specificity of genetic regulatory mechanisms. Many of these mechanisms can be applied to other genes in the embryo. Understanding how genes establish the body plan can contribute to advancements in developmental biology.

**Synthesis of Hyper-Branched Polymeric MRI Contrast Agent via Reverse Micelle Crosslinking**

David Bae, Chemistry, and Alice Wang, Chemistry

Sponsor: Professor Marc A. Walters, Chemistry

Magnetic resonance imaging (MRI) is a powerful diagnostic tool utilized in the medical field for locating tumors and other lesions. The contrast agents used in current clinical studies are molecular. Our aim is to concentrate the monomer agents on a larger nanoparticle scale. The method of this study involves polymerizing a gadolinium-complexed monomer. The polymerization will occur in a reverse micelle system, where the polar reactive head groups agglomerate into sphere-like structures and are separated from the solvent by a layer of nonpolar tail groups. Crosslinking in the reverse micelle will produce polymeric nanoparticles that are hyper-branched, and thus stabilized, in a three-dimensional structure in aqueous environments. We synthesized soluble particles composed of tricine and cetyl dimethyl acetamide, crosslinked by divinylsulfone, in stage one of this project. This system has been proven to be an efficient method, and we will use it for the synthesis of a tetra amino pendant hydroxyl gadolinium-complexed contrast agent via crosslinking in reverse micelles. With this contrast agent, we will be able to concentrate Gd-ligands in the form of nanoparticles to a target of interest and greatly amplify the MRI contrast.

**The Mathematical Quantification of the Dpp Gradient**

Mohit Bahel, Mathematics and Biology

Sponsor: Dr. Laurel Raftery, University of Colorado, Boulder, and Dr. David Umulis, Purdue University

Decapentaplegic (Dpp) is an important morphogen in the development of *Drosophila*, especially in the imaginal wing disc. Dpp is a homolog of bone morphogenetic proteins (BMPs), members of the TGF-beta superfamily, found in vertebrates. Previously, the understanding of Dpp in *Drosophila* has led to better understanding of BMPs in vertebrates. In my research, I focused on creating algorithms to quantitatively analyze Dpp in the *Drosophila* imaginal wing disc. In the disc, Dpp forms a morphogenetic gradient—the spatial distribution of specific stimuli across a tissue—that can be studied using fluorescent antibodies. I monitored the activity of the stimulated receptor protein using confocal microscopy to measure the level of fluorescence emitted from anti-PMad, a specific fluorescent antibody. Confocal microscopy provides digital images of the level of fluorescence exhibited by the antibody-bound tissue. Until now, tissues have been compared visually, using either the image or a linear graph of intensity values to assess the Dpp morphogen distribution, and Matlab programs have only been written for analyzing fixed shapes, such as the embryo. In my year of research, I have developed the tools necessary for normalizing and analyzing data collected in irregularly shaped wing discs.

**Good Neighbors: Assessing Territoriality in Red Titi (Callicebus discolor) and Equatorial Saki (Pithecia aequatorialis) Monkeys**

Danielle Bendicksen, Anthropology

Sponsor: Professor Anthony Di Fiore, Anthropology

This study assesses territoriality—exclusive defense of an area and its resources—in two New World Monkey species (*Callicebus discolor* and *Pithecia aequatorialis*) in Ecuador. Both taxa are frugivore-insectivores and are socially monogamous, meaning that they live in groups with one adult male and one adult female. Because ripe fruit is relatively rare and males are limited to one partner, *Callicebus* and *Pithecia* would be expected to have high motivation to defend their food and mate resources. In order to analyze their abilities to defend territories, I used GPS data collected at the Tiputini Biodiversity Station in Ecuador from four groups of titis and one group of sakis.
over a roughly one-year period to investigate patterns of range use and to calculate each group’s “defendability index” [Mitani & Rodman 1979]. I also incorporated behavioral data to examine where the groups perform territorial behaviors in relation to their ranging measures. Both taxa exhibited defendability indices and behaviors indicative of traditional definitions of territoriality. Surprisingly, the Callicebus home ranges overlapped up to 64.05 percent with conspecific groups. These analyses add to our limited knowledge of the territorial behaviors of these taxa and also provide bases for evaluating established ideas on primate territory defense.

Repression of COE by HES/HEY Trans-Factors During Heart Specification in Ciona intestinalis
Renee Marie Bogdanovic, Biology
Sponsor: Professor Lionel Christiaen, Biology

Throughout development, differential gene expression is a driving factor of progenitor cell line differentiation into specific cell fates. During tunicate Ciona intestinalis heart muscle specification, the activation of the COE gene is the deciding factor between two different muscular fates, heart muscle cells and Atrial Siphon Muscles (ASMs). After asymmetric divisions of the common progenitor line—the mesodermal Trunk Ventral Cells (TVCs)—COE expression negatively regulates the cardiomuscular cell fate. Upstream of COE, Notch signaling seems to control the transcriptional repression of this crucial gene. What proteins, activated by Notch signaling, are repressing COE expression in the heart progenitors? I propose that the direct effectors on COE signaling, are repressing COE expression in the heart of this crucial gene. What proteins, activated by notch signaling seems to control the transcriptional repression of COE, notch signaling is located on the X chromosome, but its precise location is not known. We, therefore, employed the method of recombination mapping in order to identify which gene is affected by the mutation. To do so, we crossed the don mutants to flies with a marker chromosome, which contains several phenotypic markers spread out among various positions on the X chromosome. We then crossed females that are heterozygous for don and the marker chromosome to males with an rh5>GFP reporter that allowed us to visualize the Rh5-expressing ommatidia without having to dissect the retinas. Lastly, in the next generation, males had both the recombinant chromosome and the GFP reporter. We then analyzed these males using a fluorescence microscope, and scored whether they had the GFP and were, therefore, don negative, or instead were don positive. Next, we determined for both groups which marker mutations were present and which were absent in order to narrow down the chromosomal area in which don is located. Our recombination experiments indicated that don is located in the Drosophila chromosomal region 9F11-15F7. Next we will use available small deletions and duplications, as well as complementation tests, in order to identify the don locus. We will moreover, explore how don is related to known genes that affect R8 rh expression, such as the tumor suppressor warts and the growth regulator wld.

Drosophila retina is comprised of approximately 800 ommatidia, or unit eyes. Each ommatidium contains 8 photoreceptor cells (PRs), six of which are outer PRs (R1-R6) while two are inner PRs (R7-R8). Similar to the human eye, the Drosophila retina is a mosaic composed of stochastically distributed PRs that express different light-gathering proteins. Depending on the rhodopsin (Rh) expressed by the R7/8 PRs, two main types of ommatidia can be distinguished: In the pale (p) subtype, R7 expresses Rh3 and R8 expresses Rh5; in the yellow (y) subtype, R7 expresses Rh4 and R8 expresses Rh6. The p and y subtypes are found in a consistent ratio of 30:70. Here, we study daltonien (don) mutants, which show an abnormal distribution of R8 rhs; Rh6 is expanded into almost all R8 cells, whereas Rh5 is dramatically reduced. Previous experiments showed that don is located on the X chromosome, but its precise location is not known. We, therefore, employed the method of recombination mapping in order to identify which gene is affected by the mutation. To do so, we crossed the don mutants to flies with a marker chromosome, which contains several phenotypic markers spread out among various positions on the X chromosome. We then crossed females that are heterozygous for don and the marker chromosome to males with an rh5>GFP reporter that allowed us to visualize the Rh5-expressing ommatidia without having to dissect the retinas. Lastly, in the next generation, males had both the recombinant chromosome and the GFP reporter. We then analyzed these males using a fluorescence microscope, and scored whether they had the GFP and were, therefore, don negative, or instead were don positive. Next, we determined for both groups which marker mutations were present and which were absent in order to narrow down the chromosomal area in which don is located. Our recombination experiments indicated that don is located in the Drosophila chromosomal region 9F11-15F7. Next we will use available small deletions and duplications, as well as complementation tests, in order to identify the don locus. We will moreover, explore how don is related to known genes that affect R8 rh expression, such as the tumor suppressor warts and the growth regulator wld.

Design and Synthesis of a Novel Synthetic Scaffold to Mimic Alpha-Helical Conformation
Thomas Brewer, Chemistry
Sponsor: Professor Paramjit S. Arora, Chemistry

Protein secondary structures play a fundamental role in protein-protein interactions, and alpha-helices are important motifs featured in these interactions. Short peptide sequences require stabilization to adopt alpha-helical conformation, so efforts have been made to mimic the conformation of an alpha helix. I am designing a new class of alpha-helix mimetics, called oligooxopiperazines, derived from alpha-amino acids and featuring chiral backbones which we believe will be able to imitate the binding surface
of an alpha-helix and inhibit protein-protein interactions. Such a mimetic would provide a means to probe a diverse array of biological pathways by determining the influence of specific protein-protein interactions. Oligooxopiperazines are synthesized on solid phase through manipulation of the peptide backbone. After synthesizing a dipeptide, we constructed the piperazine ring between two neighboring nitrogens, followed by coupling of the next amino acid. We continued synthesis in this fashion until the oligooxopiperazine was completed. The product was cleaved from resin, purified by high-performance liquid chromatography, and characterized by NMR and mass spectrometry.

A Photo-Transduction Dependent Rhodopsin Repression Mechanism
Konstantin Brodetskiy, Neural Science
Sponsor: Professor Claude Desplan, Biology

G protein coupled receptors (GPCRs) are a family of receptors that have been well conserved throughout evolution. The yellow R8 (yR8) photoreceptor cell in Drosophila provides an opportunity to study how the activity of one receptor type in this family has an effect on transcription within the cell. The yR8 cell type normally expresses the green light sensing Rhodopsin 5 (Rh5) GPCR, which represses transcription of the blue light sensing Rhodopsin 5 (Rh5) protein in a light-signaling-dependent manner. This mechanism is of interest for several reasons. (1) Expression of a single Rhodopsin in this cell type ensures for spectral sensitivity. (2) It potentially provides a compensatory mechanism of neuronal plasticity, whereby if Rh6 is either non-functional or not expressed, derepression of Rh5 allows for the photoreceptor to retain some light sensing function. (3) A similar use-dependent mechanism is thought to govern expression of distinct GPCR expression in vertebrate olfactory neurons, suggesting a broader applicability; however, despite the potential broad interest for this mechanism, the downstream effectors in this pathway have not been well characterized. I have, therefore, conducted a biased screen to identify potential candidates for Rh6 repression signaling. Phototransduction candidates were chosen which participated in signaling, adaptation, termination, and scaffolding. Of these candidates, I have identified several genes as potentially playing a role in rh5 repression: Gβ76C, Gγ30A, arr2 and dCAMTA.

The Role of the Rho Pathway in Circadian Rhythms
Anita Burgos, Biology
Sponsor: Professor Justin Blau, Biology

In Drosophila, the transcriptional and translational feedback loops that characterize the molecular clock have been well established, but the downstream pathways leading to circadian behavior remain unknown. Rho GTPases are molecular switches that are active when GTP-bound; guanine exchange factors (GEF) activate GTPases by exchanging GDP for GTP. Previous studies have shown that the expression of a putative Rho GEF (CG33275) is clock-regulated and highly enriched in PDF neurons (master pacemaker neurons that help synchronize all of the other clock neurons), suggesting that Rho GTPases might be important in generating circadian activity. I have found that reducing Rho1 function by overexpressing a Rho1 dominant negative allele (Rho1DN) in PDF neurons lengthens the period of circadian activity. Furthermore, immunocytochemistry revealed that overexpressing Rho1DN in PDF neurons leads to constant expression of VRILLE (VRI) in another group of clock neurons, the lateral dorsal neurons (LNs). Rho1 might be functioning downstream of the clock by regulating communication between groups of clock neurons via vesicle trafficking or synaptic plasticity. These findings reveal a novel role for GTPases and offer a potential pathway downstream for the molecular clock leading to circadian behavior.

Macrophage Detection in Atherosclerosis Using Targeted Gold Nanoparticles and Computed Tomography
Miruna Carnaru, Biology
Sponsor: Dr. David P. Cormode, Mount Sinai School of Medicine

Atherosclerosis is characterized by the buildup of low-density lipoprotein (LDL) and recruited macrophages within arterial walls. Rupture of atherosclerotic tissue leads to thrombus formation and is the major cause of heart attacks and strokes. High macrophage burden indicates a greater risk of tissue rupture, thus noninvasive computed tomography (CT) imaging of macrophages could help diagnose patients at high risk. We postulated that gold core high-density lipoprotein (Au-HDL) nanoparticles would provide clinical CT images with significant contrast and that the particles would target macrophages. Additionally, lowest effective dose and ideal imaging timeframe of Au-HDL remained to be determined. We injected five atherosclerotic male New Zealand white rabbits with a 75, 150, or 300 mg Au/kg dose of Au–HDL, and we took CT images pre–, 24 hours post–, and 48 hours post-injection. CT images of aorta walls after injection exhibited greater radiodensity compared to pre-injection images. The lowest effective dose tested was 75 mg Au/kg and the ideal imaging timeframe was 24 hours post-injection. Transmission electron microscopy (TEM) images of rabbit aorta sections confirmed localization of Au-HDL nanoparticles in macrophages.
Au-HDL’s ability to increase radiodensity in CT images and to target macrophages indicates its possible use as a CT contrast agent for evaluating atherosclerotic disease.

**Synthesis and Study of Redox-Reconfigurable Molecular Switches**  
_Noelle Cataneu, Chemistry_  
**Sponsor:** _Professor James W. Canary, Chemistry_

For this project, I synthesized molecular switches by a number of different synthetic routes and studied their properties using UV-visible and circular dichroism spectroscopy. I made derivatives of N,N-bis(quininalyl) methionine, a copper ligand known to exhibit an inversion of helical chirality upon reduction/oxidation of the metal center, and subsequently used them to form metal complexes. I synthesized these derivatives with several different functional groups attached to the quinolines. When bound to copper, each of these ligands can be switched between two or more distinct stable states that are distinguishable by circular dichroism spectroscopy. I identified and optimized a novel synthesis of these unique ligands showing greater reliability and higher yield than the previously employed route. Using readily obtained quinolinecarbadehydes, I utilized reductive amination methodology as a key step for efficient introduction of functionalization into the methionine-based ligands. I used circular dichroism spectroscopy following copper complexation to ensure that racemization of the methionine was minimized. Substitution at the six-position of each quinine with hydroxyl groups yielded a pH-sensitive red-shifted chiroptical switch. Current research involves using amino group substitution as a means for linking visible light absorbing chromophores, such as tetraphenylporphyrin monocarboxylic acid, to the ligand by peptide coupling. Possible applications for these switches include photonic materials and asymmetric reaction catalysts.

**Improving the Modeling of Stratospheric Ozone Depletion**  
_Clement Chan Yat Hin, Mathematics, and Michael Hirsch, Mathematics_  
**Sponsor:** _Professor Edwin P. Gerber, Mathematics_

Our goal is to improve the modeling of climate change in the stratosphere. We have focused on the Brewer Dobson Circulation, which describes the mass circulation that carries ozone depleting substances, such as chlorofluorocarbons (CFCs), from the troposphere to the stratosphere. By modeling the time it takes these reactive gasses to travel through the atmosphere, we provide insight about the chemistry of ozone depletion. The specific aim of our research is establish accurate estimations of these transit times by comparing the transport in two atmospheric circulation models with very different numerical methods: pseudo-spectral and finite-volume. We hoped to provide a benchmark to compare against other numerical schemes. Through experimentation, however, we found that transport of trace gasses in these two models varies significantly, despite the fact that they have the same mean circulation over a wide range of forcing configurations. This suggests that model numerics may be limiting the accuracy of climate prediction model estimates of ozone depletion.

**Time Course Expression of Plasma Cytokine Levels Following Acute Hypotension and Associated Cognitive Dysfunction in Mice**  
_Jeffrey Chan, Biology and Mathematics_  
**Sponsor:** _Professor Michael Haile, NYU School of Medicine_

Hypotension has been implicated in cognitive dysfunction (CD). Nitroglycerin induced hypotension (NTG-IH) below CBF autoregulation causes a transient delayed impairment of short-term memory (STM) attenuated by the NSAID Meloxicam (MEL) at 24 hours. STM was intact on Day 1, impaired on D5, and recovered by D9. We tested for plasma cytokine level association with CD. After IACUC approval, 30 Swiss-Webster, 30-40 g mice (6-8 weeks) were randomized: 1) no treatment; 2) intraperitoneal (i.p.) NTG (60 mg/kg) tested at 8h; 3) NTG at 24h; 4) NTG at 72h 5) NTG on D5; 6) NTG then i.p. MEL (60mg/kg) at 24h tested on D5; 7) NTG on D9. After i.p. Ketamine (90mg/kg)/Xylazine (10mg/kg), the mice had cardiac puncture. We determined the levels of inflammation-associated cytokines (TNF-a, INF-g, IL-1a, IL-1b, IL-2, IL-6, & IL-10) using enzyme-linked immunosorbent assay with MILLIPLEX Profiling. We conducted Kruskal-Wallis One-Way ANOVA against baseline using Mann-Whitney post-hoc tests with Bonferroni correction. Values > or < standards had max or min detectable values assigned. After box-plot adjustment, one sample each from groups 2, 5, and 6, and two samples from group 4 were excluded. There were no significant differences for NTG and MEL groups at D5 compared to baseline. A time course analysis of cytokines showed that at 8h IL-1b is down-regulated while IL-10 is up-regulated (p < .00167); IL-6 showed trends of up-regulation at 8h, albeit not significant (p = .286). At 24h expression returned to basal levels and did not significantly differ from baseline up to D9. At D9 there was a significant down-regulation of IL-1b and IL-6, and an up-regulation of IL-10 compared to baseline (p <
The Impact of Luminance Contrast on Color Saturation

Stephanie Chen, Neural Science
Sponsor: Professor Robert Shapley, Neural Science

Lighter and darker achromatic surrounds can decrease the apparent saturation of a colored region. In the present study, we performed perceptual experiments with twelve equiluminant, chromatic targets of low, medium, and high saturation on grey backgrounds ranging in luminance. We found that maximal color saturation always occurs at or around the point of equal luminance. Furthermore, using the technique of saturation scaling, we found that the saturation change decreased in a graded pattern as the chromatic target was made brighter or darker than the surrounding grey region. This effect, however, markedly decreased for the higher saturated colored targets in comparison with targets of low and medium saturation. These findings, in conjunction with other evidence, suggest the presence of mutually inhibitory mechanisms between the color and brightness mechanisms that characterize the visual sensation at visual borders.

Fidelity and Rate of Transcription Coupled Repair of Damaged DNA

Marcus Cimino, Biology, and Peter Raimondi, Biochemistry
Sponsor: Professor David Scicchitano, Biology

The ethenoguanine lesion contains an exocyclic ring which obstructs the Watson-Crick base-pairing edge of guanine. Ethenoguanine is formed endogenously from lipid peroxidation and oxidative stress, and by the reaction of DNA with oxidized metabolites of industrial agents, such as vinyl chloride, a known human carcinogen, and urethane. Previous studies have shown this adduct to induce deletions, rearrangements, and base pair substitutions of DNA in animal cells. In vitro studies showed highly polymerase-dependent processing, with blockage, mutagenic, and non-mutagenic bypass observed in RNA upon transcription elongation past ethenoguanine. This study observed the effect of transcription past the adduct on DNA containing ethenoguanine in human cells. Lung adenocarcinoma cells and untransformed primary cells with a mutated XPA gene, a gene which is necessary for nucleotide excision repair, were transfected with a plasmid containing a single site-specific ethenoguanine adduct in an inducible transcription unit. We sampled cells at multiple times pre- and post-transcription induction to examine the resulting RNA transcripts and DNA repair. We used qPCR to assess the recovered DNA plasmid to study whether the ethenoguanine has been repaired. Early data of RNA transcripts supports our hypothesis that DNA repair and transcriptional accuracy increase over time, correlated to transcription induction.

Copy Number Variants: A Promoter Polymorphism’s Effects in Flowering Time Variation

Kelly Clemenza, Biology
Sponsor: Professor Michael Purugganan, Biology

The CONSTANS (CO) gene is a key player in the regulation of flowering in plants. This gene is best represented in the plant species Arabidopsis thaliana, an organism that has been established as the major model for flowering time genetics. In our previous study, 24 wild-collected accessions were sequenced for the CO gene and its upstream promoter region, the portion of DNA that helps control when CO is expressed. That study revealed duplications within the promoter region, with most strains containing either 4 or 5 copies of the nucleotide sequence TTTACAC, which serves as a cis-regulatory element binding site for a repressor of flowering time. It was also revealed that accessions with the 5X copy number variant (CNV) flowered earlier than accessions with the 4X, despite the increase in repressor binding sites. For the current project, the CO gene and promoter region of more than 200 additional accessions of A. thaliana have been sequenced, representing a wide range of habitats throughout Europe. By constructing a phylogeny to map patterns of relatedness and layering this map with climate information, I have found that the distribution of CO does not follow any obvious geographic clines. It is expected that plants that flower later should be found at higher clines; however, accessions with the 4X and 5X CNVs can be found at adjacent coordinates, despite their difference in flowering times. I will continue my study using population genetics and phylogenetics to understand the evolutionary history of this cis-regulatory polymorphism, as well as compare its distribution to other polymorphisms in the flowering time network, in attempts to understand the evolutionary purpose of the CO gene and its CNVs.
Metal Oxide Clusters in Artificial Photosynthesis

*Erica Crosley, Chemistry*

**Sponsors:** Dr. Paul Kögerler, RWTH Aachen University, and Professor James W. Canary, Chemistry, NYU

My research project was a small part of an overall study by Professor Paul Kögerler at RWTH Aachen University that focused on how to recreate photosynthesis. The study of converting sunlight into chemically stored energy is an increasingly important field as our society looks for more environmentally friendly fuel sources. Water oxidation is an important step in artificial photosynthesis; in order to create solar fuels, a molecular catalyst is extremely important for developing sustained water oxidation. “The ideal water oxidation catalyst (WOC) should be fast, amenable to interfacing with sensitizer materials of various kinds, and stable to oxidative, hydrolytic, and thermal degradation during turnover. Furthermore, it should exhibit several electron transfer (ET) or proton coupled electron transfer (PCET) events over a narrow potential range (redox leveling) facilitating water oxidation/oxygen evolution near the thermo-dynamic potential” (Nadeen H. Nsouli, Bassem S. Bassil, Michael H. Dickman, Ulrich Kortz, Bineta Keita, and Louis Nadjo, *Inorganic Chemistry*, 2006, 45, 3858-3860). My research project focused on studying a metal oxide cluster catalyst based around the element silicon and then synthesizing a similar catalyst based around the element germanium. I performed a synthesis of a metal oxide cluster containing germanium many times. During each trial, I changed certain variables in order to discover a procedure that produced the highest yield and least contaminated metal oxide clusters. After synthesizing the germanium catalyst, I studied its properties using IR spectroscopy, thermal gravimetric analysis (TGA), and cyclic voltammetry. Although I synthesized large catalyst crystals in high yield, my product contained many different unwanted isomers. These isomers were detected through the IR measurements that produced graphs with very wide peaks. These wide peaks confirmed the presence of isomers. In order to eliminate these isomers, different techniques should be tested, such as using the differences in solubility of the isomers. I started to test this technique, but the research project ended before I could make a conclusion on how to eliminate the isomers.

Control of Germline Proliferation in *C. elegans* Through Insulin Signaling Pathway

*Maygen del Castillo, Chemistry*

**Sponsor:** Professor Jane E. Hubbard, NYU School of Medicine

This project investigates coordination between cell proliferation and cell fate specification during germline development in *C. elegans*. The reproductive system balances proliferating germ cells and differentiated cells to maintain an adult germline stem cell population and mature gametes. Delays in differentiation can result in germline tumor formation at the proximal end of the gonad (the Pro phenotype). Two pathways controlling germline proliferation act through genes encoding the Notch receptor (*glp-1*), and the insulin receptor (*daf-2*). A temperature sensitive mutation in *glp-1* increases the activity of the receptor and delays differentiation. A mutation in *daf-2* slows the germline cell cycle, also delaying differentiation. Combining *glp-1* and *daf-2* mutations can result in the Pro phenotype at low temperature. This enhancement of the Pro phenotype by *daf-2* is dependent on the DAF-16 transcription factor and can be suppressed by a *daf-16* loss of function mutation. In the lab, genetic screens have identified >200 genes enhancing the Pro phenotype. Through RNA-interference assays, I observe a few of these enhancer genes that, when knocked out in the *glp-1; daf-16* double mutants, result in a suppression of the Pro phenotype, and therefore might be implicated in the insulin signaling pathway.

Investigation of the Function and Regulation of ERK3

*Vincent Dodson, Chemistry and Neural Science*

**Sponsors:** Professor Brian Dynlacht and Professor Irma Sanchez, NYU School of Medicine

In our study, we want to show that cdc2/B1 cyclin phosphorylation of ERK3 is a prerequisite for binding to polo kinase 1 (PLK1). After studying the open reading frame, we determined that there are nine potential phosphorylation sites (three in the catalytic domain and six in the carboxyterminal domain) in the open reading frame of ERK3. We generated mutants via site-directed mutagenesis for each of these potential sites, and will use these mutants in *in vitro* kinase assays to establish that cdc2/B1 cyclin phosphorylates ERK3 at these sites in both the catalytic and noncatalytic domains. We tested all these mutants against a control which had all nine sites mutated. After generating the mutants, I subcloned the ERK3 open reading frame into bacterial expression vectors to express the protein in bacteria. We purified the ERK3 protein from bacterial lysate using affinity chromatography with glutathione. These purified proteins
are used for the kinase assays, which are to be performed over the summer. Other future work entails quantifying the number of cells that demonstrate interaction between ERK3 and PLK1.

Using Alpha Helix Mimetics via Hydrogen Bond Surrogates to Contact Nucleic Acids
Rebecca Freilich, Chemistry
Sponsor: Professor Paramjit Arora, Chemistry

Protein secondary structure is an extremely important aspect of many protein-protein and protein-nucleic acid interactions. Often, an alpha helical peptide segment plays a crucial role in the recognition of proteins by DNA. Alpha helices are a pattern of secondary structure that is characterized by a hydrogen bond between the carbonyl oxygen of the i\textsuperscript{th} residue in the peptide backbone with the N-H hydrogen of the i + 4\textsuperscript{th} residue of the backbone. This hydrogen-bonding pattern is repeated over and over until the backbone takes the shape of a right-handed helix. The alpha helix backbone orients different amino acid side chains in a very specific manner and enables contact between these amino acids and their binding partners. Hydrogen Bond Surrogates (HBS) are a class of alpha helix mimetic that replace an i and i + 4 hydrogen bond at the N-terminus of peptides with a covalent carbon-carbon linkage. The covalent linkages stabilize the helix on short peptides. These HBSes have been shown to target protein receptors with high affinity due to the increased stabilization. Zinc Finger Proteins use this crucial helix motif in order to recognize specific triplets of DNA. In this study, I synthesized a number of short peptides and HBSes based on the known sequences of the helical DNA-binding components of zinc fingers. We tested these short peptides for their affinity for DNA in order to determine if they may be used as possible DNA binding compounds.

Large Gene Expression Patterns Due to Small Peptides of Upstream ORFs
Leatt Gilboa, Biology
Sponsor: Professor Claude Desplan, Biology

*InquIry* • Volume 15, 2011

_Nasonia*’s mille-pattes gene is a highly regulated developmental gene with an unusual structure, composed of four small peptide-encoding regions followed by a sequence encoding a slightly larger peptide. Little is known about the functions of small peptides in the cell, especially those encoded upstream of larger proteins. Because mille-pattes encodes five peptides, it contains as many stop codons, termination sequences in the process of protein translation. One theory is that these small, upstream regions can downregulate larger, downstream peptides. Accordingly, we injected constructs built with certain mutations of the mille-pattes gene into *Drosophila melanogaster*, a model organism that is easily genetically manipulated. Three constructs altered the start codon of each of the second, third and fourth peptide-encoding regions; one altered the start codons of all four regions; one altered the first, second, and fourth regions; and one was a wild-type control construct. The purpose of start codon point mutation is to halt the creation of the corresponding small peptide. *In situ* hybridization using a GFP probe detected the transgene in all fly strains except the strain with the mutated first, second, and fourth regions. Further attempts are necessary to develop this strain and that of the solely mutated first peptide. Further experimentation will involve antibody staining targeting the EGFP fused to the fifth sequence in each construct. This will reveal the translation of the large protein under each constructed condition. If the levels of the large peptide increase when the upstream peptides are absent, then the upstream peptides negatively regulate the translation of downstream peptides. The validation of this hypothesis will present a function in insects, negative regulation of downstream peptides, previously known only in plants.

Elucidating the Interaction Between Two Spore Coat Morphogenetic Proteins of *Bacillus subtilis*
Elizabeth Glicksman, Biology
Sponsor: Professor Patrick Eichenberger, Biology

*Bacillus subtilis* is the model organism used when experimenting on Gram-positive bacteria. It has a dynamic life cycle, undergoing sporulation when devoid of nutrients to form an endospore. From there, the spore can revert to its vegetative state when placed back into a nutrient-rich environment. As a spore, *B. subtilis* is highly resistant to a variety of harsh conditions, including exposure to intense heat, radiation, and lysozyme. Its robustness can be attributed to the spore’s composition: the core houses the bacterial genome; the cortex provides strength and stability; and the coat encases the spore and protects it from predators. This outermost coat layer, comprised of at least 70 unique proteins, is assembled in a highly structured manner at the direction of a select few morphogenetic proteins. Two such proteins are SpoVID and CotE, the former being required for proper localization of the latter. The principal aim of this work was to determine whether the observed interaction between SpoVID and CotE is direct or indirect. I used fluorescent microscopy to confirm the existing interaction, and subsequently carried out a series of histidine-tag pull-down assays to test the interaction. An analysis of the resulting Western blots showed a direct interaction between SpoVID and CotE.
Effects of each treatment or combination of treatments groups, including one baseline control, to examine the remobilization period. Animals were divided into seven and the administration of parathyroid hormone during the restoration of weight-bearing following immobilization, risedronate drug risedronate during limb-immobilization, the osteoporosis, including the administration of the bisphosphonate drug risedronate, the prevention and treatment of this aggressive form of this experiment, we investigated potential methods for impacted by such disuse are not well understood. In space flight; however, the metabolic pathways in bone from a stroke and astronauts returning from long-term shown to spur dramatic bone loss, increasing fracture risk. Such bone loss is common among patients recovering from the prevention and treatment of this aggressive form of osteoporosis, including the administration of the bisphosphonate drug risedronate, the restoration of weight-bearing following immobilization, and the administration of parathyroid hormone during the remobilization period. Animals were divided into seven groups, including one baseline control, to examine the effects of each treatment or combination of treatments on bone cell function and tissue architecture. I collected blinded histomorphometry observations, tabulating key tissue-level indicators of bone formation and resorption. While risedronate prevented some bone loss during long-term immobilization, it also stunted the recovery effect of remobilization present in drug-free animals. Parathyroid hormone had no effect on the restoration of bone lost to disuse. These findings help inform astronauts, patients, and their caregivers as to the appropriate use of these drugs for disuse osteoporosis.

Differences in the Cis-Regulatory Logic of Two Genes Activated by a Stochastically-Expressed Transcription Factor in the Drosophila Eye
Gregory W. Goldberg, Biology
Sponsor: Professor Claude Desplan, Biology

In the Drosophila compound eye, repeating units known as ommatidia contain two main classes of photoreceptors—’outers’ (R1-R6) and ‘inners’ (R7-R8). Two subtypes of R7s can be distinguished by their expression of specific rhodopsin genes: ‘pale’ R7s express rhodopsin3 (rh3), while ‘yellow’ R7s express rhodopsin4 (rh4). The Krizia Gupiteo, Anthropology
Sponsor: Ms. Sarah Bradley, Maimonides Medical Center

BRCA1 and BRCA2 are tumor suppressor genes that are involved in the regulation of gene expression and the DNA repair process. Germline mutations in these genes result in increased risks to develop breast and/or ovarian cancer. Due to the early onset of cancer in mutation carriers and the autosomal dominant manner of inheritance, individuals may opt for genetic testing to determine their risk and that of family members. Under medical supervision, those who test positive for a BRCA mutation may participate in more frequent screenings or decide to take preventive measures, such as prophylactic surgery. A by-product of genetic testing is information on ancestral origin because certain mutations are more prevalent in some groups, such as the Ashkenazi Jewish population. Under the supervision of Sarah Bradley, a genetic counselor at Maimonides Medical Center, I built a retrospective database of BRCA-positive patients which included genetic status, family history, and reported race and ethnicity. I then conducted a literature review for each mutation to determine if it had a high prevalence in any populations. By comparing the patient’s reported ethnicity to the population in which the mutation is reported in high frequency, I was able to shed new light on a patient’s ancestral origin and the overall movement of populations.

Preventing Bone Loss Due to Disuse
Jason Gruener, Mathematics
Sponsor: Dr. J. Christopher Fritton, New Jersey Medical School

The ability of mechanical loading to induce bone formation and to inhibit bone resorption has been well-documented. Conversely, long-term limb disuse has been shown to spur dramatic bone loss, increasing fracture risk. Such bone loss is common among patients recovering from a stroke and astronauts returning from long-term space flight; however, the metabolic pathways in bone impacted by such disuse are not well understood. In this experiment, we investigated potential methods for the prevention and treatment of this aggressive form of osteoporosis, including the administration of the bisphosphonate drug risedronate during limb-immobilization, the restoration of weight-bearing following immobilization, and the administration of parathyroid hormone during the remobilization period. Animals were divided into seven groups, including one baseline control, to examine the effects of each treatment or combination of treatments

The Role of Amygdaloid Nuclei in Mediating Sidman Avoidance Response in Good and Poor Performers
Nikita Gupta, Neural Science
Sponsor: Professor Joseph LeDoux, Neural Science

Active avoidance is a form of aversive learning that is modulated by the amygdala. It has been noted that a substantial number of animals fail to acquire avoidance responses to shock stimuli and instead express a persistent freezing response. The aim of this experiment was to evaluate c-fos expression in the amygdala nuclei in
order to establish a detailed circuit that is responsible for eliciting the avoidance response in good performers and not doing so in poor performers. Behaviorally, while the poor performers expressed persistent freezing across all eight training sessions, the good performers learned to shuttle between the two chambers in order to avoid the shock stimuli. When compared to the poor performers, the good performers had a greater Fos expression in the following regions: central nucleus of amygdala (lateral and medial part), lateral nucleus (dorsal and ventral part), basolateral nucleus (anterior and posterior part), basomedial nucleus (posterior part), and medial nucleus (anterior part). These findings show that the behavioral distinction between poor and good performers can also be explained based on the differential pattern of activation of amygdala nuclei.

**Cognitive Enhancement Through Exercise and Affirmations in an Elderly Population with a History of Substance Abuse**

Vish Gupta, Neural Science  
*Sponsor: Professor Wendy Suzuki, Neural Science*

Addiction to illicit drugs and alcohol is an issue that impacts everyone from the individual to the community as a whole, with substantial physical, psychological, and social consequences. The most popular courses of treatment tend to involve pharmaceuticals and cognitive therapy, and consequently most research on treatment effectiveness is focused within these categories. In this study, we proposed a novel form of treatment involving aerobic exercise that incorporates physical movements from kickboxing, dance, and yoga, paired with spoken affirmations (IntenSati). This study tested the hypothesis that aerobic exercise can improve learning, memory, and cognition and decrease cravings in a population of elderly, life-long substance users. We used a randomized design, with one group participating in an hour of exercise twice a week for 12 weeks, and the other not implementing any change in their normal routine. Both groups were given psychosocial assessments and underwent neuropsychological testing prior to and directly after the intervention period, with individual performance compared using unpaired t-tests. A significant improvement (p < .05) was found in the delayed recall portion of the Hopkins Verbal Learning Test, indicating an improvement in long-term memory formation. This finding suggests that exercise can be included in treatment regimens to help restore cognitive function.

**Serotonin and Temporal Discounting Rates: A Genetic Contribution to Impulsive Decision-Making**

*Amanda Hersh, Psychology*  
*Sponsor: Professor Elizabeth Phelps, Psychology*

Prior research suggests that the serotonergic neurotransmission may influence impulsivity by affecting the rate at which one discounts the value of delayed rewards. Here, we examined whether two common polymorphisms in the human serotonin transporter gene (5-HTTLPR and rs3813034) are associated with individual differences in temporal discounting rates. Participants were genotyped and completed a task in which they were asked to choose repeatedly between smaller immediate or larger delayed monetary amounts, with varying amounts and delays. From these choices, we estimated individual discounting rates that were compared across genotype groups to determine whether we find evidence of a genetic propensity towards impulsive choice. Our results revealed that participants homozygous for the G allele of the rs3813034 polymorphism showed decreased temporal discounting rates, suggesting a genetic contribution to impulsive decision-making.

**Characterization of Cancer Cells Overexpressing the miR-21 Precursor**

*Jiyao Hu, Biology*  
*Sponsor: Professor Bin Shan, Tulane University School of Medicine*

MicroRNAs (miRNAs) are small non-coding RNAs that modulate cell biology in both physiological and pathological conditions. Cancer features a global reduction in miRNAs, although the miRNA signature of human cancer consists of the elevated expression of several oncogenic miRNAs, such as miR-21. The mechanistic link between reduced miRNA biogenesis and cancer remains largely unknown. A549 cells, a human lung adenocarcinoma cell line, were transduced with a retroviral vector expressing a fragment of pri-miR-21 (A549miR-21) or its backbone vector (A549vec). Surprisingly, forced expression of the miR-21 precursor resulted in little change in miR-21 in the A549mir-21 variant compared to the A549vec variant. Despite the lack of increase in miR-21, the number of colonies formed by A549mir-21 cells was double that formed by A549vec in low density colony formation assays. Moreover, both A549miR-21 and MCF-7NmiR-21 exhibited resistance to Torin 1, a mammalian target of rapamycin (mTOR) inhibitor to induce expression of LC3BII, a molecular marker of autophagy. Our findings, despite their preliminary nature,
demonstrate a link between the overexpression of miR-21 precursor and the acquisition of aggressive behavior in cancer cells. Our results warrant further investigation of the tumor-modulating activity of miR-21 and other miRNA precursors independent of their mature products.

**The Effect of Familiarity on Perceptual Crowding**

Marianne Jacob, Biochemistry and Psychology

Sponsor: Dr. Denis Pelli, Psychology

The identification of a peripheral target object surrounded by flanker objects becomes increasingly difficult when the spacing between target and flanker decreases. The difficulty lies in an increase of spatial interaction, leading to an inappropriate integration of target and flankers (Pelli et al., 2007). This perceptual phenomenon of crowding affects everyday activities, such as reading a book or looking at pictures. One factor of crowding that has not yet been extensively studied is familiarity. Preliminary experiments show that those literate in English find it less difficult to identify the Korean target when English flankers surround it. It is suggested that the familiarity of the English flankers reduces crowding, allowing for the correct identification of the unfamiliar Korean target. This study examined the differences in how English and Korean observers perceive English, Korean, and symbol letters. All observers were asked to identify a flanked peripheral target. We varied target-flanker spacing in a staircase fashion to find the minimum spacing needed to correctly identify the target (critical spacing). Results suggest that the familiarity of the flanker is not important for the successful identification of the target. Both English and Korean observers’ familiarity with English and Korean flankers, respectively, did not significantly influence the correct identification of the target. This research, therefore, shows that familiarity does not affect one’s perception of an object.

**Probabilistic Modeling of Tidal Streams**

Aukosh Jagannath, Mathematics and Physics

Sponsor: Professor David W. Hogg, Physics

Tidal streams are streams of stars orbiting in the Milky Way’s gravitational potential that are formed by the disruption of compact, gravitationally bound clusters of stars, such as those found in globular clusters and dwarf galaxies. Such streams, particularly those formed by the disruption of globular clusters, form thin curves in phase space which can be thought of as delineating the orbit of a single, ideal particle. The proper methodology of fitting orbits to tidal streams has become an important problem in astronomy as its resolution has many applications, particularly in the modeling of the galactic gravitational potential. We present a novel methodology for this fitting problem. Unlike other attempts to resolve this problem, which have treated it as an exercise in parametric curve fitting, we approach the problem from a probabilistic standpoint. We begin with the general framework probabilistically modeling data sets in n-dimensions that are assumed to lie on curves with one affine parameter and a k-dimensional underlying manifold of adjustable parameters. This framework is applied to the problem of modeling tidal streams, creating a robust methodology for treating the tidal stream modeling problem. The techniques we have developed are presented on realistic, simulated data. Some studies of the relative importance of the quality of information in various phase space parameters are examined.

**The Effect of Early Moderate Hearing Loss on Adult Auditory Perception**

Ramanjot Kang, Psychology

Sponsor: Professor Dan H. Sanes, Neural Science

A general theory of sensory development is that early experience plays an important role in central nervous system function and thus shapes adult perception. Support for this idea has come from experiments in which the developing sensory system is deprived of experience for a prolonged period. For example, previous studies have shown that a loss of early auditory experience can lead to deficits in perceptual maturation. Here, we examined, in an animal model, whether a moderate form of developmental hearing loss influenced adult perceptual abilities. Adult gerbils were trained on a behavioral task to detect frequency modulation, an important component of both animal and human communication. We used signal detection theory to compare the frequency modulation depth detection thresholds for animals reared in a normal auditory environment and those reared with conductive hearing loss. Our preliminary results reveal that adult animals with conductive hearing loss, on average, have higher depth detection thresholds as compared with the control adults, suggesting that a loss of early sensory experience can disrupt adult perception and provide an animal model which can be used to examine underlying neural mechanisms.

**Non-Trivially Parallelizable Applications with zNet Framework**

Antony Kaplan, Computer Science and Physics

Sponsor: Professor Douglas Schmidt, Vanderbilt University

As multicore and multiprocessor systems are becoming ubiquitous and large chip makers have announced
that much of their further development will go into this very market, parallel and distributed computing is becoming a more and more attractive solution for high-performance computing needs. Naturally, this has led to the development of many toolkits, frameworks, and even languages that attempt to address the difficulties of writing parallel and distributed applications. Even with the help of these frameworks, however, parallelizing some applications can be a truly intricate (and sometimes unfortunately fruitless) process. Focusing specifically on single machine, multicore/multiprocessor parallel computing, we describe three such types of applications which are difficult to parallelize. We have chosen three separate case studies from the financial domain, which exemplify each of these difficulties. Specifically, we implement three applications—the Heston Model Calibration, Binomial Option Pricing, and Path-Dependent Scenario Evaluation—using Zircon Computing’s zNet framework for parallel programming. We evaluate how and whether these difficulties were addressed by the zNet framework and measure its performance in a massively multicore environment.

**Synchronization of the Molecular Clock in *Drosophila* Pacemaker Neurons**

*Harris Kaplan, Biology*

*Sponsor: Professor Justin Blau, Biology*

Circadian rhythms are internally generated patterns of activity which control behaviors such as sleeping and eating. The *Drosophila* larval circadian network contains nine neurons, each with its own molecular clock. Four of these neurons, the lateral neurons (LNs), are known as pacemaker neurons and exhibit synchronous rhythms of molecular clock protein levels. These neurons signal to other cells in the network, the dorsal neurons (DNs), via the neuropeptide PDF. In PDF Receptor mutants, the molecular rhythms in the LNs become desynchronized: one to three cells show different concentrations of clock proteins than the other cells at irregular times. These mutants have weakened activity rhythms as adults in constant darkness. It remains unclear whether the synchronization of the LNs is controlled via signaling back from the DNs or via LNs signaling to each other. Through RNAi and transgenic rescue of PDF Receptor mutants in subsets of neurons, I found that the LNs are synchronized predominantly by each other, in a cell group autonomous manner. Rhythmic behavior is also restored primarily through PDF Receptor rescue in the LNs but not in the DNs. Therefore, both rhythmic behavior in constant darkness and LN molecular clock synchronization require LN signaling to each other.

**Towards Efficiency and Stability of the Forward Euler Method for General Stochastic Differential Equations**

*Dylan Karten, Mathematics*

*Sponsor: Professor Nawaf Bou-Rabee, Mathematics*

Stochastic differential equations (SDEs) provide a description of real world phenomena such as molecular systems, financial processes, and new materials. SDEs cannot be solved exactly (analytically) and therefore must be evaluated with approximation. The Euler method is a widely used approximation to solve SDEs, and new variations of this algorithm are constantly being proposed that have more success. In this study, I examine how to adapt this method to systems that possess multiple time scales. In addition to stochastic effects, these systems are subject to different forces that generate motion on different time scales. The idea is to evaluate the system over a number of time steps, which allows slower forces to be computed less frequently, while evaluating the effects of the faster forces with smaller time steps. Just as a swing set displays properties of resonance, a force acting on this particle with a certain frequency will skyrocket the energy of the particle. The creation of MATLAB code to evaluate this “swing set” system allows us to spot resonance and achieve the most stable approximation very easily. This computational approach reduces computational costs, maintains stability, and produces an efficient method for the evaluation of multiscale dynamical systems modeled by SDEs.

**Loss of Transcription Factor Early Growth Response Gene 1 and Impaired Endochondral Bone Repair**

*Jihye Kim, Biochemistry*

*Sponsor: Dr. Philipp Mayer-Kuckuk, Hospital for Special Surgery*

Early Growth Response Gene 1 (EGR-1) is a transcription factor that is involved in a broad range of cell functions, such as proliferation, differentiation, apoptosis, growth control, and vascular permeability. Most importantly, as the name suggests, EGR-1 plays a role in ossification during development, which brings out a possibility that it might participate in endochondral bone formation during fracture repair. In order to construct the detailed involvement of EGR-1 in fracture healing, we assessed the consequences of loss of EGR-1 on endochondral bone repair. In wild type and EGR-1 knockout mice, mechanical fractures on the eighth rib were created and the differences in tissue morphology and composition were followed over 28 Post Fracture Days (PFDs). The healing phases in EGR-1 knockout mice were impaired by alterations. A persistent accumulation of fibrin within the fracture gap was observed on PFD 7 and remained pronounced in the callus on PFD 14. Additionally, the
PFD 14 callus was abnormally enlarged, which also showed increased bone formation. Lastly, cell deposits located near the callus were detected on PFD 14. Despite these abnormalities, repair in the EGR-1 knockout mice callus advanced on PFD 28, suggesting that EGR-1 is not essential for healing. In conclusion, this provides genetic evidence that EGR-1 is a pleiotropic regulator of endochondral fracture repair.

**How Emotion and Attention Affect Perception: Consequences of Anxiety, Negative and Positive Affect, and Attentional Control in Response to Fearful and Neutral Facial Expressions**

*Min Kim, Psychology*

*Sponsors: Professor Marisa Carrasco, Psychology, and Professor Elizabeth Phelps, Psychology*

This study investigated how the validity of covert, exogenous, neutral, or fearful facial cues affects contrast sensitivity, and how those effects are influenced by anxiety and negative affect. Forty participants performed a task in which they discriminated the tilt of a target gabor stimulus (a simple visual stimulus) presented simultaneously with three distractor gabor stimuli. Contrast of the gabor patches varied across trials. Before being presented with the gabor stimuli, the participants were primed with either neutral or fearful face cues in six different conditions; fearful or neutral facial expressions appeared at the same location as that of the target gabor (valid), at all four possible locations (distributed), or at a different location from that of the target gabor (invalid). Results showed that contrast sensitivity was greatest in valid conditions, less in distributed conditions, and least in invalid conditions regardless of the face cues’ emotionality, in line with previous results. A median split of the participants’ self-report measure scores showed that only the low and high trait anxiety, high state anxiety, high negative affect, and low attentional control showed attentional bias (a significant difference between the valid and invalid conditions) for fearful faces. Importantly, greater cost to contrast sensitivity for fearful faces than neutral faces in the invalid cueing condition occurred only in the high trait and state anxiety, high negative affect, and low attentional control groups. Results are consistent with prior work showing that people with high anxiety, high negative affect, and low attentional control have greater difficulty disengaging attention from threat-related stimuli.

**Understanding the Evolution of Epistasis: Relationships Between Leaf Shapes and Sizes and Flowering Time of Arabidopsis**

*MinJu Kim, Biology*

*Sponsor: Professor Michael Purugganan, Biology*

Living organisms are the final outcome of a series of instructions contained in genes. These instructions
The mechanisms on which we rely to see and perceive color are not clearly understood. Our experimental goals were to design a project capable of taking a more in-depth look at these mechanisms. First, we wanted to find the ratio of L to M cone photoreceptors across the human retina from the fovea to the periphery. Our data showed a wide range of L:M cone ratios across individuals, but the individuals themselves did not exhibit a wide variation across the retina from the fovea into the periphery. The variation of L:M ratio across the population, however, implies that there may be an underlying normalizing color mechanism which allows us to perceive color as the same, despite these differences in L:M ratios. Our second goal was to use each individual’s measured L:M cone ratio to determine the temporal resolution of cone photoreceptor input to the color pathway as one goes away from the fovea. Our data show that the temporal resolution of the color pathway appears to decrease as one goes away from the fovea. This is strikingly different from achromatic visual mechanisms that have long been known to increase in temporal resolution further in the periphery (a result we replicated). The decrease in temporal resolution of the color pathway is consistent with other measures of color perception in the peripheral visual field: color vision declines markedly in peripheral vision. The decrease in the color pathway’s temporal resolution could be caused by intrinsic properties of the brain’s integration of color signals. But it could also be a result of the weakened color signals sent to the visual cortex by the peripheral retina from a decrease in color contrast sensitivity. We obtained preliminary results that support the latter view.

**Drebrin A Decrease in the Hippocampus of an Animal Model of Alzheimer’s Disease**

David Lee, Neural Science  
**Sponsor:** Professor Chiye Aoki, Neural Science

Presenilin conditional double knockout (PScDKO) mice have been used to study the development of Alzheimer’s disease (AD) phenotypes. Studies to date indicate that these animals exhibit memory dysfunction and a decrease in synaptic plasticity, the latter of which may lead to neurodegeneration. Loss of synaptic plasticity and memory function have been linked to defects in neurotransmitter receptor trafficking at the level of synapses. How does the loss of presenilin function lead to these defects? The F-actin binding protein drebrin A may have a role in impairing the machinery that allows for the activity-dependent redistribution of glutamate receptors at the synapse. We used electron microscopic immunocytochemistry to analyze drebrin A levels in PScDKO mice. This allowed us to quantify drebrin A labeling and to differentiate between labeling at the synapse and at nonsynaptic areas, the latter of which would reflect the protein’s role in regulating the reserve or degradative pool of glutamate receptors. Our results demonstrate that a loss of presenilin function in mice leads to a decrease in drebrin A compared to control mice. This study, taken with the results of others, indicates that drebrin A has a causal role in impairing the machinery that allows for activity-dependent glutamate receptor trafficking in PScDKO mice. Thus, loss of presenilin function likely leads to impaired receptor trafficking, which in turn causes impaired synaptic plasticity and subsequent neurodegeneration in PScDKO mice.

**Zelda Concentration in Drosophila Gene Activation and Embryonic Development**

Albert Li, Biology  
**Sponsor:** Dr. Christine Rushlow, Biology

The development of Drosophila depends heavily on the presence of a transcription factor called Zelda. Zelda controls the timing of gene expression in young embryos. Our hypothesis is that, once a critical level of Zelda protein accumulates, genes are activated and
development proceeds. I examined how different doses of Zelda would affect the speed of embryonic development as well as the expression of early zygotic genes. I assayed embryos in the developmental period of 1-2 hours. I observed that Drosophila embryos containing two copies of Zelda developed slightly faster than those with only one copy. For zygotic gene activation, I focused on two essential genes for body patterning and cellularization, zen and serendipity-a, respectively. In situ hybridization results showed that zen required lower levels of Zelda to be activated than did serendipity-a, indicating that Zelda target genes respond differentially to Zelda protein levels. These results indicate that Zelda concentrations control the timing of gene activation and thus developmental progression.

**Deregulation of Genomic Methylation in Fetal Origins of Adult-Related Disease**

*Daniel Lia, Chemistry*  
*Sponsor: Professor Francine H. Einstein, Einstein College of Medicine*

Today it is commonly believed that development in an adverse in utero environment can biologically “prepare” a fetus for a lifetime in a similar environment. This idea, most famously known as the thrifty phenotype hypothesis, is clearly understood. What is less clear is the process by which such information can be conferred to a fetus and stored for decades. This research project investigated the mechanism by which infants that are born abnormally small or large are predisposed to a higher incidence of adult-related diseases later in life. We have proposed that an epigenetic mechanism—specifically the deregulation of genome-wide DNA methylation patterns—is to blame. We have collected and analyzed DNA samples from hundreds of experimental and control newborns, and are using the results to look for a pattern between abnormal birth size and irregular genomic methylation. Using a novel detection protocol, the methylation status at greater than 1.8 million loci throughout the genome can be compared between control and experimental DNA. The project is ongoing; our preliminary data suggests that poor nutritional conditions during gestation may, in part, cause deregulation of normal methylation, and overall hypomethylation throughout the genome.

**PX-JX2 Conversion of a DNA Nanomechanical Device Attached to DNA Origami Tiles**

*Peter Liang, Chemistry*  
*Sponsor: Professor Nadrian Seeman, Chemistry*

DNA is a robust material for making nanomechanical structures because of the predictable Watson-Crick pairing of its components. One such structure is the PX-JX2 device. The structure can start in the PX state and have one end rotate a half-turn with respect to the other end to form the JX2 state. This device has been utilized in moving DNA “arms” and gold nanoparticles.

In my experiment, I am attaching a DNA origami tile to each end of the device and running the PX-JX2 conversion. In the PX state, the origami tiles will be positioned above each other, while in the JX2 state, the tiles will be adjacent. I have designed a complex that can attach to each individual tile and can convert from the PX state to the JX2 state. I am currently working on conditions that will allow both tiles to attach to the complex at the same time and that will be robust enough to convert from one state to another. Atomic force microscopy is the key source of the data to demonstrate the action of the device.

**Therapeutic Effectiveness: Measuring the Impairment of Axonal Transport of Mn⁺ with MRI to Evaluate Immunotherapy Effectiveness**

*Benjamin Winthrop Little, Biochemistry*  
*Sponsors: Professor Youssef Wadghiri, NYU Langone Medical Center*

Alzheimer’s disease is a progressive dementia characterized by two microscopic lesions: amyloid plaques made of extracellular Abeta protein, and neurofibrillary tangles consisting of intraneuronal abnormally phosphorylated tau protein. A seven-day tract tracing manganese-enhanced magnetic resonance imaging (TT-MEMRI) protocol has shown, in previous laboratory work, that the level of axonal impairment observed is strongly correlated with the level of pathological tau immunostaining by examining multiple neuronal transport parameters in 2D between P301L transgenic (TG) mouse models compared to wild type (WT) mice. This shows the significance of axonal transport impairment in the pathological progression of Alzheimer’s disease. To further test the technique’s usefulness, we used the same seven-day protocol to examine the same parameters in WT control, and in mice that have undergone immunotherapy (IT) for tau pathology in a therapy developed by the collaborators. Preliminary results in comparing eight WT to eight IT mice show the effectiveness of the immunotherapy, but a busy MRI facility limits the speed of the project. To solve this problem, a one-day protocol was developed at the expense of two measured parameters. We compromised by measuring the rate parameter in 3D instead of three parameters in 2D. The protocol has shown transport impairment sensitivity in distinguishing age-associated effects so far, but it will take a few more months to provide results for the mice that have undergone immunotherapy.
Glucose Regulation in Diabetes
Samantha Lozada, Mathematics
Sponsor: Professor Charles S. Peskin, Mathematics

Complicated and extensive models of glucose regulation, involving several variables, have been developed over the years. Our research specifically focuses on the feedback loop between insulin and glucagon. Although our model is simpler than a model including state variables such as non-esterified fatty acids concentration in the blood plasma, b-cell mass, TAG content of lipocytes, and/or leptin concentrations in the blood plasma, we are still able to simulate most of the key effects of diabetes and other health problems on glucose regulation—such as hyperglycemia, hyperinsulinism, and insulin shock (hypoglycemia). We are even able to simulate eating a bowl of vanilla ice cream! For most of our qualitative and quantitative experiments, we worked with MATLAB, a computer programming language and data visualization software which offers a rich set of tools for solving problems in engineering, scientific, computing, and mathematical disciplines. Our model is a refinement of a realistic model developed by Cobelli et al. (1982). Despite the fact that their paper is nearly 28 years old, the experimental data of diagnostic tests used by medical professionals, such as the Intravenous Glucose Tolerance Test (IVGTT), correlates with our simulated graphs. We discovered that our model closely correlates, both qualitatively and quantitatively, to observed experimental data. Medical professionals could use our model to precisely determine the dosage of insulin a diabetic patient would need to inject for a given meal. After further research to create an extended model, our model could be used to work toward a better understanding of why obesity sometimes leads to diabetes. We could also try to integrate exercise into our new model as treatment for diabetes. With a more complex model, we could simulate more components of a typical meal, such as protein and fat content. Essentially, we would be able to construct a basic diet for our subject, and then we could attempt to find a diet that could help treat or negate some of the effects of diabetes.

Detection and Removal of Anomalies in Astronomical Images Using Hough Transform and Robust Estimation
Patrick P. Maffucci, Biology
Sponsor: Professor David W. Hogg, Physics

When telescopes take images, various anomalies occasionally occur in these images. For example, if a telescope takes an image as a satellite passes by, the resulting image will display a bright trail of light. For another, bright stars can create reflection and refraction artifacts inside the telescope. Physicists must now manually go through each image to detect and then remove the anomalies, which is a time and energy consumptive task. My project is to develop a computer program, based on the language “Python,” that will take in millions of astronomical images, analyze them to detect the presence of anomalies, and automatically remove them without any input from the user (except the original images). As a first step, I will consider anomalies created by earth-orbiting satellites that leave “trails” in the images. I have written code that analyzes an array (an image) by examining every possible offset of the anomaly and every possible angle, and then creates two new arrays: the mean and median at each value of the angle and offset. These new arrays are then used to determine, via Hough Transform, the location of the anomaly, which is represented by a specific angle and offset that is traced back to the original image. The Hough Transform used in this step is a general linear filter with nonlinear parameters for finding geometric features in images. We are currently writing code that isolates the anomaly by trimming the image to contain the selected region and then optimizes the parameters determined by the Hough Transform.

The Localization of Non-Muscle Myosin in an ect-2(-) Mutant during C. elegans Male Tail Tip Morphogenesis
Daniel Martin, Biology
Sponsor: Professor David Fitch, Biology

During the last larval stage (L4) before becoming adults, the C. elegans male tail goes through an extensive remodeling process called morphogenesis, wherein the four most posterior tail cells (hyp 8-11) fuse together and retract from the animal’s surrounding cuticle. This results in adult males having a rounded tail tip following morphogenesis. When something goes wrong with the retraction mechanism in morphogenesis, the male tail can have several abnormal phenotypes, such as over-retracted, unretracted, and knob. Non-muscle myosin II (NMY-2) plays a big role in morphogenesis because it is the motor protein that physically pulls the cells in the tail tip anteriorly and allows the tail tip to retract from the cuticle. ect-2 codes for a RhogEF protein which is important in the building of the actin cytoskeleton in cells. In order to examine how non-muscle myosin acts in a ect-2(-) mutant, we compared the green fluorescent protein expressions of a ect-2(-);NMY-2::GFP strain to a NMY-2::GFP control strain of C. elegans in order to determine if non-muscle myosin II is localizing correctly in the mutant, and, more importantly, how having a mutant copy of the gene affects male tail tip morphogenesis. We
found that the *ect-2(-)* mutant was missing expression of NMY-2::GFP in the tail tip cells during the final stages of retraction, and adult *ect-2(-)* mutants had an increase in unretracted and knob phenotypes. We concluded that NMY-2 is not localizing properly in the mutant, and that *ect-2* is necessary for proper localization of NMY-2.

The Role of the TOR1 Pathway in Yeast Cell Quiescence
Alicia Mastrocco, Biology
Sponsor: Professor David Gresham, Biology

The TOR1 pathway in model organism *Saccharomyces cerevisiae* is critical for growth and quiescence. In mammals, the homologous pathway, mTOR, plays important roles in tumorigenesis. Understanding the TOR1 pathway in yeast cells and defining the requirements for quiescence in viable cells might contribute to our knowledge of mTOR in proliferating tumor cells. It has been determined that a cell population of yeast which are auxotrophic for leucine dies quickly when starved for leucine; however, when the TOR1 gene is deleted from the auxotrophic strains, the population lives for a prolonged period of time under leucine starvation (Boer et al. 2008). By performing a time series of density gradients of knockout cells in leucine-limiting media and comparing this series to a control series with a functional TOR1, we have seen that the former remains dense for a longer period of time. We hypothesize that increased production of the disaccharide trehalose may contribute to this trend in density and increased survival of the knockout. Performing an enzymatic assay to further examine the presence of trehalose in the knockout cells may provide insight into molecular mechanisms which suppress lethality.

An Evaluation of the Relationship between Stress, Body Mass Index, and Ability to Lower Blood Pressure over a Six-Month Period in Veterans with Uncontrolled Hypertension
Dana McCloskey, Economics
Sponsor: Dr. Jennifer Friedberg, Veterans’ Administration and NYU School of Medicine

Stress and obesity are postulated to be important modifiers of hypertension effects; however, their influences on blood pressure (BP) are still unclear. We evaluated whether changes in perceived stress level (PSL) or body mass index (BMI) are related to BP lowering over a six-month period. Veterans with uncontrolled hypertension enrolled in a behavioral intervention trial to improve BP control (N=533) were monitored for changes in BP, BMI, and PSL between baseline and six-month visits. Veterans’ BP was measured using the mean of six automated readings, and PSL was measured using the Perceived Stress Scale (range 0–40). Veterans’ BMI was calculated using height and weight measurements recorded during interviews. We conducted robust regression analysis independently on systolic (SBP) and diastolic (DBP) BP changes with PSL and BMI changes, controlling for demographic and health factors. At six-month follow-up (n=474), average SBP and DBP changes were -4.29mmHg and -2.84mmHg, respectively. These adjustments were not associated with PSL changes. Alternatively, a one-point BMI increase was associated with a 2.31mmHg SBP increase and a 1.22mmHg DBP increase (both p<0.01). While veterans’ PSL was not associated with lowered BP at six months, changes in BMI were correlated with BP reductions. Accordingly, clinicians can expect to find success in lowering patients’ risk of BP-related complications by focusing efforts on reducing BMI.

Long Distance Photoinduced Electron Transfer in Oligomeric Porphyrin-[60]Fullerene Dyads with Triazole-Based Conjugated Linkers
Elizabeth O. McCord, Chemistry
Sponsor: Professor David I. Schuster, Chemistry

I have recently succeeded in the preparation of a new conjugated zinc(II) porphyrin-[60]fullerene dyad using 1,2,3-triazole “click” chemistry of alkyne and azide precursors. The triazole linkage has been shown to facilitate efficient electronic communication in the excited state between the porphyrin and fullerene moieties. By increasing the number of azido-alkyne linker subunits, I can systematically increase the length of the linkage and the number of triazole groups between the terminal porphyrin and fullerene moieties. I report on the synthesis of these new materials and the effects of changes in spacer length on the dynamics of photoinduced charge separation and charge recombination. The results add significantly to our understanding of the effects of molecular topology and molecular conformation on the dynamics and energetics of long-range intramolecular energy transfer and electron transfer processes induced by UV-visible photoexcitation of these nanoscale materials.

Fine Mapping of the Head-Plugging Gene in *Caenorhabditis elegans*
Daniel McNelis, Biology
Sponsor: Professor Matthew Rockman, Biology

Normally, male roundworms in the *Caenorhabditis* genus will deposit mating plugs over the vulvae of their sexual partners, presumably to ensure paternity; however,
in some wild isolates, when there is high male density, mating plugs are deposited over male excretory pores, which are just ventral to the head. This head-plugging behavior is found in some populations of at least two hermaphroditic species, *C. elegans* and *C. briggsae*, but no gonochoristic species, suggesting a possible evolutionary mechanism in the degradation of a male-specific gene or genes. For the head-plugging AB2 strain of *C. elegans*, previous lab work indicates a probable genetic association between the phenotype and Chromosome II. To further map the putative gene, we made an F2 cross between AB2 and CB4856, a non-head-plugging strain. During the final larval stage, F2 males were isolated onto plates of 40 each. After 96 hours, each male was phenotyped and then genotyped using several insertion-deletion markers along each. After 96 hours, each male was phenotyped and then genotyped using several insertion-deletion markers along Chromosome II. Preliminary results based on recombi-

Chromosome II. Preliminary results based on recombi-

nation events between these markers strongly indicate recessive genetics associated with a 0.4-megabase pair stretch of DNA containing approximately 90 genes. Further genotyping using single nucleotide polymorphisms (SNPs) between the two strains will likely narrow this region down to several candidate genes that may be responsible for the head-plugging phenotype in AB2.

**The Role of the Akt Protein Kinase in Acute and Chronic Stress Responses**

*Anastasios Mirisis, Neural Science*

*Sponsor: Professor Thomas Franke, NYU School of Medicine*

Biochemical studies on human postmortem brains of major depressive disorder sufferers show significant impairments of AKT signal transduction. To understand the importance of intact Akt signaling for the normal and pathological processing of fear responses, we have used pharmacological and genetic models of impaired Akt signaling in mice to study its role during the encoding of fear memories and after exposure to chronic stress. When investigating the importance of intact Akt signaling during the acquisition of fear memories, findings of depression-like behaviors in chronically-stressed mice suggest opposing roles for intact Akt signaling during behavioral responses to acute aversive stimuli versus coping with chronic stress.

**Exploring Elevated Expression in zelda Mutants**

*Adrianne Monsef, Biology*

*Sponsor: Professor Christine Rushlow, Biology*

Characteristic of all organisms is the early period of embryogenesis, where cell function and growth is regulated by maternal gene products deposited into the developing oocyte. During some point after fertiliza-

tion, the control of embryo development is transferred to the zygotic genome. This critical period is deemed the *Maternal to Zygotic Transition* (MZT). This shift in developmental control is characterized by the degradation of maternal gene products and the activation of transcription of the zygote’s own genome. Previous research performed on the model organism *Drosophila melanogaster* led the Rushlow lab to uncover Zelda, a zinc finger transcription factor that is responsible for the activation of many early zygotic genes. Genome-wide expression profiling experiments have shown that *zelda* mutants have elevated expression of hundreds of genes, many of which are thought to be maternally loaded. Recent studies have characterized Zelda as a critical factor for activating transcription of some zygotic microRNAs, some of which may be responsible for degrading maternally loaded RNAs. To investigate the mechanism underlying the upregulation of RNAs in 1–2 hour *zelda* mutants during the MZT, we considered two hypotheses. The first hypothesis proposes that Zelda activates transcription of degradation factors such as microRNAs, which are then responsible for degrading maternally loaded RNAs such as CG3752 (4.19-fold upregulated). Thus, in *zelda*, deficient embryos’ maternal gene products will be upregulated because the source of degradation is absent. Alternatively, although RNAs are maternally deposited, they could also be zygotically transcribed, and *zelda* could function as a direct repressor of these genes in early embryos. To test which specific process occurs in *Drosophila melanogaster*, we performed in situ hybridization using wild-type embryos, *zelda* mutant embryos, wild-type and *zelda* mutant ovaries. Nuclear dots, which indicate hybridization to nascent transcripts, were not visible in *zelda* mutants (80–100 min into development, using exonic probe CG3752), which indicates that transcripts are present only in the cytoplasm, and supports the hypothesis that *zelda* is involved in maternal RNA degradation by activating degradation factors. These findings support the primary hypothesis that *zelda*-deficient embryos cannot activate degradation factors and thus maternal gene products are upregulated. A complementary analysis done by Chung-yi Nien and Albert Li using ChIP-chip data further supports this finding, as there is no binding of Zelda to the CG3752 gene region in the ChIP profiles. We conclude that Zelda does not act as a direct repressor of CG3752 during 1–2 hour development in *Drosophila*. RNA Polymerase II data shows no peaks, thus binding of RNA Pol II to the CG3752 gene in 2–3 hour embryos does not occur. Without the presence of RNA Pol II, there can be no transcription of CG3752 in the 2–3 hour development time frame, and thus upregulation in *zelda* mutants would not be due to
zygotic transcription triggered by the absence of repression due to zelda.

**Exploring the Iron Chaperone Function of PCBP3, PCBP4, and FMR1**

*Navin Natarajan, Biochemistry*

*Sponsor: Dr. Caroline Philpott, National Institute of Diabetes and Digestive and Kidney Diseases*

Iron homeostasis in the cell is critical for proper functioning. Imbalanced iron levels have been linked to disorders such as cirrhosis and diabetes. It has been shown that the poly-C-binding proteins, PCBP1 and PCBP2, are able to act as iron chaperones in delivering iron to the iron storage protein, ferritin. Ferritin is a protein that stores iron in non-toxic form within the cell. PCBP3, PCBP4, and FMR1 are proteins that are structurally related to PCBP1 and PCBP2. The similarities in structure raised the question of whether or not PCBP3, PCBP4, and FMR1 also functioned as iron chaperones. In this study, PCBP3, FMR1, and PCBP4 were transformed into yeast cells expressing ferritin. The yeast were histidine auxotrophs and were grown on a histidine-deficient medium. If the proteins studied do function as iron chaperones, they would be able to lower cytosolic iron levels and thereby activate the Aft1 promoter that would allow the yeast to grow in the medium. Using this design, we screened the yeast for growth to see if the studied proteins had iron chaperone function. We have found that PCBP4 does function as an iron chaperone, while FMR1 isoform 9 and PCBP3 variant 2 do not.

**From Local to Global Visual Processing: The Development of Illusory Contour Perception**

*Kritika Nayar, Neural Science*

*Sponsors: Professor Lynne Kiorpes, Neural Science, and Professor Karen Adolph, Psychology*

An ongoing debate in perception research concerns a putative developmental shift from local to global visual processing. A local strategy involves attention to individual object elements; a global strategy involves perception of the object as a whole. Using an objective match-to-sample paradigm, we charted the developmental trajectory of Kanizsa illusory contour (KIC) perception, an index of global processing, in 3- to 9-year-old children and in adults. A KIC comprises opaque “pacman” elements that are arranged in specific organizations to induce perception of an illusory shape. We recorded response location with a touch-sensitive monitor. Our results show that accuracy to touch the matching KIC increased with age: younger children achieved only about 60 percent correct, while older children showed results similar to adults and achieved near 100 percent correct. Response latency decreased systematically with age, suggesting greater confidence among the older children. Younger children moreover, predominantly touched the “pacman” elements, suggesting a local strategy. Conversely, older children and adults touched the center of the KIC, which is an indication of global perception. These results demonstrate that there is a developmental progression from local to global processing, implying a fundamental change in perceptual ability between early and late childhood.

**Evolutionary Divergence in the Blind Mexican Cavefish Astyanax mexicanus**

*Emmanuel Nisimov, Biology*

*Sponsor: Professor Richard Borowsky, Biology*

A species of fish native to NE Mexico, *Astyanax mexicanus*, is found in 29 different caves (cave form) and the surrounding streams and rivers (surface form). The two forms differ in both morphology and behavior, with the cave form having reduced eye size, less pigmentation, and decreased sleep. In addition, the cave form is known to be of double origin, that of old and new stock. Old stock cave fish are the descendants of ancestral eyed surface fish, and new stock cave fish are the descendants of an existing surface form. Although hybrid cave fish have been found in nature and bred in the lab, suggesting that these cave populations comprise a single species as a result of their ability to interbreed, we asked whether hybrids had a reduced reproductive fitness. We studied this by examining differences in sperm viability, such as percent motility and sperm velocity, using tracking software. Of the hybrid fish populations tested, hybrid sperm had a decreased duration of activity, and lower percent motility and velocity in comparison to the pure-bred populations. In addition, hybrid fish of old and new stock crosses generally exhibited a lower reproductive fitness than hybrids within the same stock. This decreased reproductive fitness, a hallmark of speciation, suggests that *A. mexicanus* populations are undergoing evolutionary divergence and may eventually comprise unique species that can no longer interbreed.

**The Environmental Factors of the Vertical Meridian Asymmetry**

*Aaron Nizam, Psychology*

*Sponsor: Professor Marisa Carrasco, Psychology*

Visual performance is better along the lower vertical meridian than the upper vertical meridian, an effect which is called the *vertical meridian asymmetry* (VMA). The VMA is found only in adults, not in children (Kothari, Mahon & Carrasco, 2005). Are there environmental
factors that influence the magnitude of the VMA? We tested two environmental factors: height, because as one gets taller there is less relevant information in the upper visual field, and usage, because decreased usage of the upper visual field could lead to the VMA. Seventeen females and fourteen males of height ranging from 150-195 cm completed an object discrimination task, and we found no correlation between height and the magnitude of the VMA, $r = -.0478$. Also, a comparison of eight athletes participating in sports that require the use of the upper visual field to eight non-athlete gender- and height-matched controls found no significant difference between the magnitude of the VMAs between the two groups $t(7) = 0.8385, p > .01$. Thus, it is unlikely that height or athletic upper visual field usage is related to the development of the VMA.

Enhanced Conformational Sampling of Peptides via Reduced Side-Chain and Solvent Masses
Laura Nocka, Chemistry and Mathematics
Sponsor: Professor Mark E. Tuckerman, Chemistry

Many computational methods have been developed for sampling the equilibrium conformations of complex chemical systems and their statistical distribution. One such method, molecular dynamics, is a physics-based model which employs Newton’s laws of motion to predict a dynamical trajectory of a system or molecule. Unfortunately, complex systems often have a “rough” energy landscape in which low energy equilibrium conformations are separated by high energy barriers. This makes it difficult to sample all equilibrium conformations efficiently, and as a result molecular dynamics alone does not provide us with a practical sampling method. One possible way to enhance sampling recognizes that the equilibrium and thermodynamic properties of a system do not depend on the atomic masses. This means that, in sampling the statistical distribution of the equilibrium conformations, the masses can be used as adjustable parameters. Here we studied the equilibrium conformations of the protein met-enkephalin in several different trials of reduced solvent and side-chain masses. Reduced solvent mass has the physical manifestation of reducing viscosity, while reduced side chain mass effectively allows the backbone to move more “freely”. Current trials aim to develop a scheme for the best choices of scaling factors for these two sets of masses.

The Concentration-Dependent Function of Semaphorin3A in Commissural Interneuron Axon Pathfinding in the Xenopus Spinal Cord
Hanna Oh, Biology
Sponsor: Professor Kyonsoo Hong, NYU School of Medicine

A fundamental step in the proper formation of neural circuitry is the guidance of axonal growth cones of developing neurons to correct target cells. Axonal pathfinding occurs as external guidance molecules repel or attract the axonal growth cone. Semaphorin3A (Sema3A), a diffusible guidance molecule, has important functions in axon pathfinding and nerve regeneration after nerve injury in the adult nervous system. Sema3A is known to function as either a repellent or an attractant, but how its dual function is induced is not well understood. The expressions of Sema3A and its receptor protein, Neuropilin-1 (Npn-1), are spatiotemporally regulated during spinal cord development. Here, I report that Sema3A function depends on its concentration in the guidance of Xenopus commissural interneuron ($\alpha$CIN) axons, in vivo. By utilizing embryo microinjection and in vivo spinal cord imaging methods, I observed the effect of both down-regulation and upregulation of Sema3A on $\alpha$CIN trajectories. Specifically, antisense-morpholino oligonucleotides against Xenopus Sema3A or human Sema3A mRNA were injected for down-regulation and upregulation of Sema3A, respectively. The results from this study will provide insight into understanding the concentration-dependent function of guidance molecules in axon pathfinding.

Surface-Level Expression of GluR2 in the Presence of Lithium
Sunny R. Patel, Biochemistry
Sponsor: Professor Edward B. Ziff, NYU School of Medicine

Since lithium’s worldwide approval as a therapeutic drug in 1970, it has been a key ingredient in medications used to treat manic-depressive illness and exhibits various benefits, including anti-manic and antidepressant effects, a long-term prophylactic effect, and an anti-suicidal effect. Yet lithium’s role at the molecular level is not well understood. With the established finding that lithium inhibits GSK-3, I suggest a model that predicts a novel role for lithium with respect to synapses. I studied the effect of a lithium salt (LiCl) on ion channels and other proteins associated with the postsynaptic density (PSD) of neurons. I hypothesized that lithium stabilizes a protein scaffold that holds the GluR2 subunit of AMPA-type glutamate receptors to the plasma membrane surface.
by inhibiting GSK-3, which destabilizes this scaffold. GSK-3 is known to phosphorylate a component of the scaffold, δ-catenin, modifying the scaffold by dissociating it from Cadherin. This destabilizes the scaffold and internalizes GluR2, which is bound by its C-terminus to one of the seven PDZ domains of the ABP/GRIP protein. I visualized the expression of the GluR2 subunit in dendrites of cultured rat embryonic hippocampal neurons using immunological staining and protein fluorescent tagging techniques (Serulle et al. 2007). I infected neurons on coverslip with a sindbis viral vector expressing the Myc epitope tagged GluR2 subunit construct, and treated the cells with NaCl or LiCl. The surface-level expression of GluR2 was found to increase in the presence of lithium, suggesting that lithium inhibition of GSK-3, which stabilizes the scaffold, indeed holds GluR2 at the plasma membrane surface. GluR2 expression was quantified through confocal microscopy using Simple PCI software. Further, experiments expressing GluR2 with a mutant C-terminus showed that GluR2 must bind ABP/GRIP for lithium to exert its efficacy. This demonstrates that lithium induces specific molecular effects on signal transducing molecules of the synapse dependent on their interaction with the scaffold. Lithium’s stabilization of the scaffold that holds GluR2 at the surface suggests a mechanism for lithium’s action as an antidepressant drug.

Development of Visuo-Motor Integration in Infant Pig-Tailed Macaques (Macaca nemestrina)
Amelie Pham, Neural Science
Sponsors: Professor Lynne Kiorpes, Neural Science, and Professor Karen Adolph, Psychology

We investigated the development of visuo-motor integration in infant macaque monkeys aged 2 to 15 months. We recorded reach accuracy, latency, and hand choice as a function of the location of static targets or the trajectory of moving targets. Monkeys sat in a rotating chair and were turned to face a vertical board containing the target on each trial. Static targets were positioned at seven locations along the horizontal meridian; dynamic targets moved along eight trajectories through the midpoint of the board. Subjects under 3 months of age reached for a toy target, while subjects over 4 months reached for a toy target with an embedded food treat. By testing subjects longitudinally, we observed the evolution of individual strategies and recorded improvements in reaching and grasping visual targets. Our results show that bimanual reaches decreased with age and a right hand bias emerged with development. Moreover, latency to reach decreased with age for static targets; however, it was independent of age for dynamic targets. Finally, accuracy was consistently high at all ages, with very few errors, even in 2-month-old infants. These findings demonstrate that macaque development of visuomotor control occurs rapidly at a very young age, and provide us with a quantitative animal model for studying primate visuomotor development.

Theoretical Model for Protein-Protein Inhibition
Thomas A. R. Purcell, Chemistry
Sponsor: Professor Mark E. Tuckerman, Chemistry

It is now widely recognized that computational techniques can play a potentially vital role in the problem of rational drug design. Computational approaches, if both efficient and reliable, can be used to “pre-screen” a database of candidate molecules, allowing for the identification of the most promising lead compounds. This project tests a new theoretical/computational protocol for predicting how effectively a flexible inhibitor, such as a peptide-based inhibitor, will bind to the active site of a target enzyme with full atomic resolution. The technique is based on state-of-the-art molecular dynamics methods for the rapid calculation of free energies in systems with a large number of accessible conformations called driven adiabatic free energy dynamics. The test system is a candidate small peptide inhibitor of the so-called PDZ protein domain. The free energy surface as a function of these collective variables allows us to identify the most probable conformations of the peptide. To date the tested sets of collective variables do not separate all the conformations of the system. In order to study the effects of the solvent, we perform simulations in vacuo, with an implicit solvent model, and with explicit water molecules. The model requires the use of explicit water molecules to explore the entire set of conformations. By calculating free energy surfaces with the PDZ protein included in the simulations, the binding affinity of the peptide can be determined.

Refined Protocols for Myotube Formation and Maintaining Muscle Satellite Cells in Culture
Todd Rubin, Biology and Chemistry
Sponsor: Professor Louis Terracio, NYU College of Dentistry

Muscle satellite cells are mononuclear pluripotent cells that have been shown to differentiate and regenerate myofibers after cellular injury and during muscle regeneration. They have, therefore, become an intriguing niche of cells for generating muscle tissue transplants; however, muscle satellite cell numbers and myotube forming abilities decrease with age. Here we seek to refine protocols for maintaining a muscle satellite cell population in culture and increasing optimum myotube formation. Sorted muscle satellite cells were separately assessed for tube forming ability and cultured with multiple concentrations...
of N-acetyl cysteine (NAC), a precursor to the antioxidant glutathione (GSH). We found that a pure population of muscle satellite cells is not optimal for myotube formation. Also, the use of NAC for enrichment of growth media appears to decrease the differentiation of these cells, as observed by the maintenance of specific markers of muscle satellite cells as compared to controls; however, the optimum NAC concentration required to maintain satellite cell phenotype differs between species. Using antioxidants to effectively maintain muscle satellite cells in culture may be the key to maintaining a stem cell like phenotype over an extended period and to overcoming a major hurdle in tissue transplant generation.

Investigating Nanoscale Chemistry with Polymer Pen Lithography
Kevin B. Schesing, Chemistry
Sponsor: Professor Adam B. Braunschweig, Chemistry

Current techniques for printing biologically active molecules with sub-micrometer feature diameter have high cost and limited throughput. Polymer pen lithography (PPL) is a low cost and high throughput nanolithography method to effectively deposit organic and biologically active molecules onto surfaces. To develop methods of modifying surfaces with soft matter and nanoscale feature size, we (1) prepared surfaces with azides so that they are reactive in the Cu(I)-catalyzed azide-alkyne click reaction (Cuaac), (2) printed redox-active molecules onto surfaces by PPL, and (3) optimized the reaction conditions. To induce the Cuaac, we used polyethylene glycol as the medium of transport, which subsequently formed nanoreactors. Fluorescent and redox-active inks demonstrated that the molecules were immobilized covalently onto the surface and that precise control over ligand orientation and density was achieved. This study demonstrates that PPL can induce multicomponent reactions on surfaces and could provide a route to gene chips, sensors, and biomimetic surfaces.

Cyclooctene-Supported Cobalt(salen) Catalysts in the Aminolytic Kinetic Resolution (AKR) of Terminal Epoxides: A Route to Enantiopure 1,2-amino Alcohols
Nina Schuchman, Chemistry
Sponsor: Professor Marcus Weck, Chemistry

Cyclooctene-supported Co(salen) cyclic oligomers are among the most reactive catalytic species for the hydrolytic kinetic resolution (HKR) of terminal epoxides. Exploitation of this catalytic system with the use of nitrogen as the nucleophile in asymmetric aminolytic kinetic resolution (AKR) of terminal epoxides can afford enantiopure 1,2-amino alcohols, which have biological importance. Because of the existence of multiple catalytic sites within a single molecular framework, a decrease in catalyst loading is possible compared to a monomeric catalyst. Carbamates have been shown to work effectively as nitrogen sources for the AKR of terminal epoxides with monomeric Co(salen) units. The cyclooctene-based Co(salen) macrocycle catalyst shows high activity and enantioselectivity with 0.5 equivalents of tert-butyl carbamate as the nucleophile at 0.5 mol% catalyst loading with hexene oxide as the epoxide (enantiomeric excess of residual epoxide ≥99 percent within 24 hours), providing promise for the further development of reactions catalyzed by this system.

Changes in Calcium/Calmodulin-dependent Kinase II (CAMKII) at Hippocampal Synapses that Precede Neurodegeneration in Presenilin Conditional Double Knockout Mice, an Animal Model of Alzheimer’s Disease
Lokesh Shah, Neural Science
Sponsor: Professor Chiye Aoki, Neural Science

In the progression of Alzheimer’s Disease, it is known that neurodegeneration precedes the typical phenotypes such as neurofibrillary tangles and senile plaques. Presenilin conditional double knockout (PScDKO) mice at two months of age have been reported to show impairments in memory and synaptic plasticity, but do not yet have any changes in neuronal or excitatory synaptic density. A protein that was implicated in the electrophysiological and future structural changes was calcium/calmodulin-dependent kinase II (CAMKII). We report that there is a reduction of CAMKII in PScDKO mice in the spine head; specifically, the reduction is greatest at synaptic locations in the spine head (at or near the postsynaptic density). The decrease in CAMKII at two months of age may consequently lead to future neurodegeneration.

Stochastic Modeling of Prion Disease Formation
Michael Sharpack, Mathematics
Sponsor: Professor Charles Peskin, Mathematics

Proteinaceous infections, dubbed prion diseases, are among the most novel, poorly understood diseases on the planet. Contrary to the pattern in all other known classes of diseases, prions require only protein and not nucleic acids to spread. Prion formation and propagation are largely a mystery, although recent advances in yeast prion studies have provided clues as to their behavior. Prion diseases are responsible for Kreutzfeldt-Jacob and mad cow disease, an infection that can be passed to humans who eat infected beef. Although rare, prion diseases are difficult to detect, lay dormant for years, and upon
infection are inevitably fatal. My research investigates the mathematical properties of prion infection dynamics. Through modeling both human and yeast prions, we seek to propose mechanisms for their conversion from the healthy to the diseased state. Previous studies have shown that it is unlikely that human prions spontaneously convert into the diseased state; however, yeast prions are known to interact with each other and influence each other’s dynamics, possibly including their formation. Although only one human prion protein has been discovered, these findings in yeast are promising for the future of human prion studies, given the evolutionary importance of prion proteins.

Crystal Growth of Amorphous Indomethacin and Nifedipine Below and Above Tg Using Real Time in situ AFM
E-kyung Chelsea Shin, Chemistry
Sponsor: Professor Michael D. Ward, Chemistry

The study of an amorphous form, a solid that lacks the fixed order of a crystal, is becoming an important topic due to its several advantages over crystalline states, e.g. high solubility. This study was to investigate the growth rate of indomethacin and the change of nifedipine morphology below and above Tg (glass transition temperature), and to explain their kinetics of overall crystallization. In order to observe the growing crystals from amorphous forms, we used AFM (Atomic Force Microscopy). It is a very high resolution microscopy that is capable of measuring in fractions of nanometers, more than 1000 times better than optical microscopy. We measured crystal growth at several temperatures ranging from 27°C to 90°C for both indomethacin and nifedipine. We found that even at temperatures below Tg, there is sufficient molecular mobility to ensure the growth of crystals. The growth rate generally increased as the temperature increased; however, indomethacin growth rate showed a sudden rise below and near Tg. Due to this sudden peak, its growth rate at 40°C appeared to be similar to the rate at 50°C. In addition, nifedipine changed its morphology between different temperatures. It grew as small fibres that split into many branches at 27°C. At 40°C, close to the Tg, longer fibres with continuous bending were observed. It grew as irregular spherulites with longer lamellae as temperature increased to above Tg. The growth rate of nifedipine was impossible to measure due to its fast nucleation and the growth of crystals induced by the AFM tip.

Finding the Minimal Enhancer of COE Expression in the Atrial Siphon Muscle of the Ascidian Ciona intestinalis
Eric Siu, Biology
Sponsor: Professor Lionel Christiaen, Biology

In Ciona intestinalis, the transcription factor COE is strongly expressed in the atrial siphon muscle (ASM) precursors, where it is required for inducing ASM formation and suppressing heart cell specification among cells of the B7.5 lineage. We used reporter gene expression assays to identify the minimal enhancer region for ASM-specific expression of COE. We designed reporter gene constructs by fusing target DNA fragments, amplified by PCR from the COE locus, upstream of a minimal bpFOG promoter and an mCherry reporter gene. Dechorionnated and fertilized Ciona intestinalis eggs were transformed by electroporation with separate COE enhancer constructs and a marker for the B7.5 lineage, namely the cis-regulatory DNA from the gene Mesp fused to a GFP reporter gene. Two different constructs containing 5kb DNA fragments initially produced ASM-specific expression of mCherry. The two fragments were truncated using new primers in subsequent rounds of PCR and fused into the bpFOG>mCherry construct. Each target region was reduced to 1kb without loss of ASM-specific expression. Moreover, the two regions were found to synergize to produce amplified ASM-specific mCherry expression when joined in a reporter construct. The two constructs will be further truncated to produce 0.5kb minimal enhancer regions for mutational analyses. This approach will identify putative binding sites for candidate upstream regulators of COE expression.

The Role of Minocycline in Long-Term Associative Memory Retrieval Caused by Lipopolysaccharide-Induced Inflammation in Mice
Tanya Stolper, Biology
Sponsor: Professor Michael Haile, NYU School of Medicine

Systemic inflammatory responses may result in neuro-inflammation and central nervous system dysfunction. Lipopolysaccharide (LPS)-induced inflammation produced an impairment of long-term associative memory retrieval but not consolidation in a passive avoidance (PA) paradigm. We investigated Minocycline Hydrochloride (Mino), an antibiotic with anti-inflammatory properties, as a treatment. After IACUC approval, 30 Swiss-Webster, 30-40 g mice (6-8 weeks) were randomized into three groups for i.p. injection of: 1) LPS (830µg/kg isolated from E.coli 055:B5) 4h before testing; 2) LPS & Mino (50mg/kg) 4h before testing; 3) Mino 4h before testing.
Training latencies were recorded for entry from a platform into a Plexiglas tube where a shock (0.3mA; 2 sec) was automatically delivered. At 48hrs testing latencies were recorded with no shock. Latencies > 900 sec were assigned this value. Lower testing latency is indicative of an impairment of long-term associative memory. After box-plot adjustment for outliers, two samples from group 2 were excluded. There were no differences in training latency. A Kruskal-Wallis one-way ANOVA indicated differences in testing latency ($H = 13.48; df = 2; p < .005$) between groups. Post hoc comparisons using the Mann-Whitney U test with Bonferroni correction to *$p < .0167$ significance showed that Mino treatment with LPS 4h before testing preserved PA retention ($U = 8.00; r = -.39$). Mino alone did not impair retrieval. In conclusion, LPS-induced inflammation produced an impairment of long-term associative memory retrieval in a PA paradigm, while Mino treatment prevented impairment. Mino decreases cytokine output by acting on microglia and attenuates LPS induced neuroinflammation and its sequelae. These results suggest that an acute-phase inflammatory response may disrupt the ability to retrieve long-term associative memory. Post-operative inflammation may have a role in the etiology of post-operative cognitive dysfunction.

**Presenilin and Vesicle Glutamate Transporters**  
*Na Sun, Neural Science*  
*Sponsor: Professor Chiye Aoki, Neural Science*

My research looks at how conditional double knockout of presenilin affects the expression of vesicle glutamate transporters. I worked with two sets of mice, the presenilin double conditional knockouts and the wild types (single knockouts and healthy ones). I focused on the hippocampus area and used antibody staining technique to distinguish the vesicular glutamate transporter in the synapses using electron microscopy. What I discovered, while counting the amount of stained synapses (those containing vesicular glutamate), was that the double knockouts had significantly fewer stained synapses than those that are considered wild types, thus they have fewer vesicular glutamate transporters compared to the wild type mice. The state of having fewer vesicular glutamate transporters has been shown to reduce long term potentials (LTPs), since the quantal size of each vesicle is reduced. This is significant in confirming that the familial type Alzheimer’s Disease (Early Onset) already shows presynaptic dysfunction long before the appearance of plaques and tangles.

**Identification of Novel Activation Markers of Inflammation in Mice**  
*Jonathan Tang, Chemistry*  
*Sponsor: Professor E. Sergio Trombetta, Langone Medical Center*

Cell surface proteins have key roles in the communication between cells of the immune system. This communication is initiated and/or maintained by the binding of ligands to surface-exposed receptors or by the interaction between proteins expressed on the surfaces of interacting cells. The Trombetta lab has discovered that in markedly different mouse models of inflammation, several populations of immune cells (T-cells, Dendritic cells, etc.) appear to have a similar activated phenotype. The fact that very different inflammatory triggers and the concomitant differences in the ensuing immune responses appear to segregate with the same set of available surface markers indicates that additional unidentified cell surface molecules are likely to be involved in these different responses. In this study, I attempted to identify differences in the surface-proteome between resting and inflamed cells isolated from the immune system in mice. I quickly and selectively labeled proteins exposed only on the outer side of the plasma membrane in living cells. The extent and specificity of the labeling conditions were routinely verified by flow cytometry by detecting the degree of incorporated biotin using fluorescent streptavidin. I have tried a side-by-side comparison on silver-stained SDS-PAGE gels of the surface proteins isolated from the different cells under study.

**Dispersal Patterns of a Social Group of Spider Monkeys (Ateles geoffroyi) in Runaway Creek Nature Preserve, Belize**  
*Marie Tosa, Biology and Environmental Studies*  
*Sponsor: Professor Anthony DiFiore, Anthropology*

Social organization and social structure are intricate and important components of animal behavior. Because dispersal is a rare behavioral process that moves genes across both social and physical landscapes, the utility of observational studies becomes limited. In addition, it is difficult to evaluate dispersal in societies that form subgroups which vary in size. In such societies, genetic analysis of populations can provide valuable information about underlying dispersal behaviors to augment observational data. In this study, we examined the population genetic composition and dispersal patterns of a social group of spider monkeys (*Ateles geoffroyi*) in Belize using a panel of 13 microsatellite loci. We extracted DNA from non-invasively-collected fecal samples. Molecular analyses revealed that this social group has much lower
allelic diversity than other previously studied groups of spider monkeys. Although frequency distributions of assignment indices suggest that two females probably immigrated into the group, this social group showed no significant differences in assignment indices, which would be indicative of sex-biased dispersal. Relatedness between female-female and male-male dyads were also not significantly different. These results are inconsistent with strong male philopatry and female-biased dispersal. These findings suggest that this population may be threatened by anthropogenic disturbances or other environmental stresses and may be exhibiting behavior to adapt to these stresses.

**Genetic Buffering in Genetically Diverse Knock-Out Yeast**

*Maria Traficante, Biology and Anthropology*  
*Sponsor: Professor Mark Siegal, Biology*

Variation in some phenotypic traits is small, despite high variability in genetic makeup across populations. This suggests that robustness is a component of many biological systems. It has been proposed that robustness against genetic variation evolved as a side effect of robustness against environmental fluctuations. It is unknown whether genes that buffer environmental variation, or phenotypic stabilizers, also play a role in buffering genetic variation. Phenotypic stabilizers have been identified in yeast through systematic screening for single-gene deletions that increase variance in genetically identical strains. I have constructed plasmid DNA constructs to knock-out phenotypic stabilizers in a set of genetically diverse yeast strains. Once I have a set of strains with identical gene deletions, I will measure growth rate and morphology on individual cells with high-throughput methods. If the analysis of variance in cell shape and growth among strains shows a significant increase with the gene deletion, then the gene in question is buffering genetic variation.

**Parallel Protein Folding**

*Nathaniel Weinman, Mathematics and Computer Science*  
*Sponsor: Professor Dennis Shasha, Computer Science*

Proteins are defined by the way in which the polypeptides that form them are folded. The way the polypeptides fold can greatly affect the function of the protein. Because of this, knowing how polypeptides will fold under certain conditions has many applications, including medical treatments and drug development. An important tool to scientists involved with this field is the ability to simulate these protein foldings. Unfortunately, these foldings, which only take a few milliseconds in nature, can take months to simulate even with specialized computers. My aim was to increase the speed of simulation code written in Matlab based on a machine learning analysis of protein structures. I converted the Matlab code into vector-based code written in Q, a language that optimizes the computation time of vector and matrix operations. This translation led to a 3x improvement of speed. Parallelization is another method to improve the speed of code. A cheap but effective way to parallelize code is parallelizing with graphics cards. With this in mind, I used a specific subset of Q that is easily parallelizable on graphics cards, hoping that in the future this could further increase the speed of simulation.

**The Karatsuba Middle Product for Integers**

*Michael Weiss, Mathematics*  
*Sponsor: Professor David Harvey, Mathematics*

In the field of arbitrary precision arithmetic, the middle product of polynomials or integers is a generalization of the ordinary product. Utilizing a method first introduced by A. A. Karatsuba in 1960, known as the Karatsuba algorithm, one can reduce the number of multiplications required to compute a product, significantly reducing the asymptotic running time. This method can be adapted for the computation of middle products according to the transposition principle for linear algorithms. The computation of middle products of polynomials using this transposed Karatsuba algorithm has been well documented in the literature and implemented in computation libraries. Our research provides an adaptation of the Karatsuba and the related Toom–Cook algorithms for the more general situation of computing the middle product of integers. Specifically, in this study we resolve the failure of bilinearity of the integer middle product and discuss an implementation for the GMP (GNU Multiple Precision) library. We examine the performance of our algorithm against the methods currently implemented in the GMP library and discuss the proper integration of the new algorithm with the latter ones.

**The Effects of Visual Engagement on Saccadic Eye Movements**

*Melanie Wen, Psychology*  
*Sponsor: Dr. Moran Cerf, Neural Science and Stern School of Business*

At every given moment our visual system is flooded with more information than it can process effectively. This limited cognitive capacity requires selective processing of the visual stimuli. Very fast saccadic eye movements serve as a critical component of selective processing by focusing scenes on the central part of the retina, the fovea,
with greatest acuity. The present study investigates the changes in the rate of saccades and smaller microsaccades in a film which has shown to elicit similar responses from participants (high inter-subject correlation during fMRI viewing). Film is a highly naturalistic medium to investigate the relationship between selective attention and saccadic eye movements. Both the high engagement condition, consisting of the original film, and the low engagement condition, no narrative scrambled film, were viewed by participants. Participants watched the original film first \((n=6)\) or viewed the scrambled first \((n=7)\). The rate of saccades and microsaccades were compared for all participants \((N=13)\) between the high and low engagement conditions. The increased rate of saccades in the scrambled condition was expected, because attention is unfocused when there is no order or continuous movement; however, the rate of microsaccades showed an opposite effect, with an increased rate in the high engagement condition. Microsaccadic eye movements may have a role in keeping interesting visual stimuli in our visual field and may be linked to cognitive, “top-down” processing of attention and engagement. Understanding the function of microsaccades could be useful for marketing analysis and the entertainment industry to better evaluate consumer response.

**Auditory Chimeras: Developing a Speech-Music Hybrid Stimulus**

*Kevin Woods, Neural Science*

**Sponsor: Professor David Poeppel, Psychology and Neural Science**

The intelligibility of a spoken sentence depends on the integrity of the sound speech’s envelope. The complementary component—the sound’s fine structure—while almost extraneous in speech comprehension, is necessary for comprehension of pitch (and therefore music). Functional imaging studies targeting neural networks integral to the intelligibility of speech and music are complicated by those aspects of the signal which are not strictly essential to intelligibility; activation associated with these acoustic complexities may not be distinguishable and may even obscure activation integral to intelligibility. Here, we designed a stimulus to control for this issue of acoustic complexity. These ‘auditory chimeras’ combine in one sound envelopes of spoken sentences with fine structure information from pitch sequences. By retaining only the essential aspects of each sound type, the stimulus should elicit differential activation of neural networks specific to speech and music comprehension. Our results demonstrate that the stimulus is intelligible and perceptually balanced between its components, the relative saliencies of which can be modulated in a directed and systematic manner, making the auditory chimera a promising stimulus for future neuroimaging studies targeting neural networks underlying the processing of speech and music.

**Isolation of Adult Pacemaker Neurons Using FACS Sorting**

*Timothey Wu, Biology*

**Sponsor: Professor Justin Blau, Biology**

Circadian rhythms control when an organism is at rest and when it is active. Of the 100,000 neurons in the fly brain, there are eight responsible for the overall maintenance of sleep cycles. In order to further study the significance of these master pacemaker neurons, a methodology must be developed for the isolation of these few neurons from the brain. To isolate the neurons, a transgene is used. A promoter expressed specifically in the master pacemaker neuron was attached to RFP, giving a red color to the neurons; however, other unimportant neurons also shine red. To distinguish between these neurons, we used a separate transgene which produces a green protein product in the master pacemaker neurons but not in the unimportant red cells. We used a FACS machine to sort for cells which shine both red and green to ensure accurately isolated neurons. Once isolated, the mRNA from these neuronal cells can be amplified and hybridized to a gene chip in order to tell which genes are expressed and suppressed at different times of day. This experiment will be the first to determine which genes are expressed in adult clock neurons, and may be directly applicable to areas of understanding involving the human sleep cycle.

**Early Overgrowth of Serotonin and Quadratic Changes in Post-Mortem Autism Brains**

*Raymond Xu, Neural Science*

**Sponsor: Professor Efrain Azmitia, Biology**

Autism is a developmental disorder characterized by, but not limited to, impairments in communicative and social interaction. This disorder causes neuropsychological changes in anatomical loci. Serotonin has a global innervation pattern that is capable of expressing the widespread changes seen in autism. Furthermore, this system has been implicated using animal models, genetic, and biochemical studies. In this study, serotonergic fibers were stained using a monoclonal antibody against the 5-HT transporter protein. We report an increase of 5HT axons in postmortem brain tissue from autism aged 2.8-29 years relative to controls \((age = 1.8-21\) years of age) in the deep layer of the superior temporal cortex. This region is of significance because of its association with language and audition. The distribution of dystrophic and degenerative serotonergic particles across age follows a quadratic polynomial regression \((R^2 > 0.66)\). These results
provide morphological evidence of increased serotonergic innervation in autism, and suggest an involvement of these neurons in the early etiology of the disorder.

**Interactions between CwlJ and GerQ in Bacillus subtilis Spores**

**Jenny Yeh, Biology**

*Sponsor: Professor Patrick Eichenberger, Biology*

Under harsh conditions, the soil bacterium *Bacillus subtilis* survives by forming protective spores. *B. subtilis* spores are encased in two layers: the cortex, made of peptidoglycan, and the spore coat, a highly organized structure comprised of at least 70 proteins. When *B. subtilis* spores sense a favorable environment, they germinate and resume growth. To better understand sporulation and germination, this study examined the interactions of two spore coat proteins: CwlJ and GerQ. Both proteins are necessary for spore germination. We observed low levels of unlocalized CwlJ-YFP in gerQ mutant cells, suggesting that GerQ may be necessary for CwlJ protein stability as well as its localization. Alternatively, GerQ may be necessary for cwlJ expression at the transcriptional level. Our β-galactosidase assays found that GerQ upregulates CwlJ mRNA expression. GerQ is the first example of a spore coat protein that affects gene expression. Yeast two-hybrid data also showed possible interactions between GerQ and two other spore coat proteins, suggesting that GerQ may also be important for spore coat assembly. *Bacillus subtilis* sporulation is a non-pathogenic model for studying more dangerous *Bacillus* species, such as the agent for anthrax (*Bacillus anthracis*), which also relies on CwlJ for cortex hydrolysis during germination.

**Molecular Capsules in Hydrogen-Bonded Host Frameworks**

**JinJu Yi, Chemistry**

*Sponsor: Professor Michael D. Ward, Chemistry*

Trisulfonate molecules, which bear three sulfonate groups in their structures, can affect the structural outcome when crystallized with guanidinium ions. When the sulfonates are intra-connected by flexible linkers, such as alkyl chains, lamellar structures with quasi-hexagonal GS sheet structures are formed. In this structure, the three sulfonates from one molecule are attached to the same sheet, forcing the linkers to point in the same direction. In this way, the flexible trisulfonate is fixed to a particular conformation with a capsule structure. When the sulfonates are intra-connected by rigid linkers, such as aromatic groups, however, tubular structures are produced when they are crystallized with guanidinium ions. The achievement of controlling the crystal structures indicates that the local environment of multisulfonates has a profound effect on crystal structures of GS compounds. By alternating the geometric properties of the sulfonate component, different crystals can be formed. Initially, we have been able to design relatively small molecular structures; however, the broader future goal of this project is to design larger host frameworks.

**The Endosomal Sorting Complex Required for Transport (ESCRT) and Phagosome Maturation**

**Aleena Zahra, Biology**

*Sponsor: Professor Jennifer A. Philips, NYU School of Medicine*

ESCRT, crucial for trafficking cell surface receptors to the lysosome, restricts growth of intracellular *Mycobacterium smegmatis* and *Staphylococcus aureus*, suggesting that ESCRT affects phagosome maturation (Philips, JA et. al PNAS, 2008 and unpublished observations). We examined bacterial trafficking in ESCRT-depleted cells. We examined intracellular localization of GFP *S.aureus* and *Mycobacterium bovis*-BCG in ESCRT-depleted RAW264.7 cells using fluorescence microscopy. Fisher’s exact test assessed the statistical significance of co-localization between bacteria and Lysotracker, a lysosomal dye, or EEA1, an early endosomal marker. ESCRT-depleted cells exhibited altered bacterial trafficking, evidenced by impaired *S. aureus* and BCG delivery to the lysosome and enhanced early endosomal confinement (p<0.001). We hypothesize that *Mycobacterium tuberculosis* (M.tb) prevents lysosomal delivery by inhibiting ESCRT. A yeast two hybrid (Y2H) screen showed the M.tb-secreted protein, EsxH, interacts with Hgs, an ESCRT component. Additionally, M.tb encodes approximately 20 Esx proteins; we tested for further interactions in the Y2H. The Y2H showed only EsxH interacts with Hgs and dZip3, an E3 ubiquitin ligase. We demonstrate ESCRT’s role in phagosome maturation, essential for bacterial replication control of *S. aureus* and mycobacteria, thus representing a critical point of host susceptibility. We hypothesize that M.tb exploits this vulnerability, using EsxH to disrupt Hgs/ESCRT, thus preventing lysosomal delivery.

**The Relationship Between Cirrhosis and Barrett’s Esophagus**

**Noam Zeffren, Jewish History and Civilization**

*Sponsor: Professor Maya Gambarin-Gelwan, Weill Cornell Medical College*

The purpose of this retrospective clinical research study was to explore whether individuals with certain chronic liver diseases have a higher prevalence of Barrett’s esophagus (BE) than those without the underlying
liver disease. BE is a condition involving the replacement in the distal esophagus of normal stratified squamous epithelium with intestinal columnar epithelium. Because BE is associated with a 30-fold increase in the incidence of esophageal adenocarcinoma, its early diagnosis is crucial to the prevention of this life-threatening complication. This project involved the review of the medical records of individuals with cirrhosis, looking at the etiology of the cirrhosis, as well as results of imaging studies, pathology reports, and upper endoscopy procedures. The data obtained thus far suggests that BE occurs less commonly in cirrhotics than in those without liver disease. This is surprising given that obesity is a known risk factor for both the development of BE and the development of nonalcoholic steatohepatitis (NASH), itself one of the most common causes of chronic liver disease. Because BE and cirrhosis share this common marker, it would thus be expected that patients with cirrhosis would have a higher incidence of BE. A possible rationale for the counterintuitive finding in this study could be related to the presence of esophageal varices in many cirrhotic patients. Endoscopists may be wary to biopsy the esophagus of such patients because of the risk of bleeding, which can sometimes be life-threatening. Additionally, the patient population whose records we reviewed may have included individuals who were conscientious about their health, and who presented at a stage before signs and symptoms developed. Analysis of the collected data is ongoing.