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INTRODUCTION:

Research as Educational Paradigm

Research is disciplined inquiry. It is at the heart of human endeavor, for humans crave knowledge with every move we make. It is, of course, also at the heart of this University and the education we offer. The journal you are reading was made possible by donors who believe in what we do. It also emerges from the brilliance and dedication of the students whose work you will read and the faculty who mentored them during the academic year 2015–2016 in the College of Arts and Science at New York University. It is a celebration of the achievements of our most curious, driven students.

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

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

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

G. Gabrielle Starr
Seryl Kushner Dean, College of Arts and Science
Professor of English
Good afternoon and congratulations to you all! It’s such an honor to be here to help celebrate all this incredible science that has been presented during the course of this conference today. In fact, when I arrived in the hall this morning at 9:30 a.m. and opened the doors to the building from Washington Place, I could immediately hear a rumble of activity that got louder and louder as I walked down the hall. When I turned left into Silverstein Lounge, I found it virtually exploding with activity and discussion! It was the most energy and excitement that I have seen at one of these events!

Today, you all experienced the excitement of presenting your academic work for an audience and engaging in deep discussion about your findings. I also know that every one of you were inspired to get to this day where you could present your research at a conference like this by an event—be it a person or class or even a newspaper article that you read that might have started you on this path. I wanted to share with you a story of my own scientific inspiration.

I can remember the day I first realized I wanted to be a neuroscientist. It was the first day of my freshman year at UC Berkeley when I took a freshmen seminar course called “The Brain and it’s Potential” taught by Professor Marian Diamond, a legendary lecturer, though I didn’t know it at the time. There were only about 15 of us with a full Professor talking about her specialty. That day in class was memorable first because of what she looked like. She was a very tall, striking, athletic women wearing a crisp white lab coat over a pretty skirt and blouse, and I couldn’t help thinking that she looked like a science rock star up there. The other memorable thing is that on the desk in front of her was a bright flowered hat box. She started telling us about the brain and how it was the most complex structure known to mankind. And, as she started to list all the things the brain allows us to do, like see, feel, move, love and tell a joke, she slowly and dramatically opened that hat box (just like the one I have in front of me right now) and with her gloved hands, she pulled out a real preserved human brain! [Suzuki pulls an actual preserved human brain out of a hat box.]

We all said “Ooohoooo!!” Just like you did because seeing a real human brain is always amazing.

But, it was not just seeing the human brain that caught my attention that day. Professor Diamond also told us about the now classic studies she did in the 1960s in which she looked at the effects on the brain of raising rats in a big cage with lots of toys and other rats to play with (think of a rat version of Disney World) compared to rats that were raised in relatively impoverished environments with no toys, smaller space and just a few other rats. She found that raising rats in enriched environments actually made the outer covering the brain, called the cortex, thicker, increased neurotransmitter levels as well as increased the number of blood vessels in the brain. I thought this was the most interesting thing I had ever heard in my life, and I walked out of that class that day knowing I wanted to become a neuroscientist.

And, I did! I went on to get a Ph.D. in Neuroscience at UC San Diego, did a post-doc at National Institutes of Health, and got my first faculty position here at NYU in 1998 focused on understanding how the brain allows us to form new long-term memories. I was so happy to have my own research lab, and when I think back on the atmosphere in the lab at that time, I think about the atmosphere of a great dinner party that you never want to leave because there is always someone interesting to talk to and something interesting to talk about. My social life, by contrast, brought to mind the image of a deserted ghost town from a Clint Eastwood western. Nothing going on there. I worked so hard, I had no friends outside the lab and ate so much take-out I gained 20 pounds. Well, I didn’t really know how to make more friends, but I did know how to lose weight. So, I went to the gym, got a trainer and seriously improved my overall fitness levels. And, after a good 6–9 months, the weight started to come off.

Wendy Suzuki is a Professor of Neural Science and Psychology and the Director of Undergraduate Studies in the Center for Neural Science. She received her undergraduate degree from U.C. Berkeley and her Ph.D. in Neuroscience from U.C. San Diego. She completed a post-doctoral fellowship at the National Institutes of Health before starting her faculty position in the Center for Neural Science at New York University in 1998. She is a recipient of numerous grants and awards for her research including the Lindsley Prize from the Society for Neuroscience, the prestigious Troland Research award from the National Academy of Sciences and NYU’s Golden Dozen Teaching award. Her research has focused on understanding the patterns of brain activity underlying long-term memory and more recently understanding how aerobic exercise might improve our learning memory and cognitive ability. She is a four-time TEDx speaker and is regularly interviewed for TV and print for her work. Her first book Healthy Brain Happy Life came out in paperback in March of 2016.
The class at the gym that really got me coming back time and time again was an unusual class called intenSati. This class pairs physical movements from kick-boxing, dance, yoga and martial arts with positive spoken affirmations like “I am strong now!” and “I believe I will succeed!” I noticed a huge mood and energy boost immediately after I started going to the gym, but with real regular workouts (after about 1 year of going to the gym), I noticed something extraordinary. I noticed that my grant writing sessions seemed to go much smoother. In particular, I seemed to be able to focus my attention better and remember much better the details from all the research papers that I was reading to construct my new hypothesis. This was a striking observation, and I came up with the hypothesis that my new regular exercise regime might be causing this improved brain function.

In fact, we know that exercise can increase brain levels of neurotransmitters that typically decrease in depression. It can improve our ability to shift and focus attention, and studies in rodents show that exercise can increase the rate and survival of new neurons born in a brain area called the hippocampus, critical for long-term memory. These were all things I noticed in myself. To learn more about the neuroscience underlying the effects of exercise on brain function, I decided to develop a new undergraduate class that I called “Can Exercise Change your Brain.” And, because exercise inspired the development of the class, I thought it would be an interesting twist to include actual exercise sessions in the class. I thought I could have an exercise instructor teach the class exercise and then I could lecture on the effects that exercise was having on their brain. But, when I asked my department if there were extra funds to pay an exercise instructor, they said that because they paid ME to teach the classes, there were no additional funds to pay an additional instructor for the class.

So, I did the next most obvious thing: I decided to go to the gym to get trained to become an exercise instructor myself. And, I did. I did a 5 day teacher training, and for the next 6 months as I developed the academic part of the class, I practiced teaching this class to any friend who would let me teach them.

That first day of my “Can Exercise Change your Brain” class was memorable. First, I was clad head to toe in spandex (not a usual occurrence at work!). Second, I was really quite nervous because I had never taught exercise in front of an NYU classroom before! Third, while students are typically a little nervous or excited the first day of a new class, these students looked really scared! I think it was me in my spandex.

“\textit{In fact, exercise changed my life in many ways.}”

I want to bring you all back to that first day of class in 2009 and ask you all to stand up for 3 minutes of exercise! Adding exercise ended up transforming that classroom because the level of engagement that I got during the exercise portion of the class easily flowed over into the academic part of the class, and it ended up changing the way that I taught every class since at NYU. This had become my new model for the level of engagement that I wanted in the classroom.

In fact, exercise changed my life in many ways. Not only did it get me in shape, improve my mood, memory and attention and change the way I taught classes, but it ended up changing my entire research focus. I realized I was fascinated with the effects of exercise on brain function that has become the major theme of my neuroscience research lab.

Who would have thought that just going to the gym would change all that. My message for you is to stay open and available for inspiration wherever it may come. Because sometimes, it changes your life!

Professor Wendy Suzuki's address during the 2016 Undergraduate Research Conference at NYU College of Arts and Science.
There is today a good deal of confusion about the status of knowledge in the humanities. To some, the admission that we seek only an interpretation seems to allow all kinds of subjective opinion to count as knowledge. Or worse, it seems to endorse the principle that those with the power to impose “their” opinion define knowledge. Nothing could be further from the truth. Interpretation is a form of knowledge, not mere opinion. What distinguishes knowledge, even knowledge that makes no claim to absolute certainty, is evidence and rigorous analysis. That is the meaning of disciplined inquiry in any field.

—Thomas Bender, University Professor and Professor of History

Uncertainty and the Establishment of Chinese Communism
Claudia Arnoldo, History
Sponsor: Professor Zvi Ben-Dor Benite, History

Chinese communism was introduced into China as one of many ideologies of the radical left and ultimately came to dominate the intellectual arena. Mao Zedong (1893–1976) began as a young student who was interested in both Chinese and Western ideas. He was initially introduced to many different leftist ideologies, one of which was anarchy. After a few years Mao chose to move towards communism, as there was a split within the radical leftist community. As some were moving towards anarchy, others began to associate with communism. What is interesting about this is many intellectuals such as Mao identified as Marxists before really grasping the complexities of the ideology. This project traces how Mao was one of many intellectuals grappling with the changes in Chinese society in the early twentieth century, eventually creating Mao Zedong Thought. This project focuses on understanding the rise of Chinese communism and the ultimate rise and canonization of Mao Zedong Thought. Through a close reading of Mao’s early work it is possible to see his thought process before it was dictated by a specific ideology and constructed for a specific purpose and audience. Prior to the 1930s, Mao’s work was uncensored and for this reason it is possible to better understand his thought process prior to creating his established ideology. The rise of Mao Zedong Thought helps illustrate the complexities of the production of an ideology. Rather than focus on Chinese history, this paper will explore the intellectual history of that time and try to deconstruct Chinese Marxism, discussing elements of Chinese history but in the realm of ideas. In terms of ideology China could have gone in many different directions; however, intellectuals decided on communism and Mao Zedong Thought. This project strives to understand why.

Recognizing Palestine by Her Trees: Anglophone-Palestinian Storytelling of the Nakba
Hannah Jean Barz, Comparative Literature
Sponsor: Professor Hala Halim, Comparative Literature, Middle Eastern and Islamic Studies

The creation of the Israeli State in May 1948, known as the nakba—the catastrophe—to Palestinians, violently ruptured Palestinian identity and serves as a common reference point for storytellers throughout the Arab world. The land of Palestine was split apart and denied existence while Palestinians were scattered and killed. Anglophone-Palestinian storytellers are complicated individuals working to bring forth narratives about a contested space—Palestine, a space to which they do not always understand their relation. In fact, they can hardly recognize the Palestine they once knew and loved. When trying to tell their story of the nakba, these writers face the complication of writing in a narrative form new to Arab writers, i.e., the novel, about the inherited silence of violence, the rupture in space and time that was the nakba, and the conflict between individual and collective imaginings of Palestine. Despite these struggles, the writers are united by a common theme—trees. Trees appear in these works in three major ways: as childhood whimsy, as sustenance and security, and as death and beauty. Trees as childhood whimsy or as sustenance and security show how such diverse writers experience the trees of Palestine in similar ways, while trees as death and beauty continue to form a picture of Palestine, but in contrast to
Israel’s heavily manipulated use of trees in building its own united nationhood. A collective understanding of what trees represent to Palestinians emerges from these narratives. This collective understanding shows how we can recognize Palestine despite all the obstacles in the way of doing so.

**Alternative Historical Memory: Discrepancies in the Canonized Story of the Civil War in Kentucky**  
*Alexie Basil, Film and Television Production, History  
Sponsor: Professor Martha Hodes, History*

This research looks at how the narrative of the Civil War is recounted by present day Kentuckians who are descendants of Civil War veterans. Specifically, this project endeavors to examine how white Kentuckians may or may not subscribe to the Lost Cause narrative and to analyze the particular nuances of storytelling about the war within Kentucky’s borders. Similarly, the collected narratives are examined to determine if they are in line with or vary from the narrative accepted by most professional Civil War historians. Paying particular attention to the causality of any discrepancies, the project explores Kentucky’s unique position as a slaveholding border state as well as how unity and security among white Kentuckians was lost because of the conflict. This inquiry hinges upon oral histories collected by the author from several present day Kentuckians as well as personal accounts written by Kentuckians and collected from local archives.

**Vive le Québec Libre! Nationalism and Separatist Movements in Québec to 1980**  
*Christopher Berenson, History  
Sponsor: Professor Valerie Deacon, History*

On July 24, 1967, French President and World War II hero Charles De Gaulle delivered a speech at Montreal City Hall in which he uttered the phrase “vive le Québec libre!” (“long live free Québec!”) and validated a two-hundred-year long struggle for autonomy and equal rights by the French-Canadian minority in Québec. The French-speaking residents of Québec, known as the “Québécois,” had experienced calls for nationalism based on ethnicity and religion until the late 1960s, but De Gaulle’s speech coupled with a large-scale modernization project called the “Quiet Revolution” changed the nature of nationalism in Québec. No longer was nationalism a call to maintain an agrarian, religious lifestyle but rather a complex argument that advocated for the formation of an independent nation-state that would separate from Canada. For nationalists in the 1960s and 1970s, political separation was the only way to achieve equality for the Québécois, and independence brought Canada the most unstable decade in the country’s peaceful history. Events such as terrorism, the imposition of French as an official language and deep political divisions made the province a hotbed for protest and mass politics.

In the end, independence was voted down in the 1980 referendum for sovereignty, but the legacy of these nationalist movements spearheaded by René Lévesque and others carries their legacy in Quebec and Canada today, as Québécois independence is still a divisive and highly debated topic in Canadian Parliament and popular society alike.

**The Katharinenthal Visitatiom: Vision, Mysticism and the Eucharist**  
*Josefa Bitenc, Medieval and Renaissance Studies  
Sponsor: Professor Kathryn Smith, Art History*

Attributed to Master Heinrich of Constance, a sculpture of the Visitatio dating ca. 1310–1320 from the convent of St. Katharinenthal in the Lower Rhine Valley has long drawn the fascination of visitors to the Metropolitan Museum of Art, where it resides today. The reason for this fascination is straightforward: Mary and her cousin Elizabeth have two quartz cabochons inserted into their torsos, rock crystal representations of holy wombs nurturing the fetal Christ and John the Baptist. These crystals make the Visitatio a strikingly unique devotional object in the eyes of the modern viewer, but when considered in the context of the fourteenth century German devotional object, they also provide insight into the devotional practices of their users, that is to say, cloistered nuns. While primarily an art-historical endeavor, this project takes a multidisciplinary approach, making use of a wide variety of sources: contemporaneous artworks found at Katharinenthal and other convents around the Rhine valley; theological treatises concerning the Incarnation (and, therefore, the Marian womb); the mystic and visionary accounts of Hildegard of Bingen, Henry Suso, and others; and the work of prominent medievalists across the humanities among them Jeffrey Hamburger, Caroline Walker Bynum and Jacqueline Jung. Through an examination of the Visitatio itself, the visual and visionary worlds that surrounded it at Katharinenthal, and the theological milieu of the Rhineland at the turn of the fourteenth century, this study addresses the aesthetic, devotional and liturgical function of Mary and Elizabeth’s crystal wombs.

**On the Value of Truth in Nietzsche’s Genealogy of Morals**  
*Sergiy Viktorovych Bokhnyak, Computer Science, Philosophy  
Sponsor: Professor John Richardson, Philosophy*

This project is mainly concerned with answering the question: in what sense is truth ascetic for Nietzsche as claimed in the third essay of the Genealogy of Morals (Walter Kaufmann trans.); and what are the implications of this claim for truth, philosophy, scholarship, academia, etc. The author claims and attempts to argue that Nietzsche’s claim
about truth is not so much about Truth, as it is a criticism of the belief forming mechanism, which is dependent on an, up until now, unexamined value judgment: that true beliefs are better than false beliefs. Because this value judgment is external to the person holding it, it turns out to be ascetic since it affirms an other, “objective” world which does not take into account the subject’s perspective, life and experiences. Most previous interpretations of the third essay have been mainly concerned with Truth and how either Truth is impossible, inaccessible or is plainly an inconsistent notion. However, it is argued here that the essay is concerned with humans and their relation to truth (via the will-to-truth) more so than any metaphysical notions of truth, meaning, existence, etc. Furthermore, the author advances the idea that the will to truth has some of the same characteristic need for external justification that is used and exploited by ascetic priests, which results in the will to truth being something that Nietzsche cannot wholeheartedly endorse.

Instincts of Instrumentality: On the Pervasion of the Productive Apparatus
Bridget Brasher, Comparative Literature, Philosophy
Sponsor: Professor Leif Weatherby, German

How do economic aims and rationalities come to manifest themselves on the level of sexual needs? This research project seeks to address this apparently absurd question, namely, how can an economic rationality of appropriating means towards ends—of instrumentalizing things as means in the interest of a final product or commodity—come to enforce itself from within an individual’s most private and intimate moments. Through uncovering the existence of social demands in the sphere that one might expect to be most protected from society—namely, the sexual instincts—this project aims to show precisely how powerful that society has become and how it was able to achieve such totalizing power. Utilizing an appeal to Freud’s group psychology and psychic structure, Marx’ theories of commodity fetishism and commodification of relationships and the works of various members of the Frankfurt School, it is argued that what Freud calls the individual’s ego-ideal, the agency responsible for absorbing demands of the surrounding society, enforces dominant economic demands upon the individual and that through this repressive enforcement, the limits of the instincts are reformed in accordance with these demands. Further, the continuation of this internal enforcement is guaranteed by the nature of the ego-ideal itself. Insofar as the ego-ideal serves as the substitute object for the individual’s narcissistic and self-regarding energies, adherence to its demands, those of the external society, fulfills an individual’s own self-regard. Economic needs thus become coextensive with the preservation and healthy regard of the self. In this way, reigning economic systems necessarily ensure their own survival.

How Can We Contemplate God? Reconciling Materially-Bound Epistemology with Aristotle's Most Valuable Object
Bridget Brasher, Comparative Literature, Philosophy
Sponsor: Professor Jessica Moss, Philosophy

Aristotle is unequivocal on the following point: the most worthy human activity is contemplation. The prescriptive nature of this claim is clear—humans should contemplate. The life of contemplation is the best human life, for this life alone enables humans to actualize their essence qua humans. Moreover, humans should contemplate God, in particular. This particular contemplative object, it is argued, is the most valuable object of knowledge for Aristotle’s humans, and this is so for two reasons. On the one hand, God is the most explanatory object of knowledge. On the other, God is also the object of knowledge that most fully enables humans to actualize their contemplative activity and thus most fully enables them to actualize their essence as humans. And yet, the following problem strikes readers as they consider claims made across Aristotle’s philosophical corpus: namely, humans cannot actually contemplate God. How could we? Aristotle’s epistemology for humans is materially based: all knowledge originates in perception of material particulars. God, however, is fully immaterial. It does not exist as a material particular and therefore cannot be perceived. It seems, then, that Aristotle’s most privileged object of knowledge is not a possible object for humans at all. Aristotle certainly thinks humans can have knowledge of God. What is to be made of this apparent contradiction? This project seeks to determine how Aristotle believes humans can get knowledge of God not, as one might expect, by an appeal to his philosophy of method and epistemology, but rather, by appeal to the method he himself undertakes when he is in fact doing philosophy. That is, the method Aristotle actually undertakes when arguing for the existence of God is used to shed light on Aristotle’s otherwise incommensurate philosophy of epistemology.

Explicit: Sherlock Holmes Fanfiction and Readerly Desire
Alexandra Braverman, English, History
Sponsor: Professor Catherine Robson, English

Fanfiction is the largest literary genre about which there is virtually no scholarship. In an attempt to remedy this, this project theorizes Sherlock Holmes fanfiction as an expression of readerly desire. “Desire” connotes the sexual and the intellectual, the imaginative and the appropriative: it is the urge, on the part of the reader, to get closer to the world of the source text. In fanfiction, this project of proximity is executed through an examination of characters using psychological and literary ideas of selfhood as rooted in childhood and conceptualized as topographical space.
I discuss three fics (as individual works of fanfiction are called) that are exemplary of the genre. *Nature and Nurture* by earlgreytea68 shows how writers explain characters by investigating their childhood experiences. The *Progress of Sherlock Holmes* by Ivy Blossom uses grammatical shifts and first-person perspective to define humanity via emotional capacity and to argue for a potential romantic attraction between Sherlock and John. Finally, *An April’s Journey* by Katie Forsythe demonstrates the structural similarities between fanfiction and the adventure story. The author uses this resemblance to advocate for an understanding of fanfiction as an “intimate adventure.” Drawing on René Girard and Eve Sedgwick’s ideas of triangulated desire, Michael Saler’s discussion of readerly enchantment, Henry Jenkins’ writing on fandom and Janice Radway’s work on romance novels, this thesis demonstrates the rich possibilities for critical attention that exist in the genre of fanfiction.

**The Women of Baker Street: Gender, Politics, and Desire in Sherlock Holmes Fan Culture, 1920–2016**
Alexandra Braverman, English and American Literature, History

*Sponsor: Professor Linda Gordon, History*

This project is a historical study of what is frequently called the oldest modern fan culture, that surrounding Sherlock Holmes. Beginning in the 1890s and continuing fervently today, Sherlock Holmes fan culture has seen various ruptures focused on gender. This project considers three time periods in order to demonstrate the initial exclusion of women from the original Sherlock Holmes fan societies and the push back against this regulation of female participation, which eventually led to a more inclusive fan culture. Chapter One addresses the period between 1920–1940 when broad social and economic changes resulted in a dramatic shift in gender relations and a new independence for both working and middle class women. These social shifts formed the backdrop for the creation of the oldest and most eminent Sherlock Holmes fan society, the Baker Street Irregulars (BSI), which excluded women from membership until 1991. Chapter Two turns to the period between 1965–1991 and examines the emergence of fandom culture around mass media and genre texts and the formation of the Adventurexesses of Sherlock Holmes in protest against the BSI’s exclusion of women. Chapter Three covers the years between 1991–2016 and traces the emergence of fan culture on the Internet as well as the emergence of the vibrant and conflicted fandom of a current televised adaptation of the original stories, the BBC’s *Sherlock*. In providing an overview of the history of Sherlock Holmes fandom, its conflicts and comings-together, its creative processes and tight-knit communities, this project hopes to reveal a rich and, as yet, entirely unstudied field of potential for cultural historians.

**Representations of Violence and the Body in ¡Que viva la música! by Andrés Caicedo**
Veronica Carchedi, Journalism, Latin American Studies, Spanish
*Sponsor: Professor Maria de Lourdes Dávila, Spanish and Portuguese*

This project analyzes the representations of violence and its relationship with the body in the novel ¡Que viva la música! by Andrés Caicedo (1951–1977). Caicedo lived for only 25 years in one of the most politically charged decades in the twentieth century. While his work is in direct dialogue with global discourses on revolutionary politics and countercultural production, it is often left out of the Latin American literary canon or boom of his time. Part of this project tries to explain how Caicedo’s work can be understood as impolitical—as Karina Miller develops it in her work—meaning that it does not compromise to the hegemony of political discourse or literary realism promoted by the left during the 1960s and 1970s but still engages with the political either through irony, parody or negative experiences such as violence. This categorization may explain in part why Caicedo remained in the margins of Latin American literature and why he has not been given significant critical attention. This work develops theories on violence within the context of ¡Que viva la música!, understanding it as a discourse and way of structuring the text, rather than just a repetition of violent acts. Furthermore, violence is what permits the body to erase its marks through corporeal movement—specifically in drug use, dance and sex—which lends itself to a study on gender in the novel. Finally, violence is presented as something that is repeatedly responding to and reflecting itself until it bubbles into an uncontrollable proliferation in the final scene. These representations in the work comprise the three chapters of this project—supported by contemporary criticism and personal interviews with Caicedo’s sister and friends—and open up questions of how the body, through violence, can be understood politically.

**The Evolving Stereotype: The Mammy, Jezebel, Sapphire and the Tragic Mulatta in Twenty-First Century Film**
Joal Chen, Cinema Studies
*Sponsor: Professor Antonia Lant, Cinema Studies*

As film culture grew and developed in the United States during the late eighteenth and early nineteenth century, the portrayal of African American characters was regulated to certain stereotypes. Previous arguments suggest that these stereotypes were overwhelmingly negative and thus a contributing factor to the state of race relations in the US during the twentieth and twenty-first centuries. In simplifying a stereotype to only whether it presents a positive or negative
ideology, one ignores the prevalence of the stereotype. In contrast to previous film theories, this thesis argues that the stereotype evolves and persists. This paper focuses on the evolution of four early American film stereotypes focused on Black women, in particular the Mammy, Jezebel, Sapphire and the Tragic Mulatta. Through the close study of mise-en-scène, viewpoint, costuming and scene analysis, these films will reveal that although the stereotype has perhaps physically or narratively evolved, the original ideology remains. In focusing on films with roles in which African American women were nominated for or won an Academy Award, this research suggests the pervasiveness and attraction of these stereotypes, even in their evolution, in popular American film culture.

Riding and Writing the San Diego Trolley: The History and Prospects for Public Transportation in Autopia
Natalie Covill, Urban Design and Architecture
Sponsor: Professor Jon Ritter, Art History

The San Diego Trolley, a light rail system initiated in 1980 with a current weekly ridership of 20,000, operates in an auto-dependent city, wherein about 76% of work commutes are made by single-person driving (Equinox Center, 2015). This system is rooted in the area’s history: the original San Diego Streetcar system operated from 1886–1949, serving similar parts of the city as the Trolley serves today. This research project seeks to understand the formation of San Diego Trolley from a variety of angles, looking at the history of the system, funding structures, and current issues such as the $1.7 billion Mid-Coast Extension project, which will link Downtown to University City. Archival review of San Diego’s newspapers and literature on light rail and streetcar systems provides historical context to this research while interviews with planning officials, official documents and current news stories provide the basis for understanding the system. Field investigation of the Trolley, GIS mapping and spatial analysis explore demographics of the routes, focusing on whom the system serves. This research demonstrates the complexity of the San Diego Trolley: inputs to the system include federal and state funding, public participation from community groups, protest from Not-In-My-Backyard (NIMBY) activists, planning from the San Diego Association of Governments (SANDAG) and the Metropolitan Transit System (MTS), and regional planning strategies such as Transit-Oriented Development (TOD). Research findings will shed light on how public transportation actually works in San Diego, raising questions about who actually gets a say in the planning of our cities and the prospects for public transit in auto-oriented American cities.

“This is a Terrible War, Baby?:” Trauma in Hemingway’s Early Novels
Madeline D’Agostino, English and American Literature
Sponsor: Professor Josephine G. Hendin, English

This project examines Ernest Hemingway’s first novels—The Sun Also Rises and A Farewell to Arms—with special attention paid to the experiences of trauma they depict. This project opens the study of trauma beyond physical manifestations to include consideration of psychological traumas, which allows for new interpretations of the characters. The experiences and behavior of the main figures of each novel—Jake Barnes, Lady Brett Ashley, Catherine Barkley and Frederic Henry—are examined through the lens of literary trauma theory and put trauma at the forefront, rather than war or even love. This study also incorporates a well-known but relatively modern diagnosis: posttraumatic stress disorder. It is argued that the four primary characters suffered from PTSD (before it was classified as it is today), an evaluation that provides a quite unexplored perspective. It is concluded that, while these novels were written in the shadow of World War I, the war is no more than a catalyst for the major action. This project looks into the hidden vulnerabilities of the male characters and, contrastingly, into the women’s commonly unacknowledged power. In this way, it seeks to present a new way of reading Hemingway’s novels by focusing less on the machismo and more on the suffering underneath.

The Starving South: A History of Pellagra in America
Francesca DeRosa, History
Sponsor: Professor David Oshinsky, History

In 1902, a Virginia farmer sought help from his local doctor for severe weight loss, a painful, blistered rash and depression that recurred every spring. H. F. Harris diagnosed him with pellagra, a disease which had been previously unheard of in the United States. In a few years, pellagra would become a Southern epidemic. A nutritional deficiency disease caused by very poor diet, pellagra plagued the sharecroppers, mill workers and institutionalized people of the South, spreading suffering, fear and death. This paper tells the story of the many competing etiological theories, as well as the years of scientific trial and error that led to a 1915 experiment in Mississippi, which finally pinpointed the cause. Most histories of the disease end the story with this experiment. This paper, however, goes on to examine the social, political and economic changes that allowed the disease to fade into obscurity, going from widely feared to widely forgotten in under a century.
“I Feel Like I Am Everybody:” Camp Sensibility in Joe Brainard’s *I Remember* and His Legacy

Colin Drohan, English and American Literature
Mentor: Professor Lytle Shaw, English and American Literature

The second-generation New York School writer Joe Brainard’s *I Remember* is a book-length poem comprised entirely of anaphoric list entries. By sharing personal memories in a seemingly unfiltered way, Brainard’s persona becomes crystallized over time: readers begin to see the development of the first-person speaker as a wholly American childhood emerges in tandem with a queer coming-of-age in New York City. The work employs hyper-specific details in order to make it seem as though readers are one with the speaker. In a way, Brainard writes for an implied reader who happens to be just like him. He is allowing himself to insist that he is the same as his readers, using what José Esteban Muñoz refers to as queer relationality. This queer relationality and the campiness that accompanies it highlights one of the nuances that elevates Brainard’s text from a simple list to a text that deserves study. This project uses Susan Sontag’s “Notes on ‘Camp’” to examine the campy aspects of *I Remember* and see how Brainard relies on camp to draw readers in. This thesis ends by examining Brainard’s legacy in the work of his friend, the poet David Trinidad, to see the ways in which his work integrates a Brainardian camp sensibility, one that has perhaps become most evident in the years following gay liberation. Finally, this paper considers the role of the archive in understanding Brainard’s legacy and the archive’s potential shortcomings. It concludes that in the coming years, Cubans will need to turn their attention inward to mold their architecture to their turn their attention inward to mold their architecture to their

Bodies on the US-Mexico Border: A Fight for Recognition in a Neoliberal Landscape

Julia Einhorn, Spanish
Sponsor: Professor Laura Torres-Rodriguez, Spanish and Portuguese

This project examines the bodies of migrants on the United States-Mexico border. These are the bodies of people traveling from Mexico and Central America into the US Border States. They are typically dying from exposure in the deserts. They are usually brought over the border by a human smuggler, or a coyote, and are abandoned without sufficient food and water. This project considers how and why these bodies are so prevalent in Southern Arizona and the United States’ response. This study focuses mainly on an interactive online map, the Arizona OpenGIS Initiative for Deceased Migrants. This map comes from a non-profit/government partnership that pinpoints the bodies discovered in Pima County, Arizona. The non-profit organization Humane Borders and the Pima County Medical Examiner’s Office created this first and only comprehensive migrant death map, which includes information such as location of the body, sex, age, cause of death and other available data (occasionally the name of the deceased if they have been identified). This crisis is also compared to the desaparecido crisis in Chile after the Pinochet dictatorship, using a documentary, *Nostalgia de la luz*, as a theoretical comparative framework. Finally, this study considers relevant US legislation that has led to an increase in migrant deaths in the desert.


Marta Elliott, Urban Design and Architecture Studies
Sponsor: Professor Mosette Broderick, Art History

This thesis considers Cuba’s search for a national identity independent of its colonial past. It also traces the history of the International Style of Modern Architecture back to the 1920s in Europe when countries used functional architecture as a foundation with which to rebuild their cities unburdened by historicism. These two themes collide during the late 1930s, during a moment in Cuban history—once Cuba was liberated from Spanish imperialism and introduced to Modern Architecture from the United States—when a Cuban national identity began to take form. In Havana, new construction projects incorporated local vernacular and traditional Cuban volumes in the architectural endeavors of Cuba’s upper-class with the International Style, resulting in what Cuban architectural historian Eduardo Luis Rodriguez calls Regional Modernism. This development was disrupted in the aftermath of the 1959 Revolution, when the new government dictated that its social reform policies be manifested in functionalist architecture aesthetically similar to the previously expressive Regional Modernism. The Revolutionary government undertook an architectural strategy that would use building techniques like prefabrication to create uniformity in their Modern buildings free of references to times of severe social stratification in Cuba’s past. In recent months, Cuba has experienced a shift in its global standing that will lead to changes in the country’s built environment. This thesis concludes that in the coming years, Cubans will need to turn their attention inward to mold their architecture to their people and eventually come up with an architecture that will represent them on a global scale previously unavailable to them.

Reading Riverbend: Learning from the Literary Dimensions of the Iraq War Blog, *Baghdad Burning*

Sami Emory, English and American Literature, Spanish
Sponsor: Professor Patrick Deer, English
For many Americans, the Iraq War is a half-remembered history of contradicting narratives. For Riverbend, the pseudonymous Iraqi writer behind the prolific blog, *Baghdad Burning* (2003–2013), the Iraq War is a chronic ache of daily terrors. This thesis is a literary examination of *Baghdad Burning*, one that posits Riverbend’s immense opus of posts as a possible remedy for this historical amnesia of the Iraq War. Instead of a reading of Riverbend’s blog through the seemingly obligatory lens of new media criticism, this thesis regards *Baghdad Burning* as a literary tool in conversation with literary and social theorists and critics. This unconventionally conventional critical framework is meant as an encouragement to consider Riverbend within longer histories of critical thought and to illustrate the instructive complexity of her posts. This analysis is further contextualized through news articles, governmental reports and the complementary postings of Riverbend’s peers in what is called the “Iraqi Blogosphere.” In this analysis, the author discusses the oversimplified approach to Iraq War historiography, which prompts an explanation of the reasons for choosing *Baghdad Burning* as the primary text of this study. It is argued that Riverbend’s text places several perceptual and critical demands upon the reader, all of which elicit active and engaged reading. These demands are explored specifically through discussions on Riverbend’s humor/satire and her critiques of orientalist attitudes online. Finally, this study looks at Riverbend’s yearly reflections on April 9th, the anniversary of the Fall of Baghdad, to propose a different approach to remembering the Iraq War—one, like the experience of reading of Riverbend, that is active, engaged and anything but simplified.

**Bilingual Colombia: English Education in Different Strata**  
*Beatrice Fiechtner Christofaro, Anthropology, Latin American Studies  
Sponsor: Professor Jabier Elorrieta, Spanish and Portuguese*

In the past two decades, Colombia’s booming market has catapulted the country into the global economy. The government’s focus on attracting foreign investment and developing commercial ties influenced various state sectors, including education policies. As the accepted language of business and globalization, English became a tool for further economic advancement. For this reason, the Ministry of Education aimed to revolutionize English education with a series of bilingual policies—starting with the National Bilingual Program in 2004. Targeting foreign language standards, education technologies and professional development for teachers, the policies promote Spanish-English bilingualism to integrate Colombian citizens into the globalized job market. So far they have been ineffective: only 6.4% of all Colombian secondary school graduates speak English at the desired intermediate level. At the root of the problem lie structural socioeconomic issues that deprive public Colombian schools of didactic materials and qualified teachers. At the same time, there remain inconsistencies between the Colombian education system and the European framework the state has introduced. This project studied how Colombian teachers appropriate governmental guidelines to the classroom reality given these circumstances. Due to the lack of resources and government guidance, teaching methodologies as well as teacher and student motivation suffer tremendously in the public school system. As a result, learning English and becoming a “global citizen” remains a privilege reserved to an elite minority.

**Between Languages: Bilingualism in Sylvia Molloy’s Literature**  
*Juana Guglielmino, Psychology, Romance Languages  
Sponsor: Professor María de Lourdes Dávila, Spanish and Portuguese*

How does one study the literature of a bilingual writer? Having the option to live and write in more than one language and move between various linguistic and cultural contexts is a resource that many bilingual authors use to their advantage in their writing. This advantageous mobility does not come without a certain tension that reveals the displacements found in the identity and interpersonal relationships of the bilingual subject. Bilingualism has been studied both as a cognitive advantage and as the impossibility to be or become completely in one language. Code-switching, that is, the switching between one language and another in the same utterance, is a linguistic phenomenon that has been used and manipulated in literature by many authors. In the literature of the Argentine-New Yorker writer and critic, Sylvia Molloy, shifts in language and consciousness of language are constantly present and can be seen as the axis around which and through which other themes are articulated (gender, memory, origin, etc.). This study considers several of Molloy’s texts—*El común olvido* (*The Common Forgetting*), *Desarticulaciones* (*Out of Joint*) and *Vivir entre lenguas* (*Living Between Languages*)—from the point of view of language and speech in order to understand the experiences of the bilingual person and how the subject moves and lives in many languages simultaneously. It observes the relationship between language and the present by reading and writing from a bilingual perspective. Through Molloy’s literature, this project studies the language of the bilingual subject in terms of interpersonal relationships, linguistic self-awareness, and, overall, identity.
The Subaltern in Hong Kong’s Post-War Growth: 
Laborers in the Light Manufacturing Industry
Christopher Harvey, History
Sponsor: Professor Mary Nolan, History

On the surface, Hong Kong’s rapid post-war economic growth from the mid-1950s to 1970s through light manufacturing was a prime example of the success of laissez-faire economics and globalization. During this era, Hong Kong profitably produced everything from transistor radios to plastic flowers with innovative entrepreneurs quick to identify global demand. Through its export oriented economy, Hong Kong became known as one of the “Four Asian Tigers.” While there are many who supported this narrative of successful economic modernization, especially macro economists and those who focus on long-term trends, this thesis argues that the underbelly of this growth was far less romantic than conventionally portrayed. In order to illustrate this point, the project analyzes the Hong Kong Riots of 1967 in order to better understand the lives of laborers in the light manufacturing industries. Specifically, it focuses on the Hong Kong Artificial Flower Works as a site of vociferous labor protest. Within the context of the current historiography, this work challenges the orthodox view of the riots as Cultural Revolution spillover and instead examines internal economic causes in an attempt to place greater responsibility on the British colonial government and the neoliberal paradigm.

Vas Hermeticum: Envisioning Sex and Inscribing the Body in Forrest Bess’ Writing and Paintings
Bergen Hendrickson, Comparative Literature
Sponsor: Professor Gabriela Basterra, Comparative Literature

Until a recent Whitney Biennial highlighted his work in a miniature retrospective, the twentieth century American painter Forrest Bess remained fairly obscure. Despite the support of the influential New York gallery magnate Betty Parsons, his corpus of small-scale, vivid abstractions had only been shown in major galleries a handful of times by the 1960s. Bess, considered by many in his small Texas fishing town to be nothing more than an eccentric, expounded on his aesthetic and philosophical theories—involving a mixture of Australian aboriginal ritual, alchemy and spiritual painting—and his overarching hypothesis of the possibility of an immortality achieved through hermaphroditism in a document he called his “Thesis.” This project evaluates the role this hermaphroditic theory and his program of self-surgery played in his painting or vice versa. More specifically, the author examines whether or not the new surge of critical interest in the artist incorrectly dismisses critical facets of Bess’ artistic vision and gender philosophy as eccentricity or, worse, mental illness. The paper consists of two main components: the first is a reading that traces the intertextual body of all the theory, broadly speaking, that Bess read and collaged into his own hypothesis of Hermaphroditism. Next, the author moves to demystify the ways that these texts related to Bess’ pursuit of the idea of a wholeness of sex and traces how they do or do not constitute an intelligible, comprehensive theory of gender together. The second component places Bess’ theory in conversation with some more mainstream twentieth century gender and performance theory on the idea of hermaphroditism. Foucault, Butler, and others are read as problematizing Bess’ idiosyncratic theory.

Translation as Tool: The French National Literature and the Irish Literary Revival’s Journey to Modernism
Emer Hughes, Comparative Literature
Sponsor: Professor John Waters, Irish Studies

This project aims to explain the influence and effect of the French national literature on the Irish Literary Revival as it encountered modernism. It analyzes contemporary accounts from key members of the Revival (particularly W.B. Yeats, Lady Gregory, and J.M. Synge), journals and resources available to the Irish writers immediately before the Revival, and the published literature on the subject of translation from both French and Irish on the Revival. Building on published theories about minor languages, nationalism and modernism (notably, Languages of the Night, Barry McCrea, and Nationalism and Minor Literature, David Lloyd), this study argues that A) Irish interaction with French literature allowed it to grow and expand and that B) this history of translation facilitated the later “return” of Irish literature to the Irish language, the use of which ushered the Revival into the modern era. Important as French literature was to the Irish Literary Revival, the experience of withdrawing to a closer sphere of language was crucial to the Revival’s entrance into modernism. The resulting use of Irish and Hiberno-English were key aspects of the slanted, non-traditional use of language that exemplified Irish modernism.

The Convergence of Science and Literature: A Refutation of the Classical View of Reality
Ahnaf Tahmid Islam, Chemistry
Sponsor: Professor Friedrich Ulfers, German

For several millennia, science/classical philosophy and literature have been considered two completely different, irreconcilable cultures. Science and classical philosophy dealt with the objective language of physical facts and univocal meanings, while literature dealt with the ostensibly subjective language of metaphors and uncertain meanings. However, the fate of objectivity in science changed dramatically with the advent of quantum theory, which introduced uncertainty and a metaphorical aspect in
science. Thus, theories such as Niels Bohr’s “complementarity,” Louis De Broglie’s “wave-particle duality” and Max Planck’s “quantum of action” were aligned with ideas in post-classical philosophy and literature such as Jacques Derrida’s “undecidability” and Virginia Woolf’s “stream of consciousness.” This study aims to show that as a result of this confluence the view can no longer be held that the language and thought of classical science and philosophy represents the “truth” of “objective” reality as opposed to the merely “subjective” language of post-classical thinkers and writers. Rather, a new view of reality opens up that is beyond the dualistic approach of the “either/or” objective vs. subjective and thus closes the seemingly unbridgeable gap between the culture of science and literature.

**Trials of the Living Dead: Statelessness and Political Bodies in Mary Shelley’s *Frankenstein***

Charline Jao, English and American Literature  
Sponsor: Professor Gregory Vargo, English

The monster of Mary Shelley’s *Frankenstein* occupies liminal spaces: physically as an undead, as man and monster, and legally as stateless. This thesis explores these paradoxical stances as Frankenstein transgresses a moral boundary drawn by religion and trespasses on the state’s performance of sovereignty through a hold on population control—what Michel Foucault refers to as “biopower.” With this framework, the author examines how the displacement and patchwork of physical bodies interrogate the relationship between body and state, revealing a structurally violent and hostile environment intent on destroying the stateless monster. This critique asserts itself in trials, gesturing towards a predatory legal system. The excluded monster forces pluralism by creating informal trials with his word as testimony and himself—or Frankenstein—as prosecutor. *Frankenstein* is situated at a moment when national identity was legally tangled with the Alien Act (1793), the Habeas Corpus suspension (1794) and abolition movements. The second chapter recognizes rites of separation as nationalistic ceremonies, lending new interpretations to Frankenstein’s violation of corpses and the monster’s ritualistic suicide. By drawing on anthropological texts, the author examines the ways Shelley interrupts sovereignty, as the monster ritualistically becomes martyr—destabilizing the masculine western narratives of nation dependent on violent conquest of the other.

**Decoding Manhattan’s Rental Real Estate Market***

Shivam Jumani, Economics, Urban Design and Architecture Studies  
Sponsor: Professor Jon Ritter, Art History

It is very common for students to rent apartments in Manhattan once they move off campus. Each student has a different budget and different priorities for their “ideal” apartment. More often than not it is understandable why some apartments are more expensive than others, but in this research, the author has tried to quantify how much renters pay for each feature/characteristic of an apartment. Some of the parameters in the model developed here include, e.g., the number of restaurants in a 0.3 mile radius from the unit, the number of bars in a 0.4 mile radius, access to open space, proximity to transportation nodes, laundry in the apartment, presence of an elevator and doorman, access to a rooftop terrace. Using data of 140 rental units an econometric model was produced that helps understand how much money New Yorker’s pay for certain privileges. Using this model, a choice index was produced for each neighborhood that helps quantify choices people have access to in that area. This model will also help people estimate the rent they should be paying for a certain apartment while they are in the process of looking for one. It can also be used to explain the consequences of urban processes like gentrification, expansion of the subway system and increasing public parks on the Manhattan rental market.

**The Marriage of Sculpture and Painting in The Farnese Gallery***

Julia Katz, Art History  
Sponsor: Professor Louise Rice, Art History

Scholars have only briefly examined the correspondence between the antiquities collection and mythological fresco design in Palazzo Farnese. The present study considers the Farnese Gallery (1597–1608) as exemplary of an integrated decorative space. Each image expresses a particular stage in a Neoplatonic evolution from the mortal to divine world. The ancient poetry that iconographers and the painter used in their design often describes a relationship between the earth and the heavens. The room may be visually divided into a two-part space of sculptural walls and pictorial ceiling. While walls are representative of the earth, the ceiling design is demonstrative of the heavens. The Farnese Gallery transforms into a marriage of sculpture and painting by way of a ladder to the divine.

**The Rationale of Recognition: A History of the Chinook Indian Nation’s Compliance with the Criteria for Federal Acknowledgment***

Isabelle Klinghoffer, History, Politics  
Sponsor: Professor Martha Hodes, History

The pursuit of federal recognition by American Indian tribes has had a profound influence on contemporary Native American identity, as powerfully evinced by Tribal Chairman Tony Johnson’s description of the Chinook’s application for recognition as a “matter of life or death.” Federal recognition confers powers of self-government ranging
from gaming rights to fishing rights, and despite the institution of a structured process of federal acknowledgment for American Indian tribes managed by the Department of the Interior since 1934, recognition has since been denied to hundreds of petitioning tribes. This essay examines the language of *Final Determinations for Federal Acknowledgement of the Chinook Indian Nation* released by the Department of the Interior’s Bureau of Indian Affairs to confer federal recognition to the Chinook Indian Nation in 2001 and then revoke it eighteen months later. The author contends that the language of *Final Determinations for Federal Acknowledgment* reveals inconsistent interpretations of the criteria for federal recognition of an Indian tribe by the Bureau of Indian Affairs. An analysis of the Chinook Indian Nation’s pursuit of federal acknowledgment demonstrates that the limitations of the Criteria for Federal Acknowledgment of an Indian tribe have resulted in the politicization of the federal recognition of Indian tribes, yet also in an evolution of the debates on tribal recognition in the United States.

**Towards Indigenous Self-Determination: Indigenous Rights in International Law**

*Ashley Ko, History*

*Sponsor: Professor Masato Hasegawa, History*

This project examines the development of indigenous rights through its applications in worldwide contexts and their increasing acknowledgement and protection within courts of law. Of significance to this paper is the notion of self-determination for indigenous peoples, which is understood as central to their international movement and demand for indigenous rights. The thesis begins with an introduction to the Ainu in Japan, a rather obscure indigenous group outside of anthropological circles, and explores the ramifications of late-nineteenth-century paternalistic policy to Ainu self-determination and the goals of the twentieth-century Ainu movement to dismantle social and institutionalized discrimination. The outspoken activism and rights-consciousness of various South American indigenous groups, as well as the achievement of constitutional guarantees of indigenous rights in the region, display the diverse character of indigenous movements worldwide. However, the lack of enforcement of indigenous rights in South America presents a serious shortcoming. The court decisions analyzed in this project, made by a Japanese district court and a regional international human rights court, demonstrate a battleground for minority and collective rights and reflect varying levels of deference to international human rights norms in their relevance to indigenous groups. The paper concludes with the discussion of established arguments in the topic of indigenous rights, and observes the increasingly splintered focus within rights-based discussion (and thus state policy) and the purported conflict between individual and collective rights. Returning to the Ainu and the new law established in 1977 towards the cultural promotion of the Ainu, this paper contends that the law’s emphasis on solely cultural rights draws an artificial discrepancy and distorts understanding of how rights are practiced in reality.

**Vietnam: Paul’s War of Meaning**

*Drew A. Kogon, History, Psychology*

*Sponsor: Professor Marilyn B. Young, History*

On November 3, 1961, Major Paul C. Leonhauser, the author’s grandfather, arrived in Saigon for military dispatch into the Military Assistance Advisory Group (MAAG VIETNAM). “I think [Saigon] rather nice, in part it reminds me a lot of Japan only [the Vietnamese] drive on the right side of the street like we do, and there are quite a few Catholic Churches,” he remarked upon his arrival in a letter home. Paul was one of over 2,000 military personnel to arrive in Vietnam by the end of 1961 in the joint effort of the Kennedy Administration and Ngo Dinh Diem Regime to bolster the Army of the Republic of Vietnam (ARVN) in their fight against dissidents and communist insurgents. Paul spent his entire career in the military, serving in World War II, Korea, and Vietnam among others. When the author first envisioned this project and gathered Paul’s records, letters, and orders—whatever he thought worth keeping—it was assumed that Paul’s involvement in Vietnam would be better understood as a result. To the author’s disappointment, Paul offered few clues, just as he had with his own immediate family, of his role in Vietnam, or the military for that matter. The Vietnam War was a painful and unnecessary loss of young life, a catalyst to social change and a radical demonstration of government deception and civilian mistrust. The author firmly believes that if Paul were alive today, he would disagree. Like many men, war gave his life meaning. It gave his life purpose. The United States Armed Forces was all he ever knew and without it, he was lost.

**The City Planning of Beijing since 1949 and a Case Study on the Nanluoguxiang Neighborhood**

*Yinan Li, Environmental Studies, Urban Design and Architectural Studies*

*Sponsor: Professor Carol Krinsky, Art History*

This thesis presents a comprehensive history of Beijing’s city planning since the establishment of the People’s Republic of China (PRC) in 1949: from the imperial capital, the communist socialism forefront, the industrial center, the Olympics city, to the global metropolis today. It shows how decisions made in the past have shaped the present layout of the city and continue to influence the future planning. The narrative explains how political movements under the leadership of Mao Zedong, from 1949–1976, followed by
Towards Culinary Hope: Foodways in Queer Chinese Diasporas
Matthew Lim, Asian/Pacific/American Studies
Sponsor: Professor Crystal Parikh, English, Social and Cultural Analysis

Since the late 1980s, Chinese diasporic cinematic and literary texts have explored how food negotiates racial, ethnic and cultural identities for Chinese communities. However, a conventional analysis of food too often eschews discussions of queerness. This study of foodways utilizes what scholars David Eng and Gayatri Gopinath call the “queer diaspora” as its critical methodology, which argues that coupling “queerness” with “diaspora” can identify a transnational network of queer cultures and communities that would otherwise be lost in a traditional telling of Chinese migration. By decoding representations of food and food spaces in Chinese diasporic films and literature produced in the 1990s and early 2000s, this project locates queer diasporic subjects’ ability to embody and perform their non-normative desires, subjectivities and kinships through foodways. The sensual, visceral and affective experiences with food and its spaces serve as a conduit for producing alternative knowledge about queer subjectivity and sociality in the Chinese diaspora. By re-narrating Chinese practices of making and eating food, this research proposes that foodways are sites of hope for queer Chinese diasporic subjects to envision different futures and worlds that are not lodged in the logic of traditional Chinese patriarchy and heterosexuality.

Cu voli puisi vegan ‘n Sicilia: Giuseppe Pitrè, Risorgimento and the Flowering of Sicilian Folklore
Kyle C. Mancuso, History, Italian
Sponsors: Professor David Forgacs, Italian Studies; Professor Larry Wolff, History

This project aims to locate both the regional and nationwide discussions within nascent Italian folklore studies in the broader arc of Risorgimento politics. The study centers on Giuseppe Pitrè’s contributions to the intellectual communities that cropped up following the 1861 declaration of the Kingdom of Italy, communities held court in the pages of literary and interdisciplinary journals and publications. Pitrè, both in these journals and in his published work on Sicilian folk songs, espoused a pragmatic but impassioned nationalism, a stance that colored the way his Sicilian subjects entered into the national consciousness. Faced with the urgent need to morally and culturally unify a fledgling nation, Italian intellectuals, including Pitrè, mobilized eager to insert their regions’ traditions into the now vast and complex web of national culture. In addition to the innumerable works of Pitrè, this study taps the trove of intercontinental correspondences of the most eminent name of Sicilian folklore, glimpsing a community that saw folklore studies as an integral part of national, intellectual and increasingly bourgeois culture.

The Infantilization of the Narrative Subject in Yugoslav War Narratives
Ivana Matijevic, English, German
Sponsor: Professor Christiane Frey, German

Children are the main characters in many war narratives of the Yugoslav Wars. This project analyzed the effects of having a child-protagonist and the work authors were able to do through this child-protagonist. Research was conducted by reading Yugoslavian War narratives such as Zlata’s Diary, Girl at War, and Wie der Soldat das Grammofon repariert. In addition, critical research was examined pertaining to topics of Yugonostalgia, the de-formation of nationalist-ethnic identities in Bosnia and the commodification of Yugoslavian war literature. This project articulates the ways in which these war narratives criticize western European reading practices; deconstruct narratives of the war that exist in the US-American and German imaginaries; and the ways the authors use child-protagonists to re-construct their memories of the wars. This project aims at offering a critical understanding of the effects of using child-figures to portray and talk about war. It differs from other, similar projects in that it attempts to treat child-protagonists as full-fledged characters instead of reducing them to immature adults. This can provide a means of understanding child-figures in- and outside of the Yugoslav context.
The Nazi Nude
Nele Mayer, Art History, German
Sponsors: Professor Pepe Karmel, Art History; Professor Alys George, German

Even though 10% of the art created in the Third Reich were nudes only a handful of scholars have mentioned them in passing. This study draws on original research conducted on female nude paintings in Germany, which are not accessible to the general public. According to Nazi guidelines, the ideal female nude was supposed to be slim, athletic and unproblematic. There was an interest in emaciated body types, which show a clearly protruding ribcage, small breasts and narrow hips. Almost as an antidote, Nazi artists also seemed to have had a fondness for a different body type, which consists of feminine, almost pugnacious looking female nudes with large but firm breasts and thighs. These nudes seem overly erotic, often leisurely displaying their voluptuous bodies to the male viewer. How did the National Socialists justify these two different body types? How did their ideal of the respectable family and nurturing mother clash with their desires? How are they connected to the sexual politics at the time? Why do Nazis seem to have had an inclination towards female nudes that reveal “inappropriate” sexual desires, such as pedophilia?

The Goose That Lays the Golden Egg: Preserving Racial Integrity and Implementing Compulsory Sterilization in 1924 Virginia
Shira Mogil, History
Sponsor: Professor Maria Montoya, History

On March 20, 1924, the Virginia General Assembly passed both The Racial Integrity Act and The Sterilization Act. At the height of the Eugenics Movement within the United States, these two policies manifested Virginia’s intent to maintain, protect and secure the purity of the white race. With the passing of The Racial Integrity Act, the state of Virginia codified the one-drop rule and declared that those who possessed one drop of African blood were black, while those without any “contamination” were white. Virginia institutionalized a racial binary, composed of black and white and forbade whites to marry individuals deemed to be of a different race. The Sterilization Act, on the other hand, allowed for the compulsory sterilization of those considered “feebleminded.” In most cases this included poor white women and women of color. In this way, Virginia hoped to eradicate the further procreation of the “less-fit,” in an attempt to conceive the strongest white American race. Eugenics infiltrated the ranks of American households, universities (notably the University of Virginia) and Congress. Using science to justify public policy, eugenics offered the nation a future of progress and betterment, one that was not built upon supposed lofty ideals and notions but conceived in hard scientific evidence. While historians have studied both the Racial Integrity Act and Sterilization Act through the lens of the Eugenics Movement, these acts are studied here through the lens of both the larger Eugenics Movement and the passing of racial and “anti miscegenation” laws throughout the United States. In this effort, the author analyzes the intersection between law and society and the way in which both the larger and more local Virginia eugenics movements were connected to the creation of race in the United States.

Reconstructing Identity in a Modern City: The Shuar Nation, Cultural Adaptations and Transnational Migration
Stephanie Moncada, Romance Languages
Sponsor: Professor Sinclair Thomson, History

Over the last three decades the trend towards transnational migration has grown exponentially. Within the complexity and diversity of contemporary cross-border migration, this project focuses on a specific type of mobility: the mobility of indigenous peoples. While scholarship on international migration is becoming more extensive, few studies address the mobility of indigenous groups. For many years, indigenous groups in the global South have been perceived as “collective” societies. The Shuar, an Ecuadorian indigenous group originating from the Amazon, have traditionally considered themselves and their society to be collective (that is, relational and interdependent). However, when transnational migration takes place, Shuars feel the need to explore and reconstruct their identity. Therefore the purpose of this study is to investigate, what happens to their identity when Shuar relocate? What are the cultural and psychological consequences of relocating to a different context? What happens, in particular, when a group of Shuar has settled in NYC and the surrounding area, where notions of individualistic identity supposedly reign? This study will document some of the most important adaptations Shuar migrants have experienced and continue to experience until today. These include adaptations in identity related to spirituality and ritual networks.

Music Below the Lion Rock: Social and Political Life in Hong Kong through the Lens of Transnational Cantopop, 1964–2004
Jeffrey C.H. Ngo, History, Journalism
Sponsors: Professor David Ludden, History; Professor Thomas Looser, East Asian Studies

Produced and aimed primarily for mass consumption in Hong Kong, Cantopop—a contraction of “Cantonese popular music”—has been indispensable to social and political life in the global metropolis often described to be where “East meets West.” This project takes the Beatles’
toured the colony in 1964 as a point of departure and traces the impact of the British Invasion in inspiring the first generation of young musicians to play rock and roll, initially in English. Following the Leftist Riots of 1967, the emergence of the unique “Hong Konger” identity as a result of the colonial administration’s policies to foster a sense of belonging among local residents, however, elevated the status of the common language, thereby encouraging the music scene’s shift toward Cantonese throughout the 1970s. In addition, the author examines the role of music from Taiwan, Japan and around the world in diversifying the sounds of Cantopop during the 1980s. This, along with the rise of a second hand movement known as Cantorock and the changing political climate, eventually led to the largest music event in Hong Kong’s history: the outdoor Concert for Democracy in China that supported the then-ongoing Tiananmen Square student protests of 1989. The study then moves on to the heydays of the 1990s, when four idols— together known as the Four Heavenly Kings—completely dominated Cantopop while simultaneously benefiting from economic reforms in China to reach unprecedented regional and global success. Yet, in response to the popularization of karaoke and restrictions of the Chinese market, their songs were often dumbed down to repetitive romantic ballads and catchy dance anthems that lacked deeper meaning. The study concludes with an epilogue on how the crises in 2003, the most troubled year in modern Hong Kong history, revived both Cantopop and the “Hong Konger” identity.

**Exploring Afro-Cuban Race Identity through the African Diaspora**

*Chinyere Obi, History*

_Sponsor: Professor Ada Ferrer, History_

It was important to analyze how Afro-Cubans balanced two identities—being Cuban and black—during the formation of the Cuban Republic after the War of Independence. The Cuban Republic viewed Afro-Cubans expressing their black identity as not compatible with its nationalist rhetoric. The rhetoric in Cuban society demanded Afro-Cubans to put their Cuban identity before their black identity as well as avoid any discussion on race. As a result, Afro-Cubans’ realities of racism, racial violence and discrimination in Cuban society were silenced. Thus, in order to understand how Afro-Cubans developed their black identity, it was essential to study their involvement in the African diasporic community. By discussing three points of interaction—the Tuskegee-Cuba exchange program, Garveyism in Cuba and African Methodist Episcopal Church missionaries on the island—between people of African descent in the United States and Afro-Cubans, it is argued that Afro-Cubans carved out spaces in Cuban society in order to express their black identity. This was seen with the emergence of elite Afro-Cuban social clubs and numerous United Negro Improvement Association (UNIA) divisions on the island. Also, through exchanges of ideas, Afro-Cubans developed an image of the “New Negro.” This image was vastly different from the archaic stereotypical image of Afro-Cubans that consistently associated the group with slavery and being illiterate. As a result, Afro-Cuban activists’ image of the “New Negro” centered on being refined, educated, well spoken and embracing one’s Cuban identity.

**Beneath the Feet of Mothers, Paradise**

*Alina Pastor-Chermak, French*

_Sponsor: Professor Emmanuelle Ertel, French_

Using a corpus of literature and film, this research explores the figure of the Franco-Arab mother in contemporary beur, or second-generation French immigrant of Arab descent, culture. In understanding how the beur community portrays the central female in the familial unit, one may begin to understand how French-Arab culture can exist at odds or integrate with continental French culture. As questions about immigration and Muslim presence in Western Europe increasingly arise, an understanding of Franco-Arab culture becomes integral in maintaining an equitable, diverse society. This political and cultural tension is manifested in several of the works used to study the Franco-Arab mother. Furthermore, this mother figure can be seen to have a key role to play in re-contextualizing feminism, biculturalism and integration in a rapidly evolving social climate.

**Rozen Aso and the Discontent of Japan’s Database Animals: A Study of Otaku’s Post-Political Support for Asō Tarō**

*Siqi Shi, East Asian Studies*

_Sponsor: Professor Thomas Looser, East Asian Studies_

People who identify or are labeled as otaku have long been imagined by Japan’s mainstream society as socially inept and politically indifferent introverts who remain uninterested in real life matters. This project analyzes the reasons for and implications of an interesting phenomenon, which started in 2006 when Asō Tarō, then Minister of Foreign Affairs and Prime Minister candidate, came to receive unprecedented popularity among and support from the otaku community. Through observing otaku activities on websites like 2channel and Niconico, as well as the physical space of Akihabara where otaku gather offline, this study argues that otaku’s support for Asō is closely related to their media consumption habits, which deserve new attention from academics. Revisiting and reexamining existing scholarship about otaku and otaku culture, this study provides new observations of otaku consumption modes and raises questions about the political/post-political
potential of *otaku* activities in the postmodern society of contemporary Japan.

**Staging Wittgenstein**
*Blair Simmons, Dramatic Literature, Computer Science*
*Sponsor: Professor Julia Jarcho, Dramatic Literature*

The goal of this project is to dramatize philosophical thought conveyed in Ludwig Wittgenstein’s *Tractatus Logico-Philosophicus* through the lens of his later idea of the “language game.” Wittgenstein is wrangling with the connection between reality and language (or lack thereof), the irony being that he uses language to discuss language, thus limiting himself in using but this one form. This project acknowledges the various forms language can take, primarily through physicality. In Wittgenstein’s *Investigations*, he suggests that it is through the establishment of rules that one constructs a language. It is then through the enactment of said rules that one speaks said language. In this way, the *Tractatus* can be played out as a linguistic game. The playfulness of structure extracted from the *Tractatus* dictates the theory of our performance. We have attempted to create a system of visually dramatized representations of the linguistic propositions put forth in the *Tractatus* in order to ground this ungroundable text.

**Neighborhood Character Preservation and Small Businesses in the East Village**
*Robin Smith, Urban Design and Architecture Studies*
*Sponsor: Professor Jon Ritter, Art History*

Since its inception in the early part of the nineteenth century, the East Village has witnessed perpetual demographic change, with the dominance and decline of a multitude of populations. The neighborhood has transformed from a shipping to a manufacturing economy, and then to the service sector, withering and thriving through periods of economic recession and growth. However, against a backdrop of constant change, narratives of innovation, independence and eclecticism recur throughout the neighborhood’s history. These characteristics manifest themselves in the locally owned businesses of the area, which are critical to the neighborhood’s vibrant shopping district and diverse streetscape. These shops have also historically provided a place of economic opportunity for newcomers, due to the affordability of the small-scale street level shops of the tenement buildings. Since the 1990s, however, the neighborhood has become significantly wealthier, whiter and less family oriented, resulting in a serious socio-economic shift. The independently owned businesses of the area now suffer from extreme rent escalation and competition from chain stores and high-end boutiques. This paper examines the challenges that face the small businesses of the East Village and presents policy solutions that could be adopted to reduce the strain upon them. Issues are studied through a combination of scholarly research and interviews with local business owners, and solutions that have been tested both locally and globally are discussed. In promoting small business success, these policies can protect the unique and diverse character of the neighborhood for years to come.

**Playtesting Philosophy: Identity (Re)Construction and Ethical Exploration in The Talos Principle**
*Megan Steiner, English and American Literature*
*Sponsor: Professor Mary Poovey, English*

What happens when a philosophical encounter becomes an activity, when your actions become an argument? This project explores the effects of medium on our understanding of philosophical precepts through a case study of *The Talos Principle*, a first-person puzzle-adventure video game wherein players adopt the identity of an Artificial Intelligence and explore a virtual world of physics puzzles and existential uncertainty. Players read over one hundred philosophical and literary texts in-game and are challenged by a game-spanning Socratic dialogue with a non-player character to question the validity of the epistemological, existential and ontological theories they have discovered therein. Whereas current scholarship on philosophy in games tends to focus on narrative content, this project is concerned with what a video game can do that books cannot, with the philosophical principles it presents, but further, with how the medium’s inherent interactivity allows it to do so. Drawing on theories of epistemology, narrative interactivity, identity formation and play as well as an interview with the game’s designer, it examines the available ethical player subject-positions built into the game as revealed in its source code, the philosophical theories presented to players through in-game texts and the phenomenological dimension of player experience through gameplay videos. When does one become “a player?” How is the experience of reading affected by the mediation of a virtual identity? How can a character be programmed to logically think and argue, and how can debating with it teach players to do the same? In addressing these questions, this project argues that by recasting the evaluation of philosophical concepts as a process of “playtesting,” by adopting multiple ethical perspectives and by finding the “glitches” in each, the video game can be understood as an explicit philosophical teaching tool, an ethical playground wherein philosophical literature can be encountered and empirically tested, read and tried in a manner unachievable by any other single medium.
Disjunctions, Dislocations, Disarticulations: Discursive Modes of Memory in Spain after Franco, 1976–2008
Remington L. Stuck, Iberian Studies, Romance Languages and Literatures
Sponsor: Professor Jordana Mendelson, Spanish and Portuguese

Since the advent of the “Historical Memory Boom” in Spain in the early years of the new millennium, questions of absence, haunting and the figure of “the ghost” or “the specter” have been important conceptual keys in the field of Spanish Cultural Studies with regards to the Spanish Civil War and the fascist dictatorship of Francisco Franco, from 1939–1975. This project works both diachronically and across media, including case studies in cinema, photography and the study of print periodicals, with the aim of localizing and examining the rhetorical function(s) of what the author has termed the “dis-” or the “not-”—i.e., absences, voids, temporal ruptures and discontinuities—and its discursive modes in Spanish print and visual culture. It is proposed that, beyond the established prominence of “the ghost,” equally critical rhetorical and discursive strategies may be found in the reading of the “not-quite” or the “undone” in post-Francoist Spain—the disjunctions, dislocations and disarticulations of the narratives and the archives that comprise the memory of this period. It is argued that these strategies ultimately articulate an evident trend and even a necessity for the blurring, fragmenting and reconstituting of memory narratives in Spain today in order to re-inscribe new cultural and political teleologies into the history of this country that remains simultaneously bound to its turbulent authoritarian past and in perpetual motion.

Degrees of Boerdom: British Perspectives of Boers During the South African War, 1899–1902
Courtney Sy, History
Sponsor: Professor Andrew Sartori, History

At the turn of the century, the South African War, as one of Britain’s last large imperial conflicts, was a chance to prove notions of British civility and superiority over the alleged savage, rural and backwards Boer opponents. But the Boers, as “Dutchmen,” challenged the definition of an imperial war waged against non-white adversaries. This paper uses varied texts such as journals, newspapers or cartoons to examine how the British perceived their enemy. It also looks at more confidential sources like military manuscripts. The latter are important because they reveal the attitudes of Englishmen more directly involved with Boers on the frontier—attitudes that have not been given much attention in the war’s historiography. When comparing the discourse about Boers at home to opinions in South Africa, it becomes evident that the politically charged, disparaging rhetoric in Britain differed from ambivalent military perspectives. A jingoist press emphasized racial and cultural differences, and for the most part, the papers stayed pro-war—or anti-Boer—until the very end. But the war itself did much to transform the perspectives of the British Army. As the conflict progressed from full-scale, glorious battles to tiresome chases after a guerrilla enemy that always seemed to be out of reach—along with severe British measures such as scorched earth policies and concentration camps—soldiers began to question the issues for which the war was being fought, along with their understanding of Boers. Some focused on their similarities with an enemy they saw as noble husbandmen, while others readily turned to negative, pre-war stereotypes.

Memoria Insurrecta: Against Defeat and Oblivion in Roberto Bolaño’s Amuleto
Lorena Tamez Hernández, Comparative Literature, Journalism
Sponsor: Professor Laura Torres-Rodriguez, Spanish and Portuguese

“So I sat down on the tiles of the women’s bathroom… shut the book and shut my eyes and said: Auxilio Lacouture, citizen of Uruguay, Latin American, poet and traveler, resist.” Such is the story of the narrator in Roberto Bolaño’s Amuleto (1999). Trapped inside the National Autonomous University of Mexico during the 1968 military occupation, Auxilio explores the memory of a generation oppressed in a narration that is both transtemporal and transnational. Her focalization is expanded to include not only 1968 Mexico, but also the Southern Cone’s and Spanish experiences under the dictatorships of the twentieth century. This thesis thus examines the way in which Bolaño’s novella forces the reader to reassess the static remembrance of violence in these countries. Considering the testimonio genre and the debate on the recuperation of memory during the years of the transition to democracy, this study reads Bolaño’s Amuleto as a text that proposes a community that goes beyond national borders and therefore posits the possibility of a broader, regenerative memory. In looking at a literature that refuses to settle under the models of “official” memory, this research makes it possible to reconsider the importance of a remembrance that is purposeful and that is meaningful because it means more than simply remembering.

The Elusive Description of Reality
George Tolkachev, Computer Science, Mathematics
Sponsor: Professor Friedrich Ulfers, German

For centuries, the classical model of language has assisted humans in communicating with one another and describing the world around them. This traditional view establishes a univocal meaning for the “signifier,” a word, in reference to the “signified,” a physical object. Yet the
postmodern/postclassical school of thought, which arose in the late nineteenth century, provided a revolutionary way of looking at the real world. Postmodernism/postclassicism put into question the human ability to adequately describe reality, due to the classical model’s assumption that the world operates by way of dualistic structures, such as presence vs. absence, truth vs. falsehood, life vs. death. This project addresses how prominent postmodernist/postclassical thinkers and scientists, including Jacques Derrida, Niels Bohr and Werner Heisenberg, challenged the ability of classical, conceptual language to describe the real. As far as literature is concerned, the project investigates two works, namely, *Frankenstein* by Mary Shelley and *The Purloined Letter* by Edgar Allan Poe, as anticipatory of postmodern literature, which is in tune with philosophical and scientific innovations, transgressing the laws of noncontradiction and the excluded middle.

**Should We Be Grateful to Our Parents?**

_Ahileas Tsahiridis-Krausser, Economics, Philosophy_  
_Sponsor: Professor Kwame Anthony Appiah, Philosophy and Law_

Should we be grateful to our parents? Presumably, most people feel some sort of gratitude toward them. Justifying and explicating this intuition is a much more challenging task however. On the one hand, we do not subscribe to a sort of quid pro quo account of gratitude. On the other, it does not seem like a child should take everything it is provided with for granted only by virtue of being someone’s child. The “gratitude question,” as this paper coins it, is a highly important one to ask. It is not only inextricably linked to the debate on filial obligation, but in fact it grounds the discussion and should hence be asked first, as some gratitude theorists have previously suggested. While the literature on filial obligation has enjoyed a number of noteworthy contributions, the question of whether we should be grateful to our parents in the first place has, to date, received remarkably little attention from moral and political philosophers. This paper seeks to make a small contribution to filling that lacuna by presenting an argument in favor of children being grateful to their parents. It delves into the nature of gifts and obligations and explores the relevance, for this vexing question, of the social institutions in the society in which one is reared.

**Extraordinary Femininity: Narrative and Gender in Gai Qi’s Album Famous Women (1799)**

_Anqi Xu, Art History, Comparative Literature_  
_Sponsor: Professor Michele Matteini, Art History_

*Famous Women* is a narrative album that portrays women from popular tales and sheds light on issues of gender in mid-Qing society. The preeminent literary couple Wang Qisun and Cao Zhenxiu commissioned this album from the Shanghai artist Gai Qi. The three individuals collaborated to create the album. Each leaf presents a painting by Gai and a poem by Cao, while Wang recorded his participation in the colophon. This thesis analyzes the album from four perspectives—its visual features, context of creation, pictorial-textual dialogue and social significance. It is
argued that this album demonstrates the eighteenth-century view of women’s role in a marriage and that it emphasizes the interdependence between men and women. To deliver these social messages, Gai Qi is highly innovative in his artistic decisions: i.e., what to depict and when. He draws on a variety of visual traditions, skillfully responding to and challenging Cao’s poems. This album is therefore characterized by a conversation between its paintings and poems, providing viewers with a puzzling and intriguing read. This project is significant in two aspects: first, it draws attention to Gai Qi, a rarely studied yet important artist, and second, it brings to light the coterie of Gai, Wang, and Cao, and addresses these intellectuals’ progressive views on gender.

**Memory and Collapse in Mexico: The Image of Lázaro Cárdenas in the Energy Reform of 2013**

Montserrat Yáñez Bravo, Latin American Studies, Politics

Sponsor: Professor Laura Torres-Rodríguez, Spanish and Portuguese

On August 12, 2013, the president of Mexico, Enrique Peña Nieto, made an official statement on national TV where he announced an extensive energy reform that would open the Mexican oil industry to foreign and private capital. This industry has played an important role in Mexican history since independence, culminating in the oil expropriation executed by President Lázaro Cárdenas in 1938. From that moment on, oil and Lázaro Cárdenas has been a staple of Mexican nationalism. President Lázaro Cárdenas and incumbent president Enrique Peña Nieto both belong to the same party, the Institutional Revolutionary Party (PRI), which ruled Mexico for over 70 years. During the presentation of the energy reform in 2013, the executive government undertook an interesting appropriation of the image of Lázaro Cárdenas in order to gain support from the population even though the stance that Lázaro Cárdenas appeared to have towards Mexican oil and his action to expropriate said industry is a contradiction of the aims of the 2013 reform. This appropriation of Lázaro Cárdenas’ image comes at a time in Mexico of a profound legitimacy crisis, when questions about corruption and accountability are being raised. A study on the meaning of Mexican nationalism and the use of one of its key images is necessary to make sense, as much as it is possible, of the relationship between power and politics in present day Mexico.

**Between Drug Control and Human Rights: The Bolivian Alternative to Prohibitionism**

Julia Yanoff, Latin American Studies, Politics

Sponsor: Professor Gabriel Giorgi, Spanish and Portuguese

In the past decade, countries around the world have begun to challenge drug prohibition on the basis of human rights, national sovereignty and public health. In particular, these countries have challenged the motives, damages and results of the “War on Drugs.” In Bolivia, where coca (the plant used to make cocaine) has traditionally been consumed by the local population, the War on Drugs took the form of violent, forceful eradication programs and the criminalization of poor farmers. It is in reaction to this history of aggressive and discriminatory drug control that Bolivia emerged in 2009 with a radical alternative founded on human rights principles. Under the community coca control doctrine, the government has worked with coca farming unions to allow each union farmer to produce a designated amount of regulated coca for basic subsistence. This project explores how Bolivian drug policy since 2009 has sought to embrace human rights norms in a field where rights are so systematically ignored. Using fieldwork gathered from policy interviews in Bolivia and historical research, the author argues that Bolivia’s approach to coca does not alienate it from international prohibitionist standards. Despite its regulation of coca, the Bolivian government has demonstrated a firm commitment to hardline penalties for drug trafficking and drug consumption. These seemingly contradictory policies in Bolivia illustrate the ultimate impossibility of holistically upholding human rights under current applications of drug prohibition. For this reason, understanding drug policy in Bolivia is critical to understanding the impact that both international doctrines and local conditions have on state behavior.
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

Highlighting Societal Pressures and Its Contemporary Effects on the Mindset of Neglected Children
Jephthah Acheampong, Economics
Sponsor: Professor Trace Jordan, The College Core Curriculum

Child neglect is the most common type of child maltreatment. Children facing neglect can repeatedly experience dissociation, difficulty concentrating, prone to risky behaviors and may even experience several mental health concerns including but not limited to anxiety and depression. Children lacking the proper guidance can fall victim to at least one of these experiences, diminishing their self-esteem and clouding the extent of their truest potential. Currently, Ghana has more than 1 million orphans and the number is only increasing. The loss of parents due to diseases or abandonment usually results in children being placed in orphanages or becoming the so-called street hawksers and beggars in the streets of Accra. An emphasis is placed more on providing these children with a place to lay their heads and some level of education, which are important, but there needs to be an emphasis on their overall wellbeing and mental health. This research project aims to understand the impact of motivational presence, inspirational quotes and mindfulness-based practices on the mindset of a neglected child. Surveys will be given to a population of children (n=60) at Prime Care Network (PCN) in order to assess baseline understanding of self-esteem levels, engagement in risky behaviors and hopefulness and aspiration for the future. Those who meet low parameters (x≤3) for self-esteem, hopefulness and avoidance of risky behaviors will be placed in the research study. The research population (expected n=40) will be divided into a control and an experimental group. Control group will receive only Anansi bracelets and a brief explanation of the mission of the organization. Experimental group will receive bracelets as well as the ANANSI Mentoring Initiative (AMI). Baseline survey will be given to both groups to assess any changes in the target factors. Survey data will be subjected to statistical analysis in order to discover response to the Anansi variables.

The Problem with Cultural Competence in Health Care
Rafael Aguirre, Anthropology
Sponsor: Professor Helena Hansen, Anthropology

Cultural competence is a philosophy that has become ubiquitous in the past few decades, particularly in health care. Being culturally competent means being able to communicate cross-culturally. This usually entails having knowledge about another culture’s beliefs and practices. Advocates of cultural competence view this framework as an appropriate response to health disparities between
certain racial, ethnic and socioeconomic groups. Not surprisingly, an increasing number of medical schools have implemented cultural competence materials into their curricula in the form of lectures, courses and required texts. Despite its popularity, the use of cultural competence in medicine has come under scrutiny from anthropologists. Since its inception, the field of anthropology has constantly asked, “What is culture?” To date, no answer has gone uncontested. Indeed, culture is a very tricky concept to define. What is clear is that it is no longer possible to think of cultures as being internally homogenous, bounded groups. Such an oversimplistic view of culture does not account for the heterogeneity of behaviors and beliefs within a so-called culture. Yet this oversimplistic definition of culture serves as the foundation for many cultural competence programs. This project explores the anthropological arguments against cultural competence. Particularly interesting are the claims that cultural competence is not only useless but harmful to patients as well. This project also seeks to elucidate the alternate frameworks that have been proposed, in particular those that shift our attention to structural determinants of health. In true anthropological fashion, this project also moves from the realm of theory into the realm of every-day life by providing ethnographically obtained case studies from a New York hospital. Ultimately, this paper argues that health professionals should not discount anthropology as a useful analytical tool for resolving social issues in health care.

Bad Apples: The Peer Effects of Violence  
Sidra Ahmad, International Relations  
Sponsor: Professor B. Peter Rosendorff, Politics

One bad apple spoils the whole bunch. This oft-cited idiom is acknowledged as universal truth. In the context of international relations, it is evident that dealings between nations impact their future actions both positively and negatively. But, what if it were possible to analyze whether groups of diverse individuals in a common institutional setting modify their conduct in response to the influence of their associates’ background and behavior? Miguel et al. (2011) finds a positive relationship between the degree of civil war in a soccer player’s home country and the number of yellow and red cards they receive, suggesting that childhood socialization into violence affects future behavior. This study examines whether the contagion of violence spreads from groups to individuals and between individuals through analyzing the influence of teammates’ background and behavior on the cards received by a single player. My empirical specifications reveal that a team’s aggregate aggressive behavior exerts a peer effect on each of its player’s actions while the other models do not.

The Sensation of Remembering: Iranian Americans’ Memory and Ethnic Identity  
Ava Ahmadbeigi, Social and Cultural Analysis  
Sponsor: Professor Thuy Linh Tu, Social and Cultural Analysis

This thesis uses a theoretical and ethnographic approach to examine how the memory of migration and the “home” country in Iranian immigrant families in the United States is key to understanding the ways in which 1.5 and second generation immigrants form narratives around national belonging and ethnic identity. It is argued that if first generation immigrants share affective memories (both verbally and through embodiment of their culture) and 1.5 and second generation immigrants develop an “imaginative investment” in recreating their parents’ memories, then they will often be able to experience a “sensation of remembering” their parents’ past. This sensation complicates their ethnic identity and feeling of national belonging because it makes narratives of a “home” country affectively significant, and it situates those narratives in relation to 1.5 and second generation immigrants’ experiences in the United States. A study on how embodied and shared memories affect an individual’s creation of “self” and identity is useful not only in so far as it helps understand the individual but also in that it also creates room for further questions about how memory can be translated and identity-formations carried over from the past to the present and future.

Eliana Ajodan, Psychology  
Sponsor: Professor Madeline Heilman, Psychology

This study extends earlier work by exploring how gender stereotypes and the performance expectations they produce shape responsiveness to new information about performance. This study investigated whether changes in performance have different consequences on self-evaluated competence and performance perceptions of men and women whose earlier performance had been unsuccessful. Although the predicted results were not significant, there was a trend demonstrating that 1) change in perceived competence was greater for men than women when performance improved 2) an improvement in performance had a less beneficial effect for women than for men 3) no gender differences emerged when performance remained the same. When women's initial performance was consistent with stereotype-based expectations, and therefore was expected, women seemed to resist upwardly revising their original impressions. These trends therefore may lend support to the idea that stereotype-based expectations born of lack of fit perceptions influence the updating of impressions,
as men and women differentially respond to performance improvement information.

**Vital or Vain?: Public Access Television in the Digital Age**  
*John Ambrosio, History, Journalism*  
*Sponsor: Professor Brooke Kroeger, Journalism*

Since its advent in the 1970s, public access television has provided an outlet for those voices traditionally not heard on network or cable television. Utilizing funds the Federal Communications Commission mandates cable companies to provide, public access centers provide content created for and by the communities they serve. But now, in the face of changing technology, loosened regulations and waning interest in the medium, community media centers around the country are fighting to stay relevant and, in some cases, to survive. This project combines the tools of journalism and deep research to examine the past, present and future of public access television. In doing so, the work examines the origins of public access television and the medium’s evolving mission statement. It also considers the role that public access plays in making our society more democratic and the ways in which it is adapting in response to the growth of the Internet. Finally, it considers how the timing of an interaction with other people (i.e., in the present versus the future) affects how people use these different pieces of information in making social choices was tested. This research combines insights from the construal level and learning literature to create a unique understanding of how people learn about other people. Moreover, this project can shed light on the important social question of how and when people will choose to interact with others.

**Press Freedom and Inflation in a Democracy: Modus Operandi for Protest?**  
*Azizjon Azimi, Economics, International Relations*  
*Sponsor: Professor B. Peter Rosendorff, Politics*

Which factors lead to mass mobilization and collective action? This question has been studied extensively in the field of political science. Present hypotheses in the literature assign significance to a variety of conditions from economic factors to political systems. This study incorporates elements of two overarching hypotheses—transparency and grievances—by introducing an interaction model. It delves into examining determinants of protest by testing press freedom as a proxy for transparency and inflation as a proxy for grievances, along with joining the two in an interaction variable. A cross-national time-series analysis covering 93 democracies from 1995–2011, the research employs OLS and Poisson regressions to find strong significance for the interaction as well as reinforcing stipulations of the relative deprivation theory and the transparency argument.

**Getting to Know You: The Role of Trait Learning in Predicting Social Choices Across Time**  
*Stacy Beach, Psychology*  
*Sponsor: Professor Yaacov Trope, Psychology*

In social situations, we learn many things about the people we are interacting with. Information that we learn about people can range from their personality traits to the reward value of interacting with them. This research analyzed what factors determine the extent to which people will rely on these pieces of information in making a decision. In particular, trait information is likely to be seen as stable across various contexts, whereas reward information is likely to be seen as context specific. Therefore, how the timing of an interaction with other people (i.e., in the present versus the future) affects how people use these different pieces of information in making social choices was tested. This research combines insights from the construal level and learning literature to create a unique understanding of how people learn about other people. Moreover, this project can shed light on the important social question of how and when people will choose to interact with others.

**Distrust Shapes Perceived Distance Between Groups**  
*Jillian Biegel, Individualized Major*  
*Sponsor: Professor Tessa West, Psychology*

The present project examined whether distrust—a basic social emotion—affects the extent to which groups perceive one another as being distant. Previous research on distrust indicates that when in a distrustful situation people think of the opposite to what they would usually think. Additionally, research on intergroup relations suggests that people tend to perceive large amounts of distance between their own group and an opposing group. Participants first completed a task in which they estimated the number of dots on a screen and were randomly assigned to believe that they had either overestimated or underestimated the number of dots. Participants were then randomly assigned to either think about a time when they trusted or distrusted another person. It was found that when people thought about a time when they distrusted (versus trusted) someone, they perceived greater closeness between the two groups (overestimators and under-estimators). These findings shed light on understanding the role of distrust in-group contexts and how these types of mindsets can be used to foster more effective relations among groups.
US Correctional Institutions and Human Trafficking: Inmates at Increased Risk of Falling Victim to Human Sex Trade  
Larson Binzer, Journalism, Politics  
Sponsor: Professor Brooke Kroeger, Journalism

Researchers in Central Florida have found that correctional facilities that house female convicts have become sites for sexual traffickers to recruit inmates to add to their “stables” once the women are released. Traffickers either search through public records to seek out inmates who they then, via correspondence, lure into commercial sex work with offers of employment and stability or they use incarcerated accomplices to recruit fellow inmates from inside the facilities. Much of this recruitment, however, goes unnoticed by prison staff and officials who are untrained in recognizing the signs of this exploitation. In fact, more than twenty departments of corrections do not have any mandatory staff training in human trafficking. Indiana’s Department of Corrections is the first state taking steps to fight trafficking and raise awareness within its correctional system and has been followed by departments from Florida, Ohio and Arizona. However, the states that have no human trafficking screening process or staff training in their departments of corrections put their staff at an increased risk of overlooking one of the largest pipelines of women being forced into selling sex.

Hopes for a High Heeled Oval: The Effect of Construal Level Theory on Stereotype Activation  
Abigail Bisi, Psychology  
Sponsor: Professor Emily Balcetis, Psychology

Women are largely underrepresented in leadership positions. This study proposes that one explanation for the lack of female leaders in business and politics is the pervasiveness of nationally propagated negative stereotypes about women in leadership. However, not all Americans endorse such stereotypes personally. This research explores when individuals will give more weight to their own personally held values rather than the nationally espoused negative gender stereotypes when evaluating women for leadership roles. Using Construal Level Theory, it was predicted that at greater psychological distance people use higher-level values endorsed at the system level including negative stereotypes regarding female leaders while up close people use personal beliefs to inform voting decisions. Across three studies, results indicate that the importance of personal values does not change as a function of distance; however, the importance of nationally held values does. At a distance, people rate national values as more important than in proximity. Results from Study 3 indicate that the manipulation of national values effectively shapes participants’ voting intention in proximity but not at a distance contrary to the author’s prediction.
The Syntactic Structure of “Hella” in Dialects of American English
Wellesley Boboc, Linguistics, Psychology
Sponsor: Professor Stephanie Harves, Linguistics

While cross-linguistic syntactic variation has been widely studied, far less research has been conducted on such variation within dialects of a single language. North American English in particular is rich in morpho-syntactic variation, much of which has yet to be documented and systematically analyzed. This project explores one such instance of variation, namely the use of “hella” in West Coast dialects of the language. It is argued that there are in fact two different dialects of “hella” with distinct underlying syntactic structures, one spoken in the Northern California Bay Area and the other in Seattle, Washington. An analysis of acceptability judgments gathered from speakers in these two regions using Amazon Mechanical Turk clarifies the distribution of “hella” in each dialect. The environments in which “hella” is accepted or disallowed in each dialect are also discussed. It is proposed that these surface differences in the distribution of “hella” can be accounted for by the presence of silent elements, following from Kayne (2005), within the syntax of the Seattle dialect. Specifically, “hella” is posited to be an intensifier over silent elements for speakers of the Seattle dialect, whereas it functions as an intensifier over overt adjectives and as a quantifier in all other environments within the Bay Area dialect. This analysis accounts for speakers’ conflicting judgments and offers an explanation for the wide range of uses of “hella.”

Affective Influences on Moral Judgment: The Role of Core Versus Moral Disgust
Chelsea Bona, Psychology
Sponsor: Professor Tessa West, Psychology

The present study investigates the differences between moral disgust (caused by social “purity” violations) and core disgust (caused by noxious stimuli) and their effects on moral judgments. Previous research has demonstrated a connection between emotion and moral judgment and implicated a causal relationship between the two. However, these studies had not examined how inducing moral versus core disgust, which are theoretically distinct, may differentially affect the severity of moral judgments. By addressing this gap, this study revealed four findings of significance. First, a paradigm was developed that independently induced moral versus core disgust. Participants in the moral disgust condition self-reported comparable levels of disgust compared to the core disgust condition but had greater “wrongness” appraisals. Secondly, it was found that there was no main effect of disgust condition on moral judgment: core and moral disgust did not lead to significantly different severity in moral judgment (nor did they differ from no emotion). Additionally, it was found that private body consciousness was a moderator of these effects in two interesting ways. For participants in the moral disgust condition, unlike the core disgust condition, participants with high body consciousness made significantly harsher moral judgments than those with low body consciousness. Finally, trending results suggest that for high body consciousness participants, moral disgust affected moral judgments more than core disgust, though this effect did not achieve significance. These data provide initial evidence that core and moral disgust can be successfully disentangled. Future research should further unpack how they differentially affect moral judgment to better understand the function of each category of emotion.

Who’s to Blame? How Information Processing Underlies Disparities in Legal Blame
Tayler Born, Politics, Psychology
Sponsor: Professor Emily Balcetis, Psychology

How can two people commit the same crime yet face different punishment and blame within the American legal system? This research explores whether differences in blame stem from an underlying difference in the way people process information. Certain people can process information on a more abstract, holistic level while others tend to focus on central, concrete details. This study asks whether abstract information processing makes people more sensitive to mitigating contextual information, leading to leniency in blame. In this work, the author manipulated whether online participants considered information in abstract or concrete ways and then presented them with a scenario of harm in which blame-mitigating details were present or absent. It was predicted that mitigating details would only lead participants primed to consider information abstractly to assign less blame to an actor. These findings may have great implications on the presentation and analysis of courtroom evidence: e.g., certain jurors may be uniquely predisposed to account for evidence presented by the defense as a function of the way they process information. Understanding these differences in information processing is critical to the elimination of the systematic disparities in blame that is so often seen in American legal proceedings.

Gender, Sexuality and HPV: A Vignette Study
Alexandra Bray, Sociology
Sponsor: Professor Jennifer Jennings, Sociology

The human papillomavirus (HPV) is the most common sexually transmitted disease in both the United States and the world. In 2006, the three-shot Gardasil HPV vaccine became available, offering protection against the most common strains of HPV and the potential to significantly reduce cervical cancer. The vaccine is recommended for all children ages 11 and 12, but take-up varies greatly by sex.
In 2014, 39.7% of girls age 13–17 received all three recommended doses, but only 21.6% of boys in the same age group received all three doses (CDC). This experimental study explores the impact of gender and sexuality on respondents’ attitudes about who should receive the HPV vaccine and the conditions under which a person is morally obligated to consider others’ health in addition to their own.

**Driving the Newest Minority: Factors Influencing Latin American Voters in the United States**

Rikki Brukner, Politics

Sponsor: Professor Oeindrila Dube, Politics; Maria Carreri, Politics

This project aims to determine what role attachment to Latin American culture has on Latin American voter turnout rate such as geographical or demographic factors. This project focuses on an internal aspect of the Latin American community: culture. Latin American culture has become ubiquitous in American society. Through OLS state-fixed effects regression, the author analyzes how attachment to Latin American culture impacts voting behavior in the United States. By testing five different measures of Latin American attachment to Latino culture on the effect of whether a respondent voted in the 2004 presidential election, this project deduced that attachment to Latin American culture negatively impacts voter turnout. Based on the regression results, a driving force behind the Latin American vote is the community’s feeling of empowerment that their community has the ability to create a strong unifying bloc in the polls, especially when it comes to ensuring the best interests of their community. These results are helpful for political candidates seeking to acquire the vote of this new minority.

**Amending the Geneva Convention: An Additional Fourth Protocol**

Natasha H. Brunstein, Economics

Sponsor: Professor Nathaniel Bennett, Expository Writing Program

The War on Terror is a US invention. As such, it does not meet the requirements set out by the Geneva Convention and its Additional Protocols to properly regulate it as warfare, which is traditionally either between two (or more) sovereign nations or between an established government and a revolutionary faction. Due to this legal ambiguity, the United States’ War on Terror has altered not only the definition of warfare but also the process by which warfare is defined. This perpetual and nebulous state of war is only governed by an unclear set of laws, giving the United States great liberty in processing terror cases. While acts of terrorism are indisputably atrocious and unacceptable, so are the actions taken by the United States in response to this problem. This paper investigates each relevant article of the Geneva Convention and the three Additional Protocols to ultimately arrive at the conclusion that the War on Terror does not fall under the jurisdiction of the Geneva Convention, as it exists today. In response, an Additional Fourth Protocol is proposed that serves as a literal and metaphorical forum for discussion. In the past, scholars have urged the United States to hold itself accountable for its international human rights violations, but these pleas fall short because they do not pinpoint a potential solution. The existence of a Fourth Protocol allows for further conversation on how to improve the Geneva Convention and presents a goal to work towards. Though the Fourth Protocol itself may never come to fruition, its proposal is a vital steppingstone in updating the Geneva Convention.
**Urgenda Foundation v. Kingdom of the Netherlands: Litigation as a Means to Climate Accountability**

Melanie Calero, Environmental Studies  
Mentor: Professor Jennifer Jacquet, Environmental Studies

As the international discussion surrounding climate change becomes a topic of greater concern to the public, non-governmental organizations (NGOs) are playing a more significant role in holding governments accountable to national and international environmental policy standards. One mechanism employed by NGOs is litigation. A recent case, *Urgenda Foundation v. Kingdom of the Netherlands*, provides an example of a successful “climate litigation” case resulting in a Dutch court’s decision to order the state to adopt more stringent CO2 standards. To identify the aspects of the Urgenda case that made it such a success, this research examines the arguments and verdict, relevant Dutch legal statutes, peer-reviewed articles analyzing the case and various discussions of the media depicting public opinion of the ruling. This work also compares the case with other climate justice cases that were inspired by the Urgenda ruling developing in countries such as Belgium and New Zealand. Seeking a pattern or trend in successful approaches to climate litigation against governments, this research broadens the general understanding of climate negligence cases and their potential role in establishing national environmental accountability in climate mitigation efforts.

**An Experimental Analysis of the Use of Race/Ethnicity as a Demographic Voting Cue**

Oeindrila Dube, Politics  
Sponsors: Professor Nathaniel Beck, Politics; Professor Iddo Tavory, Sociology

To what extent would voters be willing to vote for their co-ethnic? As the proportion of minority voters in the United States continues to rise, the study of the use of the demographic cue of race/ethnicity offers valuable political and social implications. This two-step survey experiment, through a pairwise comparison of candidate profiles, tested temporal depth between the archaeological sample and the modern sample. It will also test the accuracy of the potential subgroups if they are appropriately grouped. The material used for the present analysis consists of two populations—a highland and lowland sample. The highland group is from the Cotabamba Province, within the Apurimac Region. The lowland group samples come from multiple regions: Chicama Valley, Ancon, Pachacamac, Surco and Virú Valley. This study utilizes linear analyses in which 24 cranial measurements are extracted by digitizing 28 landmarks from each cranium. Ultimately, the findings will provide valuable insight on how altitude affects cranial morphology. The author’s hypothesis is that the sample can be distinguished into two groups through a discriminant function analysis. To assess whether the groups are accurate, modern Peruvian crania will act as unknowns.

**“I’m Not Like the Rest of the People:” Aid Recipients and the Negotiation of Stigma**

Krysta Camp, Sociology  
Sponsor: Professor Iddo Tavory, Sociology

When individuals seeking assistance from nonprofit organizations experience stigma, how do they cope with this experience? The purpose of this research is to examine the experiences of stigma in individuals receiving aid from nonprofit organizations and the methods of stigma management they employ. The data were collected through a series of 32 interviews with individuals who had received aid for housing assistance, drug addictions, basic goods services and career coaching from nonprofit organizations in New York City. Analysis of this data revealed that individuals use methods of creating status distinctions most frequently as a mechanism of coping with perceived stigma. They create boundaries based upon characteristics that describe their lives outside the organizations from which they receive aid while also differentiating themselves as better or more worthy recipients of aid based upon their performance within the organization. The degree to which an individual uses these tactics of boundary work is linked to their background prior to seeking aid from a nonprofit.
1) whether or not voters will support a candidate of their shared race/ethnicity but of a different partisanship and 2) whether or not more voters will support a candidate of their shared race/ethnicity but of a different partisanship if the candidate’s stance on an issue is more in-line with the voter’s stance on the issue. It was found that voters overwhelmingly valued partisan group identification cues over ethnic group identification cues but that minority voters were more likely to support their co-ethnic. Moreover, a significant number of voters were more likely to support their co-ethnic when the candidate’s stance on immigration was more in-line with the voter’s stance on the issue. When the candidate’s stance on taxation was more in-line with the voter’s stance on the issue, there was not a significant effect. Therefore, a candidate’s stance on an issue can affect voters’ level of support for their co-ethnic, but the effect varies from issue to issue. These findings show that minority candidates have a significant advantage with their co-ethnics in primary elections and reveal how minority candidates could appeal to their co-ethnics, even if they are of a different partisanship.

**Anxiety Attributions in Interracial Interactions: Examining the Roles of Negative Mood and Memory Biases**

_Aya Cheaito, Neuroscience, Psychology_

_Sponsor: Professor Tessa West, Psychology_

Interactions with out-group members have been shown to provoke anxiety responses in individuals, thus leading to negative intergroup consequences such as contact avoidance. While previous research mostly focused on experiential anxiety, perceived anxiety in interracial interactions has received significantly less attention. This study proposes that the relation between perceived anxiety and avoidance behaviors is mediated by mood congruent memory encoding. In other words, participants engaging in a cross race interaction, who attribute their partner’s anxiety to an incidental caffeine source, and not to the interaction, will experience less negative mood and are less likely to encode anxiety related memories about their partners. This study examines whether providing different attributions for a partner’s anxiety changes the interaction outcomes: it is proposed that attributing a partner’s anxiety to an incidental source (e.g. caffeine), and not to the interaction itself, leads to a higher anticipated liking and friendship in the interracial interaction.

**Influence of Social Status on Ability to Reason Mental States**

_Feifei Chen, Psychology_

_Sponsor: Professor Eric Knowles, Psychology_

Individuals’ social classes shape the way they behave and think. People of higher socio-economic status (SES) have more resources, so they are freer to pursue their goals and interests and focus more on their internal emotions. On the contrary, people of lower SES are more concerned about external risks. (Kraus, Piff et al., 2012). Previous research shows that people of lower SES tend to display more engagement cues (e.g., nodding and smiling) and feel more empathy towards others during social interactions than people of higher SES (Kraus and Keltner, 2009; Piff, Kraus et al., 2010). In the current study, the influence of SES on people’s ability to reason about others’ mental states is examined. Reasoning about mental states is essential for people to predict and interpret others’ behaviors and to communicate effectively (Birch, 2005). The participants were asked to take the “Reading the Mind in the Eyes” test (Baron-Cohen, Wheelwright et al., 2001). They were presented with a series of photographs of the eye-region of the face of different people and asked to choose which word best describes what the person in the photograph is thinking or feeling. It was predicted that people of lower SES would score higher on the test than people of higher SES, which means that they can read emotions and mental states just by looking at others’ eyes better than people of higher SES.

**Accountability, Civil War and Human Rights Institutions**

_Jade Chen, East Asian Studies, International Relations_

_Sponsor: Professor B. Peter Rosendorff, Politics_

What compels states to join human rights institutions? The efficacy of such intergovernmental organizations and treaties has been hotly debated in the existing literature, making a state’s motivations in ratification somewhat unclear. This thesis investigates the effect state accountability and a recent history of civil war (defined as within five years _ex post_) have on the number of human rights institutions a state is a member of in a given year. On the whole, high-accountability states are more likely to join additional human rights institutions than low-accountability states. However, among high-accountability states, those that have a recent history of civil war are not likely to join additional human rights institutions while those that have had a distant history or no history of civil war are likely to join more human rights institutions. Unfortunately, this analysis was not able to provide a significant conclusion regarding low-accountability states, likely due to the diversity of such states and the corresponding variance of human rights institutions.

**What Is Real? An Analysis of Authenticity in Internet Pornography**

_Sophia Chen, Anthropology_

_Sponsor: Professor Noelle Stout, Anthropology_

Pornography, due to its accessibility on the Internet, serves as a convenient form of sex education in a time
where sex and talking about sex is still heavily stigmatized. However, professional pornography is primarily an entertainment product and not intended to be instructive or representative of “real sex.” Modern day audiences show a desire to watch porn that is “genuine,” which is reflected in the rise of amateur pornography and reality porn. These genres of pornography mimic the style of home videos, hinting at spontaneity and sex between ordinary members of society instead of porn stars. This project seeks to understand audience perceptions of authentic sex and how Internet pornography has evolved to fulfill this niche. This study builds on the existing literature on porn viewers and their habits, focusing specifically on the widespread use of free tube sites—named for their similarity to YouTube—to watch porn instead of paid subscription websites. Ethnographic interviews were conducted to reveal porn consumers’ methods of accessing and finding their preferred pornography. This data, combined with an analysis of the structure of tube and subscription websites, elucidates how sexual authenticity is mediated on the Internet. Arguing that porn is an important cultural artifact, these findings are put in a greater social context to reflect a cultural emphasis on sincerity and truthfulness in the modern day.

Creationist Origin Stories and Essentialism about Novel Categories

EuiJung (Elysia) Choi, Psychology
Sponsors: Emily Foster-Hanson, Psychology; Professor Marjorie Rhodes, Psychology

Psychological essentialism is the belief that members of a category share an unobservable essence that leads them to share obvious and non-obvious properties. The development of essentialist beliefs about particular categories, especially social categories, is shaped by cultural input. One common form of cultural input is creationist origin stories, which describe categories as made by an agentive creator. The present study asks whether creationist origin stories guide children’s essentialist beliefs about novel biological (animal) and social (human) categories. Children were read a storybook describing a novel animal or human category as either created by a magical being or discovered by a magical being. Essentialist beliefs about the novel category were then measured. Results showed a significant main effect of domain (Wald X² (1) = 6.29, p = .01) and a marginal domain X origin interaction (Wald X² (1) = 3.48, p = .06). Children who learned about a novel animal category gave similar levels of essentialist responses regardless of which origin story they heard (created: M = .50, CI = .43-.56; discovered: M = .50, CI = .44-.57). In the human domain, however, participants who heard that the category had been created by a magical being (M = .48, CI = .41-.54) gave significantly more essentialist responses than those who heard that the category had been discovered (M = .36, CI = .30-.43; p = .01). These results are interpreted as indicating that creationist origin stories, a common form of cultural input, can lead to increased essentialism about social categories.

Identifying Gene Expression Biomarkers as Indicators of Nitrogen Status in Rice and as Candidates for Improving Nitrogen Use Efficiency in Transgenic Rice Crops

Nafisa Chowdhury, Environmental Studies
Sponsors: Professor Jennifer Jacquet, Environmental Studies; Professor Gloria Coruzzi, Biology

Excessive use of nitrogen fertilizer in agriculture and inefficient capture by crops has increasingly become a source of environmental damage. Particularly, the use of nitrogen fertilizer has led to runoff into nearby bodies of water and to the advent of dead zones in marine and freshwater coastal ecosystems. The development of genetically engineered crops with increased nitrogen use efficiency (NUE) proposes a solution for mitigating such environmental issues while also promising to help meet food security demands. This paper analyzes the potential for multi-national research on genetically engineered crops with purported increase in nitrogen use efficiency to reduce nitrogen pollution. Through an analysis of current trends on research about genetically engineered NUE crops, the international and domestic legislative climate surrounding genetically modified organisms, the challenges of commercializing second-generation crops and issues with farmer compliance on nitrogen management, this paper determines that nitrogen efficiency of genetically engineered crops alone cannot reduce nitrogen pollution.

Farmer Suicides: A Fatal Consequence of India’s Flawed Agriculture System

Aarati Cohly, Environmental Studies, International Relations
Sponsor: Professor Michael Gilligan, Politics

This paper draws attention to the vast economic and environmental issues present in the current food system through the lens of farmer suicides. Through both linear and instrumental variable regression models, the author utilizes India’s 36 state/union territories from the years 2001–2014 as a case study to explain why farmers commit suicide in agrarian economies like India. This paper reveals that an increase in fertilizer consumption leads to an increase in suicide rates. It is plausible that this significant causal relationship between fertilizer and suicides exists because the price of fertilizer, an important input in agriculture, is very high and frequently results in farmer debt, which subsequently leads many farmers to commit suicide. Various other hypotheses that explain this causal relationship are
elaborated on in this paper. In addition, the results of the data analysis suggest that an increase in cash crop production has also resulted in an increase in farmer suicides in India. Lastly, other findings imply that government programs like the Kisan Credit Card Scheme and the National Agriculture Insurance Scheme have been ineffective in alleviating some of the financial stresses that many scholars suggest cause farmer suicides in India.

Putting Out in English Today
Sarah Cook, Linguistics
Sponsor: Professor Chris Barker, Linguistics

Compound words that contain the particle “out” appear to be constructed with no regard for the established rules of English compounding, with prefixation and suffixation happening almost at random. For example, “outtake” and “outreach” and “breakout” should not be two pairs of nouns. This paper examines which variables determine whether “out” will attach as a prefix or suffix to nouns. Curiously, according to the Oxford English Dictionary (OED), “out” may only appear as a prefix in compounds and never as a suffix, but clearly this is no longer the case. Also, according to the OED, most of the words that contain “out” as a suffix have been coined in the United States within the past 200 years. To research this further, the author had workers on Amazon Mechanical Turk attach “out” as either a prefix or suffix to a series of nonsense words in eighteen different contexts. The data suggest that “out” as a nominal suffix is replacing “out” as a nominal prefix in American English. In cases where speakers still prefer to attach “out” as a prefix, the particle usually connotes a competitive meaning, as in “outgun” or “outswim.” In sum, as “out” as a nominal suffix is entering the language, the nominal prefix is becoming obsolete except in cases of competition.

Do Infants Later Diagnosed with Autism Spectrum Disorder Understand the Communicative Function of Speech?
Abril Costanza Lara, Psychology
Sponsor: Professor Athena Vouloumanos, Psychology

Humans use speech to communicate information to others. Six-month-old infants understand the communicative function of speech that may facilitate their language and social development. Individuals with Autism Spectrum Disorder (ASD) show deficits in social interactions and communication, which may originate in infancy from not understanding that speech communicates. This possibility was tested by recording eye movements of 18 12-month-old typically developing (TD) infants and 7 infants later diagnosed with ASD as they watched a video of actors communicating about objects. In the video, a Communicator grasped one of two objects (the target). In the next scene, the Communicator could no longer reach the objects so she vocalized to a Listener using speech. The Listener then grasped the target or the non-target object. TD infants looked marginally longer when the listener grasped the non-target object than when she grasped the target object while infants later diagnosed with ASD did not show this pattern. These differences in looking time suggest that TD infants understand that speech communicates while infants later diagnosed with ASD do not. Therefore, understanding in infancy that speech communicates affects later language and social development and may serve as an early marker of ASD to allow for earlier diagnosis and intervention.

Do Leaders and Non-Leaders Act Differently Based on Personality, Morals and Responsibility?
Abril Costanza Lara, Psychology
Sponsor: Professor Jay van Bavel, Psychology

Many factors affect how people make decisions. People who have a communally oriented personality, a high sense of responsibility and strong moral foundations consider others’ well being when making decisions. Leaders affect the outcomes of others with their decisions. Leaders and non-leaders may act differently based on these measures. This possibility was tested by recording answers of 150 Amazon Mechanical Turk users to the Communal Orientation Scale, Moral Foundations Questionnaire and a responsibility survey and then comparing scores between participants primed with and without leadership. Participants read a narrative about fishing expeditions and distributed the catches among the group-members. Leaders distributed significantly more fish to the other group members than did non-leaders. Communally oriented leaders distributed significantly more fish to others than non-communally oriented leaders while there was no significant difference in distributions among non-leaders who were and were not communally oriented. Leaders and non-leaders showed the same significant pattern wherein those with strong moral foundations distributed more to others than themselves as compared to those with weak moral foundations. Leaders and non-leaders act differently based on individual differences of personality and morality, for example, although leaders act to benefit others more than non-leaders. Organizations can foster situations for leadership as they will act to benefit others more but should consider individual differences as well.

Pills Like White Elephants: Examining Mefloquine’s Role in the Military’s Mental Health Crisis
Daniel Costa-Roberts, Journalism, Politics
Sponsor: Professor Brooke Kroeger, Journalism

For years, the US military dosed soldiers and other personnel with a toxin whose effects on the mind can be
permanent and have been shown to include anxiety, hallucinations, psychosis and powerful, sometimes irresistible, suicidal and homicidal urges. The drug, mefloquine (brand name Lariam), is a cheap, effective anti-malarial that the Department of Defense (DoD) developed in the 1970s and the Food and Drug Administration (FDA) approved in 1989. After September 11, 2001, as American troops were deployed en masse to malarious areas, military doctors wrote hundreds of thousands of mefloquine prescriptions, often without adequate documentation or proper effort to inform soldiers about the drug’s risks. This increased use produced a surge in the number of soldiers who reacted adversely to mefloquine. Greater scrutiny from scientists and in the media made it clear that the drug’s side effects were more numerous and common than the Pentagon and FDA initially acknowledged and that mefloquine toxicity can produce symptoms very similar to those of post-traumatic stress disorder (PTSD) and traumatic brain injury (TBI). A handful of veterans have successfully demonstrated that military doctors misdiagnosed their mefloquine-related injuries as PTSD or TBI. Many more suspect that their diagnoses were similarly erroneous. This raises the possibility that misdiagnoses of mefloquine-induced health issues account for some significant portion of the military’s deluge of cases designated as either PTSD or TBI. The scope of the problem remains unclear, however. The military has declined to release its data on the subject, leaving open the question of whether mefloquine toxicity may be the modern military’s third signature injury after PTSD and TBI.

The Vocation of Funeral Service: Dealing with Death
Jonathan Creem, Sociology
Sponsor: Professor Thomas Ertman, Sociology

The cycle of birth and death is one of few constants in human history. Beginnings are celebrated. Endings are mourned. As a society we generally abstain from discussions of death as a way to ignore the inevitability of loss and our own mortality. However, those employed in the industry of death must face this matter daily. Embalming and preparing bodies, holding wakes and funerals, the clients of funeral service workers are the dead and those grieving their loss. Through a mixed methods approach of observation and informal interviewing, the present study examines the impact of funeral service work on the workers themselves and the coping mechanisms they employ. Consumed by reminders of their own mortality, funeral service workers adapt by using spirituality, humor and emotional regulation. It is the hope of this study to further discussions on the work of death and dying in the field of sociology.

The Palliative Function of Just-World Beliefs in the Presence of Economic Inequality
Ruchita De, Psychology
Sponsor: Professor Eric Knowles, Psychology

Previous research suggests that the belief that the world is a just and fair place, otherwise known as the “Belief in a Just World” (BJW) (Lerner, 1980), helps individuals cope with anxiety, stress and negative life events (Ritter, Benson et al., 1990). More specifically, a high BJW has been associated with reduced expression of negative emotion in the face of some adversity (Dalbert, 1998). The present study investigated whether people high (vs. low) in the BJW display less emotional distress when shown an instance of economic inequality. Participants were shown two video clips involving an interview with either a homeless or a non-homeless individual. Participants with higher scores on BJW displayed less negativity (disgust, anger) toward the system and less (empathy, pity) for the homeless person than did those with lower scores BJW. During the study, each participant had to answer multiple choice interview recall questions, which were intended to verify that they had paid attention to the videos. A post-study analysis of the responses additionally demonstrated that those with higher scores on BJW had less accurate recall of the topics discussed in the homeless condition than those with lower BJW, tending to misremember negative characteristics (i.e., alcoholism) that were not discussed in the interview with a homeless person. These two findings provide support for BJW’s effectiveness as a palliative belief. Furthermore, consistent with the core assumption of BJW that people get what they deserve and deserve what they get, people high in BJW make personal attributions when perceiving individuals whom the economic system appears to fail.

Women’s Empowerment through Quotas: A Study on Gender-Based Electoral Quotas in Sub-Saharan Africa
Loren Dent, International Relations
Sponsor: Professor Michael Gilligan, Politics

What factors lead Sub-Saharan African countries to implement electoral quotas that encourage more women to be elected within their parliaments? Electoral quotas are increasingly being used as a means to empower women across the world. This study focuses on foreign aid and the presence of women’s movements in each country as potential motivators of quota implementation. It is hypothesized that foreign aid and women’s movements will both significantly influence the implementation of quotas, but the impact of aid will be higher. It was found that, when controlling for the fact that aid distribution is not random, aid is not significant in influencing the implementation of quotas. It was also found, however, that the impact of women’s movements on the implementation of quotas

Women’s Empowerment through Quotas: A Study on Gender-Based Electoral Quotas in Sub-Saharan Africa
Loren Dent, International Relations
Sponsor: Professor Michael Gilligan, Politics

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Infants Visually Guide Reaching while Pivoting

Lorraine De Velez, Psychology
Monica Wang, Psychology
Sponsor: Professor Karen Adolph, Psychology

Object prehension requires the coordination of postural, visual and manual systems. Such coordination is especially challenging when body position is continually changing—for example, while the body is pivoting. As the body rotates around, quick visual search is necessary to locate the target and to accurately aim the hand, all while maintaining trunk control and coordinating movements of head, eyes, arm and hand. In previous work, researchers tested reaching while infants’ bodies were stationary. Thus, infants’ ability to relate changes in body position to target location and to coordinate visual, manual and postural systems accordingly is unknown. To test this, 6- to 12-month-old infants wore a head-mounted eye-tracker and sat with their torso unsupported on a motorized chair that pivoted them 360° at slow (35°/sec) and fast speeds (45°/sec) toward a stationary target. Preliminary findings indicate that infants can prehend objects while pivoting. They are more successful at planning the reach (touching the target) than grasp (retrieving the target), and both are related to sitting experience and speed of rotation. The faster infants located and fixated the target, the more successful they were at reaching and grasping. In a comparable study with adults, participants coordinated all actions almost simultaneously. Compared with infants, adults were faster at visually locating the target and more successful at touching and retrieving it, regardless of rotation speed. These findings suggest that coordination among postural, visual and manual systems for reaching while pivoting is present in infancy but is slower and less synchronous compared to adults.

The Gentrifier’s Dilemma: Gentrifiers’ Attitudes towards Neighborhood Change in Bedford-Stuyvesant, Brooklyn

Katie Donnelly, Sociology
Mentor: Professor Iddo Tavory, Sociology

This paper examines the ways in which gentrifiers negotiate tensions between their ideology and their role in neighborhood change. The author conducted in-depth interviews with recent residents in a gentrifying neighborhood in Brooklyn, looking for patterns in rhetorical strategies and narrative techniques employed by interviewees to manage points of conflict. It was found that gentrifiers express ambivalence and feelings of guilt surrounding their presence in the neighborhood. They manage this ambivalence through three main strategies: 1) reframing the process of gentrification as promoting positive liberal values, such as diversity and localism, 2) reframing their personal role in gentrification by distinguishing their behaviors and attitudes from the stereotypical “bad” gentrifier and 3) reframing their personal role in gentrification by displacing responsibility for the process onto another group of actors, such as the government or real estate developers. These results may have broader implications by illuminating how people construct justifications for their complicity in other processes they see as morally questionable, such as unethical consumerism.

Family Planning Knowledge and Use among Women Residing in Refugee Camps in Eastern Democratic Republic of Congo

Florby Dorme, Philosophy
Sponsor: Dr. Nerys Benfield, Division of Family Planning and Women’s Global Health, Montefiore Medical Center

The purpose of this research is to determine how the data analysis of international research plays a role in our ability to bring healthcare into low resource settings. In April 2012, approximately 300 soldiers, former members of the National Congress for the Defence (CNDP), mutinied against the Congolese government, sparking violence and displacement in the form of looting, killing and sexual conflict across the province. The United Nations Higher Commissioner for Refugees (UNHCR) estimates over 2.6 million internally displaced persons in Democratic Republic of Congo (DRC), and the Mugunga camps currently house 22,560 residents. In March 2014, a sample of reproductive-aged women residing in Mugunga I and II refugee camps in North Kivu, DRC, were recruited by independent researchers to participate in a study about reproductive health. The survey of reproductive-aged women displaced by conflict and residing in refugee camps in Eastern DRC aimed to describe their family planning awareness and needs. Individually, verbally administered surveys assessed obstetrical history including induced abortion and family planning knowledge, interest and prior use. The goals of this project included using analytical skills to inspect, investigate and reconcile the descriptive statistics from this study to inform the development of a family planning program and improve contraceptive access for this highly vulnerable group of women.
Gender Variance among Youth with Autism Spectrum Disorders: A Retrospective Chart Review
Christina Duncan, Psychology
Howard Huang, Psychology
Sponsor: Professor Aron Janssen, Child and Adolescent Psychiatry, NYU School of Medicine

Clinical evidence suggests an overrepresentation of gender variance (GV) among children and adolescents diagnosed with Autism Spectrum Disorders (ASD’s). Few large-scale, systematic studies have examined the co-occurrence of ASD’s and GV. The present study compared the rates of parent-reported GV among children and adolescents diagnosed with ASD’s (n=492) to those of a normative, non-referred sample (n=1,605). Parent-reported GV was determined through endorsement of item 110 (“wishes to be the opposite sex”) on the Child Behavior Checklist (CBCL). The hypothesis was tested that the ASD’s group would have higher rates of GV compared to the non-referred control group. About 5.1% of the ASD’s group expressed GV as compared to 0.7% of the normative sample. Odds Ratio calculation revealed that individuals in the ASD’s group were 7.76 times more likely to express GV than the CBCL normative sample, which was statistically significant (p<.001). Results of the present study support previous findings. Researchers are encouraged to further explore this co-occurrence as well as gender development among children and adolescents diagnosed with ASD’s. Clinicians working with ASD’s or gender nonconforming patients should be aware of this co-occurrence while assessing and treating these individuals.

“Biological Joyriding”: American Feminists and the Pursuit of Reproductive Control
Margaret Eby, Global Public Health/Sociology
Sponsor: Professor Iddo Tavory, Sociology

This research on feminism and the eugenics movement is rooted in the seemingly paradoxical involvement of the birth control movement in eugenics. The author researched the birth control movement itself, the public lives and personal evolution of its leaders, the demographics of the eugenics movement and the currents through which its messages were carried. It was found that the transition of thought among feminists from birth control as a “for us” movement to a “to them” mandate occurred during the interwar period, when social concerns about the future of the nation and the power of bodily autonomy resulted in widespread support for sterilizations that seemed to “solve” for various parties’ issues of multiculturalism, immigration, disability rights and hereditary “degeneracy.” The dovetail of pseudo-scientific advancement with contemporary socio-cultural tensions created a resonance that could be observed in other modern moral crusades that evolve from a public health mission into selective policing.
Faced with Faces: Do Infants at High and Low Risk for Autism Spectrum Disorder Look at Human and Monkey Faces Differently?
Rebecca Elbogen, Psychology
Sponsor: Professor Athena Vouloumanos, Psychology

Typically developing human infants attend to human faces and eyes early in life, which helps them develop mutual gaze and other social skills. Children who pay less attention to faces and eyes, like those with autism spectrum disorder (ASD), show more social disability. But do children with ASD turn away from all faces and eyes, or specifically human faces and eyes? Furthermore, how early does this face and eye aversion appear? To investigate these questions, side-by-side images of human and monkey faces were presented to 9- and 12-month-old high-risk infants (the younger siblings of children diagnosed with ASD) and typically developing low-risk infants. A remote eye-tracker calculated looking time to specific areas of interest: human face and eyes, and monkey face and eyes. Both the high- and low-risk groups attended to monkey faces slightly more than to human faces. The results show that 9- and 12-month-old high- and low-risk infants do not differ significantly in looking behavior to primate faces and eyes. Further research is needed to clarify these unexpected results. Perhaps the two risk groups differ in their motivation for attending to monkey faces with the low-risk group attracted to their novelty and the high-risk group attracted to the decreased social stimulation compared to human faces. The author plans to compare pupil dilation as a measure of emotional and autonomic arousal to better understand potential differences in how infants process faces.

Towards a Total Ban on Transshipment At-Sea
Christopher Ewell, Environmental Studies, International Relations
Sponsor: Professor Jennifer Jacquet, Environmental Studies

Regional Fisheries Management Organizations (RFMOs) and conservation groups have raised concerns over the laundering of catch from illegal, unreported and unregulated (IUU) fishing vessels into the seafood supply chain via transshipments at-sea. This practice allows fishing vessels to evade most monitoring and enforcement measures, offload their cargo and resume fishing without returning to port. Moreover, transshipment at-sea simultaneously facilitates the trafficking and exploitation of fishermen who are trapped and abused on fishing vessels for months or even years. In the face of severe overexploitation of global fisheries and growing recognition of human rights abuse in the seafood industry, an integrated social and environmental approach to high-seas fisheries policy is necessary. This study evaluates 17 RFMOs globally to assess where illegal transshipments at-sea are likely to facilitate both IUU fishing and human trafficking, the stringency of transshipment at-sea regulations across RFMOs and the effectiveness of implementing rigorous regulations in reducing unreported fishing. The results indicate that the likelihood of illegal transshipments at-sea contributing to both IUU fishing and human trafficking is higher in six RFMOs that mainly operate in the southern hemisphere. Transshipment at-sea regulations have become stricter across RFMOs since the late 1990s, and the data show a significant effect of increasing stringency on reducing unreported fishing across all RFMOs. The effectiveness of regulation in reducing unreported fishing increases with the number of vessels for which transshipment at-sea is completely prohibited. The most significant effect of regulations on reducing unreported fishing is evident in the South East Atlantic Fisheries Organization where transshipment at-sea has been banned for all vessels since 2006. These results suggest that a ban on transshipment at-sea in all RFMOs would support the ability of enforcement agencies to detect IUU fishing activities and help ensure that human trafficking does not occur at sea on legal fishing vessels.

High-Quality Prenatal Controls in Rural Colombia: Do Transportation Costs Matter?
Andres Felipe Fajardo Ramirez, Economics, Philosophy
Sponsor: Professor Christopher Flinn, Economics

This paper studies whether transportation costs constitute a significant barrier to accessing prenatal care visits. The focus of the study is people who live in municipalities in the Andean region of Colombia and who must travel to another municipality in order to attend a prenatal visit. The paper has two parts. In the first part, the effect of transportation costs on the utilization of prenatal visits is estimated by performing an OLS regression analysis of two linear models. Distance from municipality of residence to the nearest municipality that has a Level 2 (or higher) hospital is used as a proxy for transportation costs, and average number of years of schooling of the mothers in a municipality is used as a proxy for income. The estimated effect of distance on the average number of prenatal visits in a municipality is somewhat low, and the models account for around 20% of the variation in the average number of prenatal visits. The results suggest that there may be an omitted variable bias. In the second part, the sample of observations is divided in subgroups that correspond to six distinct intervals for distance. Three prenatal visits deprivation indices are calculated for each subgroup using the Foster-Greere-Thorbecke family of poverty measures. The results show that the incidence, depth and severity of prenatal visits deprivation is unambiguously higher for the subgroups that are farther away from a municipality with a Level 2 (or higher) hospital. The evidence provided,
however, fails to show that the effect works through the influence of transportation costs.

**State Policy Effect on Electric Vehicle Sales**
*Jingyu Fan, Economics, Mathematics*
*Sponsor: Professor Boyan Jovanovic, Economics; Professor Konrad Menzel, Economics*

In threat of environmental devastation, inducing and maintaining a smooth transition to an economy driven by clean technology is an essential contemporary problem. This industry revolution is particularly contingent on government policy support. Aiming at designing an optimal government policy package, this research combines the fundamental methods of macro- and microeconomics to construct an abstract model that simulates the function of both a static economy and its dynamical evolution over time with an emphasis on the contributions of both dirty and clean energy to the economic growth. By incorporating policy factors to the basic model, such as subsidy, carbon tax and research funds, their combined effect on changing the firms’ choices between dirty and clean energy production at equilibrium is analyzed. Different policy portfolios are examined and compared, and the changes to the equilibrium condition are evaluated. Empirical data will be utilized to test the model’s reliability in explaining policy effect on clean energy transition and for further modification.

**Effects of Restricted Movement on Infant Walking**
*Sara Fernandes, Psychology*
*David Lin, Psychology*
*Sponsor: Professor Karen Adolph, Psychology*

Does restricted movement impair infant walking? Previous research showed that exercise facilitates infant motor skill acquisition and restriction impedes it. However, studies of restraint are confounded with social deprivation. A traditional cradling practice in Central Asia presents a unique opportunity to study physical restriction without social deprivation. Infants are bound in the cradle but cared for by parents and siblings. Previous findings showed a dose-response effect of constraint: longer daily durations of cradling were associated with fewer postural and locomotor skills in infants’ repertoires. Here, the authors investigated whether cradling affects walking proficiency and spontaneous locomotion. 43 16- to 24-month-old Tajik infants were observed in a standard gait task and during free play in their homes. Findings show a negative correlation between cradling hours and gait: more cradling is associated with slower walking speeds and shorter step lengths—characteristics of immature gait. Further analyses will examine whether cradling is also related to the amount and variety of spontaneous walking during free play and whether infants with more mature gait produce more spontaneous walking.

Findings from this study provide new insights into the role of early experience on infant motor skill acquisition by examining the effects of physical restriction on infant development.

**An Assessment of the Politicization of Trafficking in Persons Report Rankings**
*Alyson Marie Ferro, Journalism, Politics*
*Sponsors: Professor Oeindrila Dube, Politics; Professor Nathaniel Beck, Politics*

This project examines the reliability of the State Department’s Trafficking in Persons (TIP) Report, which ranks governments based on their efforts to fight human trafficking, following allegations that rankings were politicized by US foreign policy concerns. The author explores the impact of US-country foreign policy relations on country rankings and hypothesizes that foreign policy impacts TIP Report rankings. A cross-national statistical analysis of a sample of 190 countries from 2001–2015 was conducted, pulling in international and national human trafficking data indices, foreign policy measures and development and socioeconomic indicators. By using a fixed effects estimation, it was found that foreign trade has a significant effect on rankings. As US foreign trade with a country increases, rankings improve. This is consistent with the author’s hypothesis that rankings are politicized. This finding is directly policy-relevant in light of ongoing legislation that aims to improve TIP Report processes.

**A Polarized Constituency: The Role of Emotional Allegiance and Antagonism in a Chavista Venezuela**
*Biddy Fraga, Politics*
*Sponsor: Professor Michael Gilligan, Politics*

Why do some Venezuelan citizens still support the Chavista government in Venezuela despite its negative policy outcomes? Founded by deceased former President Hugo Chávez and currently sustained under the leadership of President Nicolás Maduro, the seventeen-year incumbency of the Chavista party has caused a multitude of fiscal problems that permeate into every aspect of daily life. Although approval ratings suggest that the population is mostly against the government, there still exists polarization within the Venezuelan constituency between Chávez supporters and the opposition. Building on previous literature that argues that Venezuelans supported Chávez on the basis of hope and a low perceived share of governmental responsibility in negative events, this project tests the hypothesis that emotional allegiance to Chávez accounts for his sustained winning coalition. Further, it tests whether Chávez supporters hold the government accountable for socio-economic issues that are the direct result of the Chavista government’s policies. Through an original
survey experiment and subsequent quantitative analysis, it was found that Chávez supporters do hold the government accountable for the country’s hyperinflation and crime rates, yet blame the current president for bad policy outcomes. It was also found that exposure to partisan stimuli regarding Chávez, whether in favor of or against him, causes negative reactions in anti-Chávez respondents and virtually no reaction in pro-Chávez respondents.

Risk Perception and the Decision to Purchase Flood Insurance: Evidence from Coastal Communities in the Northeastern United States

Bhargavi Ganesh, Economics
Sponsors: Professor Eric Klinenberg, Sociology; Professor Christopher Flinn, Economics

With recent catastrophic events like Hurricane Sandy, government and community members are considering the ways that flood insurance coverage and implementation can be improved to adequately mitigate flood risk and damage. Literature on this topic notes that the shortcomings in flood insurance policy come from a failure to communicate risk, encourage enrollment and manage affordability. This study addresses the issue of flood insurance enrollment in coastal properties in the Northeastern United States. A theoretical framework was constructed based on the expected utility model to understand the impact of risk preferences, price and expected flood damage on the decision to take up flood insurance. Qualitative data was collected in the form of interviews and surveys in order to investigate the behavioral aspect of risk assessment. Surveys indicated that the lack of clear flood risk information and the reliance on past storm history to determine present risk has contributed to under-insurance. The paper also uses empirical estimation to determine which factors are most significant in influencing the demand for flood insurance at the county level. The dataset used for analysis contains coastal flood insurance claims from 1980–2007. Results from the empirical study support previous literature indicating that income and past storm history positively impact the decision to enroll. The positive relationship between premiums and enrollment, however, deviates from economic theory suggesting that higher prices would lower the demand for insurance. This finding, that individuals use price as a risk signal, shows that government policies must carefully consider pricing structures to ensure that coastal residents are fully aware of their risk exposure.

IMF Conditionality and State Capacity

Christina Gay, International Relations
Sponsor: Professor B. Peter Rosendorff, Politics

Countries applying for loans from the IMF agree to terms of conditionality. Conditionality in its broad sense covers both the design of IMF-supported programs, the macroeconomic and structural policies as well as the specific tools used to monitor progress toward the goals outlined by the country in cooperation with the IMF. While the IMF claims these conditionality programs are meant to ensure repayment and promote economic growth, these conditions often reflect the interests of major stakeholders in the fund rather than the interests of the host country. It is here argued that the strict austerity measures and fiscal reforms often included in IMF programs increase reliance on indirect taxation and nontax revenue as already weak states agree to tax reforms they do not have the administrative capacity to implement. Evidence is provided that IMF conditionality programs have a deleterious effect on overall state capacity and that this effect is even stronger on non-democratic countries.

Effects of Self-Esteem upon the Interpretation of Supportive Messages from a Romantic Partner

Alexa Geltzeiler, Psychology
Sponsor: Professor Patrick Shrout, Psychology

This study examines the relationship between self-esteem, timing of emotional support and perceived “responsiveness” of a romantic partner. Cohabitating couples took on the roles of support provider and recipient in order to investigate the conditions under which emotional support may be beneficial to a relationship or detrimental. Support timing was experimentally manipulated by delivering emotional supportive messages to the support recipient after either positive or negative feedback was given by the research team on computer-based cognitive tasks. At this point in time, the collected data are not sufficient to draw significant conclusions, but data will continue to be collected to advance this study. It is expected that participants who receive support after positive feedback will rate their partners as more responsive than those who receive support following negative feedback and that individuals with high self-esteem will rate their partners as more responsive than do those with low self-esteem. It is expected that low self-esteem individuals will rate their partners as less responsive when support comes after negative feedback but that this difference will be minimal in high self-esteem individuals. If true, this would demonstrate that high-self-esteem can be protective against hostility following emotional support. This study may provide the basis for improved methods of couples therapy, including but not limited to everyday support and stress reduction, coping techniques and supportive methods for dealing with injury, illness, bereavement and other trauma.
A Selectorate Approach to Inequality and Leader Survival in Africa
Matthew Glaser, Politics
Sponsor: Professor Bruce Bueno de Mesquita, Politics

What determines leader tenure? What determines political stability? Does inequality affect leader tenure? Selectorate Theory, a theory of selection institutions, has been used to explore what determines leader tenure and political stability. This study incorporates inequality into Selectorate Theory and investigates whether inequality (using GINI coefficients) and winning coalition size have average and heterogeneous effects on the likelihood of leader turnover in Africa. The theory suggests that leader turnover in Africa should be less likely when coalition size is small and when the level of inequality is high. Increases in inequality should also dampen the effect that increases in coalition size have on the likelihood of leader turnover. Ordinary Least Squares and Ordinary Logit regression analysis were used to test these claims. Overall, it was concluded that impact of coalition size is significant and consistent with the theory but that the impact of inequality is insignificant and unclear. However, a lot of data for gross inequality is missing, and more missing inequality data is consistent with the theory but that the impact of inequality is significant and unclear. However, a lot of data for gross inequality is missing, and more missing inequality data is correlated to decreases in the likelihood of turnover. There may be an endogeneity problem with the data that makes the results from gross inequality misleading.

A Cross-National Comparison of Sexual Risk and Health Behaviors among Gay, Bisexual and Other Men Who Have Sex with Men Who Use Geosocial-Networking Smartphone Applications
William C. Goedel, Global Public Health/Sociology
Sponsor: Professor Dustin T. Duncan, Population Health, NYU School of Medicine

Geosocial-networking smartphone apps, which connect users based on their physical proximity, are commonly used by men who have sex with men (MSM) to meet sexual partners, particularly in urban settings. The purpose of the current study is to compare the prevalence of health and risk behaviors among a sample of HIV-uninfected MSM who use apps in New York City and London (n = 330). Broadcast advertisements, which encouraged participants to complete web-based surveys, were placed on a popular smartphone application used by MSM in New York City and London. These surveys assessed recent sexual behaviors, recent substance use, HIV testing patterns and awareness of and willingness to use pre-exposure prophylaxis (PrEP). Differences in health and risk behaviors by city were assessed using chi-square tests of independence. Samples of MSM from New York City and London were comparable with regard to condomless sexual behaviors, HIV testing rates and awareness of and willingness to use PrEP. However, MSM in London were older and more likely to have used ecstasy, inhalant nitrates and methamphetamine in the preceding month (p < .05). Despite the common partner selection context of a smartphone application in both cities, behavioral differences were found and must be accounted for in creating targeted risk reduction interventions.

The Effect of State Earned Income Tax Credits on Poverty
Brian Gottlieb, Political Science
Sponsor: Professor Nathaniel Beck, Politics

The federal earned income tax credit (EITC) is the largest anti-poverty program for the non-elderly in the United States. Twenty-six states and Washington D.C. have enacted state-level EITCs at varying percentages of the federal tax credit. It is unclear as to whether state-level EITCs are an effective means of combating poverty at the state level. In order to assess the effectiveness of state-level EITCs at reducing poverty, this paper conducts analyses with state poverty rates as the dependent variable and state-level EITCs as the independent variable. This paper hypothesizes that poverty will only be significantly reduced in states with a state-level EITC of twenty percent or greater. An analysis of the effects of state-level EITCs as a whole at reducing poverty reveals that while state-level EITCs are associated with a reduction in state poverty rates, this reduction is not statistically significant. This paper also analyzes the effects of state-level EITCs on poverty in the states with the largest state-level EITC programs through a synthetic control research design. This synthetic control analysis allows for an estimation of how effective states with state-level EITCs have been at altering the trajectory of their poverty rates.
The result of this synthetic control analysis indicates that states with a state-level EITC of 20% or greater are associated with a statistically significant reduction in poverty in these states. The implications of this paper’s findings is that state-level EITCs of 20% or greater seem to be an effective means of combating poverty at the state level. The results of this study suggest that states seeking to decrease their poverty rates should consider implementing a state-level EITC of at least 20%.

**Construal Level Theory, Visual Attention and Self-Control**

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

Studies have found that visual attention can exacerbate the temptation of desired goods: increased visual attention to an object increases temptation for an object one has a predisposition towards (Carter and Tiffany, 1999; Sayette, Martin et al., 2001). Construal level theory research has also found ways to combat temptations and reduce the pull they have: thinking with an abstract mindset positively influences adherence to abstract or long-term goals (Fujita, Trope et al., 2006). The present research hopes to determine if an abstract mindset will influence visual attention, and, in turn, if visual attention will influence the choice between healthy and unhealthy foods. Understanding the role of visual attention and mindsets during self-control will provide insight into how people overcome temptation and make healthy decisions. Participants, recruited from the general public of New York City, were primed for an abstract or concrete mindset and asked to make choices between pictures of healthy and unhealthy foods as a measure of self-control, while their visual attention was being monitored through eye tracking software. They were then asked about their food preferences and their health or dieting goals to establish whether the food choices did in fact represent self-control decisions. Unfortunately, a correlation between mindset and visual attention was not found. In other words, an abstract mindset did not direct visual attention to healthy foods, and a concrete mindset did not direct visual attention to unhealthy foods. The previously established relationships between mindset and self-control and visual attention and self-control were seen. While more power may yield hypothesis-confirming results, it might be that mindset does not work through or with visual attention in self-control decisions.

**Housing, Stock and Asset Pricing**

*Xiaojun Guan, Economics and Mathematics*
*Sponsor: Professor Boyan Jovanovic, Economics*

This paper is motivated by the observation that housing has become less affordable in most major cities in China such as Beijing, Shanghai and Shenzhen, as home price has been rising at a much higher rate than the growth rate of income. In this paper the author derived a partial equilibrium model that distinguishes only two types of households: rich and poor. After solving the household problem and market equilibrium price and quantities of housing consumed, a formula for Price-to-Income Ratio was derived. It shows that there is a positive correlation between income inequality and Price-to-Income Ratio. If income inequality becomes worse in a given city, housing tends to become less affordable for the poor. For empirical testing of the model, the ratio between average income and minimum monthly wage in 25 major cities in China was used as a measure of income inequality. Moreover, in order to control for the effect of differences in cost of living in different cities on Price-to-Income Ratio, the regression model used also includes Living Cost Index as a control variable. The data show that there is indeed a positive correlation like the model predicts.

**Casual Criminality: Fake IDs and the New York College Student**

*Elizabeth Gurdus, Dramatic Literature, Journalism*
*Sponsor: Professor Brooke Kroeger, Journalism*

Thousands of underage New York City college students are buying costly, sophisticated fake identification cards (IDs) to be able to gain entry to the city’s teeming nightlife. For incoming city students, the commodity is as common on college shopping lists as twin bed sheets. Fake IDs often take the form of falsified driver’s licenses from states with “easy-to-fake” templates, such as Rhode Island or Virginia, typically supplied by friends of friends who facilitate purchase or on contraband websites. International students are known to use fake foreign identification cards or driver’s licenses, sometimes obtained from corrupt employees in the licensing offices of their home countries. Being caught can result in felony charges—or, for foreign students, deportation—but citywide enforcement remains lax: clubs and bars want more customers, clever fakes encrypted to scan often fool scanners that bouncers now deploy and the consistent priority of the NYPD’s document fraud operation is illegal immigration. This research provides an insider’s look at an effectively condoned, largely unregulated criminal practice in New York City that involves students, bars, restaurants, clubs, police and the courts.
Yu Qi Han, Economics, Politics
Sponsors: Professor Nathaniel Beck, Politics; Professor Oeindrila Dube, Politics; Professor Howard Rosenthal, Politics

Did the 2008 financial crisis cause an increase in Political Action Committee (PAC) campaign contributions to more extreme conservatives due to asymmetric polarization in the United States? This study uses DW-NOMINATE score and election cycle fixed effect regression analysis to bridge the gap between empirical analysis and the previously held belief that following the financial crisis, there was an increase in contributions toward the right-wing conservatives in the United States. It was found that firstly, extreme candidates received less campaign contributions compared to the other candidates before 2008, but there was no significant change in their tendency to receive less after 2008. Secondly, extreme liberal candidates received less than moderate liberals, and this tendency is reinforced after 2008. Thirdly, the tendency of moderate liberal candidates to receive more (than moderate conservatives) also increased after 2008. The finding indicates that contrary to previous beliefs political polarization after financial crises does not lead to an increase in the campaign contribution toward extremely conservative candidates. Instead, financial crises seems to bring campaign contribution more to the “middle” than to the “right.”

The Calibration of Persistence under Stress
Danielle B. Hazeltine, Psychology
Sponsors: Karolina M. Lempert, Psychology; Professor Liz Phelps, Psychology

Although people may want to wait for future rewards, they often quit before they attain them. This decision to quit is not always irrational because there are some situations in which a reward is not worth the wait. For example, someone who has been waiting for a subway train for ten minutes should most likely keep waiting, but if they have been waiting for an hour, they should give up waiting because the train might not come for a very long time. People often make these kinds of decisions while under stress in daily life. This research tested how acute stress affects people’s ability to wait for future rewards in different task environments in which waiting is more or less optimal. Half the participants performed a task in which persistence was optimal (high-persistence), either after an acute stressor or no stress. The other half performed a task in which it was optimal to quit waiting for a reward soon after each trial began (low-persistence), either under stress or no stress. It was found that stress did not affect waiting times for rewards in either environment. Among the stressed participants, however, controlling for baseline cortisol, the cortisol response to stress predicted better performance under stress (less waiting in the low-persistence condition, more waiting in the high-persistence condition). These findings suggest that an increased stress hormone response after stress predicts more optimal decisions about persisting for rewards.

To Sign or Not to Sign? An Analysis of Bilateral Investment Treaties in Latin America
Annika Heumann, Economics, Politics
Sponsor: Professor Nathaniel Beck, Politics

This project investigates the dual effects of bilateral investment treaties (BITs). BITs are international agreements between two countries—typically a developed country and a developing country—that are formulated to help the developing country attract foreign direct investment (FDI). By design, these treaties impose both costs
and benefits upon signatories: they promise increased flows of FDI but at the cost of significant restraints on the signatory’s sovereignty. Why, then, do leaders sign these treaties? More specifically, under what circumstances do leaders sign bilateral investment treaties? This research seeks to answer these questions. To do so, three factors hypothesized to have an effect on a leader’s propensity to sign a BIT were examined: political ideology, tenure and endowments of natural resources. The author observed 18 countries in Latin America from 1965–2015 and employed panel-data regression analysis to test these different factors. Evidence was found that right-leaning leaders sign more treaties than their left-leaning counterparts. Additionally, it was found that the longer the leader’s party has been in office, the fewer BITs they will sign. Lastly, it was found that natural resource endowments have a statistically significant effect upon a leader’s propensity to sign a BIT. The direction of this effect, however, is dependent upon the scarcity of the resource.

Male Suicide Rates in Japan
Amanda Hua, Economics
Sponsor: Professor Andrew Paizis, Economics

This paper measures the effects of alcohol consumption, unemployment rate, percentage of workers in agriculture and proportion aged over 65 among the prefectoral populations on suicide rates per prefecture through a least squares model. The regression results found that the unemployment rate and proportion aged over 65 are significant variables positively related with suicide rates, while alcohol consumption and percentage of workers in agriculture were important indicators that were not statistically significant at the 5% level. Traditionally, the elderly were more likely to commit suicide. However, recent media attention on the subject has shifted focus to the younger generation (particularly students), with suicide as the leading cause of death among males aged 15–39. As such, the author initially posited that the proportion aged over 65 variable would be negatively correlated with suicide rates. However, the regression results seem to suggest that among males, the older age bracket (65+) is still the largest at risk group for committing suicide. This suggests that suicides are still largely committed by the elderly but does not necessarily discount the media attention to students and young male adults: the regression results reflect Japan’s aging population and thus the greater proportion of elderly in the population to begin with, not necessarily a continuing trend of the elderly committing suicide.
Cherry Picking: Definitions and Experiences of Virginity Loss among Homosexual and Heterosexual Young Men
Howard Huang, Psychology
Sponsor: Professor Aron Janssen, Child and Adolescent Psychiatry, NYU School of Medicine

Current literature has seldom investigated virginity loss definitions (i.e., what behaviors would facilitate transition from virgin to non-virgin status) and experiences among sexual minority youths. The present paper tested two hypotheses: 1) homosexual men would differ from heterosexual men in what sexual behaviors they consider to be constitutive of virginity loss and 2) homosexual men would experience virginity loss more negatively than heterosexual men. 251 cisgender men were recruited from New York City. They were between ages 18–23, have lost their virginity and self-identified as either strictly homosexual (137, 54.6%) or strictly heterosexual (114, 45.4%). Participants responded to an anonymous online survey, which featured a list of male-male (MM) sexual behaviors and a list of male-female (MF) sexual behaviors. They were also asked to respond to the First Coital Affective Reaction Scale (FCARS). Multiple Marginal Independence test (Agresti and Liu, 1999) revealed that homosexual men were more likely to endorse MM Anal Reception (i.e., bottoming; OR = 4.98, 95CI [2.80 – 8.87]) and MF Anal Penetration (OR = 2.88, 95CI [1.68 – 4.94]) as constitutive of virginity loss. Multivariate analyses revealed that homosexual men scored significantly higher on items assessing Sorrowness and Embarrassment. The present paper only provides rudimentary evidence, and future researchers are encouraged to explore virginity loss definitions among other sexual minority populations. Results from the FCARS analyses should be interpreted with caution as there were significant issues regarding its internal reliability among homosexual participants.

A 15-Year Review of Trends in Representation of Female Subjects in Islamic Bioethics
Zeenat Hussain, Anthropology
Sponsor: Professor Naveed Hussain, Neurology, University of Connecticut School of Medicine

There has been increased interest in Islamic bioethics in the twenty-first century, but gender representation or bias has not been studied. The aim of this study was to analyze the trends in representation of female subjects in Islamic bioethics research. A search was done in PubMed (National Library of Medicine) for years 2000–2014 using key words “Ethics” “Islam” or “Islamic” or “Muslim.” Publications were reviewed by two independent reviewers, and information was abstracted using a data collection form. Descriptive analyses of abstracted information were performed. In the 487 publications related to Islamic ethics found on PubMed over the last 15 years (2000–2014) there was a temporal trend in increasing publications (R2 0.90; p< 0.0001). Human subjects’ research (64 papers over 15 years) also showed a positive trend (R2 –0.76; p < 0.05). Female subjects were well represented (57% from Muslim-majority; 49% from non-Muslim majority countries). There was a significant increase in the percentage of female subjects from Muslim majority countries over the past 15 years (R2 0.17; p=0.0168). Women were well represented in Islamic bioethics research studies from all regions of the world in both gender and non-gender focused studies with increasing participation trends from Muslim majority countries.

Why Do Infants Move? Locomotor Exploration Is Not Destination Directed
Siffat Islam, Psychology
Sinclaire O’Grady, Psychology
Sponsor: Professor Karen Adolph, Psychology

Researchers have long held the commonsense view that infants crawl or walk to reach distant destinations observed from a stationary position. To test this theory, 12-month-old infants (8 crawlers, 9 walkers) were observed in a laboratory playroom for 5–17 minutes. Infants wore a head-mounted eye tracker to record their gaze. From video, the authors first identified bouts of locomotion and the number of steps per bout. The authors then scored the destinations of these bouts—whether they ended at a person, place or object—and recorded whether infants fixated the destination prior to the onset of the bout. Destination-driven locomotion was rare: 19.35% of bouts. Moreover, cumulative survivor distributions of the pauses between bouts closely fit a negative exponential curve for both crawling (R2=.97) and walking (R2=.96) infants, indicating that infants are just as likely to start moving after short pauses (2 seconds) as after stopping for longer periods (2 minutes). Furthermore, when infants traveled to destinations, they were just as likely to fixate and travel to nearby goals (<4 steps, M = 66.6%) as to distant goals (>4 steps, M = 60.6%), F(1, 14) = .754, p = .400. However, both walking and crawling infants in a crawling posture are more likely to engage in destination directed locomotion than when in a walking posture, F(1, 13) = 8.962, p = .010. Despite fewer crawling bouts overall, these findings suggest that the costs of crawling mandate a destination. It is proposed that infants’ locomotor exploration is not primarily directed toward distant targets that are viewed while stationary. Rather, the exploring infant looks more like a wind up toy. Although infants can engage in destination-directed locomotion, they are more likely to start moving with no destination in mind and then happen upon interesting targets serendipitously over the course of their travels.
Is Morality Contagious? Contagion of the Moral Emotions in the Sociopolitical Sphere
Mikaela Kane, Sociology
Sponsor: Professor William Brady, Psychology

Morality is an inherently social phenomenon, yet remarkably little research has tested how social networks influence moral judgment. This study examines one process by which social networks may influence moral beliefs through interpersonal transfer of emotions, a process called “moral contagion.” In an online study (N = 60), the author examined how the spread of messages related to gun control through social networks on Twitter may be affected by morality and emotion. Tweets were categorized into four groups: moral emotional, non-moral emotional, moral non-emotional and non-moral non-emotional. It was observed that moral emotional tweets were significantly more likely to be retweeted than any other category, as determined by self-report of participant’s intentions to retweet each message type. It was also demonstrated that this effect was moderated by group affiliation defined as political ideology: tweets in the moral emotional category were only associated with higher intended retweets when the message was in line with the user’s political ideology. These data suggest that emotion may be a key process that determines when and how morality spreads through social networks but that this contagion may only occur within and not between in-group networks. These data provide a new framework for understanding how moral beliefs evolve based on influence of social networks and provide initial evidence of the processes that may catalyze people toward moral action.

Implications of Task Difficulty and Distance Perception on Task Engagement
Mariasofia Katsikoumbas, Psychology
Sponsors: Professor Emily Balcetis, Psychology

It is known that goal proximity determines individuals’ likelihood of goal pursuit and related exertion (Hull, 1934; Dollard and Miller, 1950; Heilizer, 1977; Kivetz et al., 2006). Research has also indicated that perceived distances to targets are influenced by psychological and physiological factors (Bhalla and Proffitt, 1999; Cole, Balcetis et al., 2013). The relationship between perceived distance and energization is well established, but what role, if any, does perceived difficulty play in task engagement? This study explores the relationship between perceived task distance, difficulty and energy through experiments run with 180 New York University student participants. Perceptions of task difficulty were manipulated by providing participants with false feedback about their performance on a practice task. Then students were asked how far away they thought the goal was in order to assess how perceptions of difficulty and distance influence task engagement. It was found that participants were most eager, ready, motivated and energized to complete the task when the goal felt both close and easy enough to complete.

Decoding Fed Talk: Assessing the Influence of Macroeconomic Indicators on Federal Open Market Committee Discussions
Isabelle Klinghoffer, History, Politics
Sponsors: Professor Nathaniel Beck, Politics; Professor Oeindrila Dube, Politics

This study applies natural language processing techniques to Federal Open Market Committee (FOMC) minutes and transcripts from 1994–2010 to analyze the transparency of FOMC communications and to evaluate the influence of 10 macroeconomic indicators on committee discussions. The author uses Latent Dirichlet Allocation (LDA) among other text mining techniques to track the representation of 8 economic themes across FOMC minutes and transcripts over a period of 17 years. First, thematic variation reveals that FOMC minutes do not demonstrate complete translational transparency with regards to their transcripts. Second, the themes reveal that FOMC transcripts have more significant relationships with the tracked macroeconomic indicators than do minutes. Third, National Bureau of Economic Research (NBER) recognized economic recessions are shown to influence the reliance of FOMC minutes and transcripts on macroeconomic indicators to varying degrees, depending on the macroeconomic indicator in question.

Stereotype Threat and College Membership
Drew A. Kogon, History, Psychology
Sponsors: Christina Crosby, Psychology; Professor Joshua Aronson, Applied Psychology, Steinhardt School of Culture, Education and Human Development; Professor James Uleman, Psychology

Past research on stereotype threat has indicated that academic performance suffers when a student feels stigmatized. However, this work has focused on more globally stigmatized identities (e.g., women and racial minorities). This study explored whether this effect holds for more locally stigmatized groups. Participants were recruited from several colleges within New York University, including Liberal Studies, a stigmatized college within NYU. Participants completed two sets of anagrams and, in line with previous stereotype threat research, were led to believe that the task was either diagnostic or not diagnostic of their academic ability. Their performance and their self-esteem were then measured as it related to their respective college. It was found that Liberal Studies students performed significantly worse than students from other colleges in both conditions. Given there was no difference in performance for Liberal Studies students in the threat and non-threat
Xenophobia in the 2016 Presidential Election: Explaining the Rise of Donald Trump
Jessie Ann Kohlman, Politics
Sponsor: Professor Michael Gilligan, Politics

Although far from over, the 2016 American presidential primaries have proven to be chaotic and historic. Most shocking is the campaign of Donald Trump, a businessman, whose current status as the Republican nominee frontrunner is unprecedented. This study aims to explain the “Trump Phenomenon” by defining the correlating characteristics and overarching political motivators of Americans who currently support him. This paper builds on research regarding the resurgence of Right-Wing Populism in Western Europe, which delineates three common catalysts for support for these movements as anti-immigration jargon, general economic dissatisfaction and feelings of political alienation. By comparing Mr. Trump’s candidacy to both the historical and current fascist movements in Europe, this study aims to highlight that the current extreme rightist movement being observed in the Republican primary race is not a uniquely American phenomenon and that the strongest mobilizing voter preference among Americans who currently support him. This paper builds on research regarding the emergence of Right-Wing Populism in Western Europe, which delineates three common catalysts for support for these movements as anti-immigration jargon, general economic dissatisfaction and feelings of political alienation.

Exploring through the Lenses of Children
Emily Koo, Anthropology, East Asian Studies
Sponsor: Professor Bambi Schieffelin, Anthropology

Although the lives of urban children are predominantly determined by adults, children have their own ways of perceiving their lives, their interests and things of importance. This visual and ethnographic project seeks to understand what matters to children reflexively, based on children’s own visual, verbal and written voices. When given the opportunity to participate in photographic activities, how do children convey what matters? What do they define and delimit as topics of importance? How do children perceive the world around them as shown in their representations of it? Across a series of eight weekly photography workshops, participating children wrote about and discussed the photos they took each week based on weekly themes. By analyzing the children’s photography, their written narrations of the photos and the ways they discussed their work (both in group and one-on-one settings), this project identifies what children believe to be important in their visual representations. This data also makes known how children think through and translate their ideas into images, how children take ownership of photography as a skill and a medium and how children utilize relevant vocabulary to articulate their thoughts and critiques of their own work and the photos of their peers.

And Justice for All: The Effects of Holistic Visual Attention on Intergroup Bias in Legal Punishment
Alyssa M. Kretz, Psychology, Spanish
Sponsor: Professor Emily Balcetis, Psychology

Recent research has shown that racial group identification leads people to assign greater punishments to racial out-group members relative to racial in-group members and that visual attention may moderate these effects. The current study tested whether holistic visual attention instructions could help mitigate disparities in legal punishment. White participants reported their racial group identification and could help mitigate disparities in legal punishment. White participants reported their racial group identification and watched a videotaped interracial fight between two actors. Using eye-tracking technology, the author tested whether instructions to attend equally to all aspects of a scene (holistic visual attention) changed the way viewers watched the scene (Study 1). Additionally, the author tested whether holistic attention instructions reduced participants’ punishment of the Black actor (Study 2). Results indicated that individuals who received holistic visual attention instructions attended more equally to the Black and White actors than did those who watched the video naturally (Study 1). Critically, instructions to attend holistically, compared to naturally, reduced punishment of the Black actor and evaluations of his violence, especially for people who identified strongly with their racial in-group (Study 2). These results...
provide evidence for a novel, effective intervention to alleviate legal decision-makers’ group-based biases.

**Physiological Linkage is Dependent on Context-Relevant Behaviors**

*Romina Krosnyak, Psychology*

*Sponsor: Katherine Thorson, Psychology*

This research project examined physiological linkage, or the degree to which one person’s physiological state influences another person. The author explored a potential boundary condition of physiological linkage (i.e., a condition under which affect might not spread to an interaction partner): whether or not partners are engaged in behaviors relevant to the current task. The author conducted a study of 70 participants (35 dyads), where dyad members worked together to complete a math task. Results revealed that physiological linkage only occurred when participants were 1) motivated to succeed on the math task and 2) their partners engaged in behaviors that were relevant to the current task. This work is important both for understanding 1) the impact that shared context has on affective states and 2) the bounds of physiological linkage within social relationships.

**Migration Squared: The Double Exile of Venezuela’s Cuban Émigrés**

*Rachelle Krygier, Journalism, Politics*

*Sponsor: Professor Brooke Kroeger, Journalism*

When Hugo Chávez came to power in Venezuela, Cubans who had established themselves in the country after fleeing Fidel Castro’s Communism began reliving what they had escaped. Their testimonies illustrate how both regimes affected their day-to-day lives in distinct but similar ways. Not only were Castro and Chávez close friends but their discourses and policies were linked. All the Cubans interviewed and chronicled for this research anticipated how life would become under a pseudo-socialist government in Venezuela. Some have left the country; others have remained. Either way, the two regimes buffeted their destinies, forcing them—twice—to either flee or endure the economic and political fallout of social upheaval in their home country. Double migration, double adaptation, double identity conflicts have become the recurring themes of their lives. Their stories illuminate the particular complications of the déjà vu that is repeated exile.

**The Crisis of the Black Intellectual**

*Rachel Naa-Du Laryea, Social and Cultural Analysis*

*Sponsor: Professor Michael Ralph, Social and Cultural Analysis*

This project examines the lives of black students through and after private college preparatory school in order to pinpoint the ways in which they navigate race and racism within the ranks of the elite in order to better uncover and understand the various rationalities underpinning self-accommodations made (or not) and the strategies adopted by such people in order to gain access into a racially exclusive culture of power. Such a study can help readily identify the stakes (concerning but not limited to performativity, identity politics and formation and strategic negotiations made across race and class lines) for black scholarship students who are all too often forced to grapple with, and make sense of, their privileged, yet marginal, status in their academic institutions and professional careers thereafter. Within the black student population, the present study is most concerned with better understanding the experience of students who wrestle with personal identifications involving notions of elitedom and privilege because of, but not limited to, their socio-economic status, place of origin or family structure. Thus, this text focuses on students who are introduced to (and thereby pressured to make sense of on their own terms) the world of elitedom and the hierarchical ranks of the privileged elite by their college preparatory schools.

**Modeling Chonsei Housing Rental Contracts and Households’ Risk Perception in South Korea**

*Kenny Kyunghoon Lee, Economics*

*Sponsor: Professor Basil Williams, Economics*

*Chonsei* is a unique residential rental contract in South Korea. Tenants pay a lump sum deposit, typically set at 40–70% of the property value, in lieu of any additional periodic payments to landlords who then use this deposit to finance their own financial investments. Upon the contract termination, landlords return the nominal value of the deposit without any realized interests to tenants. Many authors agree *chonsei* quickly became popular as an indigenous market response to meet the soaring demands for affordable housing and consumer credit during Korea’s rapid economic development and urbanization after the Korean War. As of 2012, 22% of national households were living in *chonsei* rentals and more than half of the rental housing market was made up of *chonsei* rentals. Despite *chonsei’s* significant influence on the Korean economy, past studies have failed to address how market uncertainty affects households’ investment and tenure decisions. The main goal of this paper is to develop and empirically test an analytical tool that can model households’ investment and tenure choices under market uncertainty. The prediction from the model is that *chonsei* should fade away as the volatility in the market and the rate of return on non-housing investment increase. This model and its implications can provide policymakers more insights into household behavior in the face of uncertainty that can help them devise sustainable housing market regulations.
Tear Down These Walls: A Study of Attitudes toward Different Foreigner Groups in Germany

Wen Yi Lin, Economics, Politics
Sponsors: Professor Nathaniel Beck; Professor Oeindrila Dube, Politics

In recent decades, anti-foreigner sentiments have intensified in tandem with aggressively exclusionist political rhetoric, tightened immigration laws and a slowdown in economic growth. Foreigners are not a homogenous group, and to aggregate all foreigner groups when conducting prejudice research cannot account for possible variance in the determinants of prejudice across different foreigner groups. This study examines attitudes toward four specific foreigner groups in post-reunification Germany from socio-cultural and economic perspectives within an East-West framework that accounts for possible differences in anti-foreigner sentiment between the old and new federal states. On the whole, it was found that socio-cultural and economic factors are both significant predictors of German attitudes toward foreigners. However, there was not conclusive evidence that one is more important than the other. There is moderate empirical evidence that amongst the four foreigner groups specified in this study, asylum seekers are perceived in the most negative light. These findings also indicate that East German residence has inconsistent effects on German attitudes toward different foreigner groups: specifically, those living in East Germany tend to have more negative attitudes toward Italians but more positive attitudes toward asylum seekers.

Competence in Context: Learning the Context-Dependent Behavior of Others

Siri Loken, Psychology
Sponsor: Professor David Amodio, Psychology

As social beings, it is crucial for humans to learn information about others through interactions in order to make informed future decisions. When engaging with others, people can experience economic or social reward (Jones et al., 2011) but can also learn about the higher-level traits of others (Hackel et al., 2015). However, people often have to make sense of others’ behavior that is not stable across contexts: for instance, someone who performs well on a math test but not on a verbal test or vice versa. In this study, participants completed a social reinforcement learning task, allowing the author to examine what information people learn when interacting with others across different contexts. The findings indicate that people learned the context-specific behavior of those they were interacting with. Further, this information was used to make future decisions about interaction partners in the same and novel contexts. This research contributes to the existing cognitive psychology literature by utilizing active learning through interaction and by extending the context-dependent variable from monetary rewards to social qualities.

Out of Place, Out of Time: The South and Its Confederate Monuments

Deborah Lubanga, History, Journalism
Sponsor: Professor Brooke Kroeger, Journalism

Four million people visit Georgia’s Stone Mountain Park annually, making it the state’s most popular tourist attraction. However, a racially motivated shooting in Charleston, South Carolina, in June, 2015, thrust the park’s Stone Mountain Memorial—a Confederate Mount Rushmore that looms over the predominantly black town—into the center of a contentious debate. It pits civil rights activists, who are pressing for the removal of the carvings of Confederate President Jefferson Davis and Generals Robert E. Lee and Thomas “Stonewall” Jackson, against descendents of the Confederacy who defend the monument as a symbol of their Southern heritage. This dispute is part of a larger discussion following the tragedy in South Carolina centered on the meaning and acceptability of Confederate symbols on public property. The current controversy, when placed in the context of the memorial’s bizarre backstory—which involves southern women’s groups and the Ku Klux Klan—highlights America’s failure to fully acknowledge its tumultuous racial history.

Political Gluttony: Centralized Corruption, Foreign Economic Interventions and Development Failures

Xuejuan Luo, Economics, International Relations
Sponsor: Professor Michael Gilligan, Politics

Upper-middle and high-income countries often use foreign economic interventions to help low- and lower-middle income countries grow and develop. However, many low- and lower-middle income countries experience high levels of corruption, where the state reaps the benefits of such interventions. With the rents collected from foreign countries as a source of government revenue, the state has no responsibility or obligation to provide public goods and increase standards of living for its citizens. Thus, this paper examines the extent to which centralized corruption alters the effectiveness of foreign economic interventions (official development assistance and foreign direct investment) in low-income and lower-middle income countries as classified by the World Bank. Using OLS regression analysis, the equations used interaction terms between official development assistance and corruption as well as foreign direct investment and corruption to test the marginal effects of corruption on foreign economic intervention. Additionally, to avoid endogeneity problems and spurious correlations, a two stage least squares method was used to test the individual effects of foreign economic interventions.
and corruption on growth and development. The results show that there are no robust marginal effects of corruption on foreign economic interventions. However, the two stage least squares regressions show that official development assistance and corruption have negative effects on development indicators.

Investigating Minority and Women Inclusion in Neurological Clinical Trials
Joy Madubuonwu, Global Public Health/Anthropology
Sponsor: Professor Nina Parikh, College of Global Public Health

Inadequate involvement of women and racial-ethnic minority groups in neurological clinical trials and limited information on demographic subgroup data (e.g., sex and race-ethnicity categories) is a significant challenge to conducting generalizable research. This study explores the proportion of neurological clinical trials, specifically stroke, Alzheimer’s disease and epilepsy, registered in ClinicalTrials.gov with study results to examine the current enrollment rates of women and racial-ethnic minorities. Three data sets comprising 3,635 clinical studies from 1999–2015 on ClinicalTrials.gov were downloaded on June 18, 2015, and of these, 396 were identified as having clinical trial results. Qualtrics, an online survey tool, was used to record the number of males, females and race-ethnic categories (Hispanic/Latino, American Indian, Asian, Native Hawaiian, black, and white) in each trial having study results. It was found that the number of clinical trials reporting any Hispanic/Latino participants was the lowest (n = 57) while any white participants was the highest (n = 81). A higher proportion of males, on average, were reported in epilepsy trials versus female participants (53.8% vs. 46.7%). Among all Alzheimer’s disease trials, the average proportion of females was higher than males (53.7% vs. 46.0%). The average proportion of any white participants was higher among all conditions (Stroke 53.0%, Epilepsy 67.3% and Alzheimer’s disease 76.0%), when compared to other race-ethnic groups. Consistent with the literature, these findings suggest that there is a lack of diverse racial-ethnic representation in the stroke, Alzheimer’s and epilepsy trials reporting study results on ClinicalTrials.gov. Further research can be conducted in order to observe demographic reporting disparities for different conditions registered over a longer frame of time.

A Closer Look: Student Experiences with NYU CAS Advising
Marina Makram, Psychology
Sponsor: Professor Jennifer Jennings, Sociology

Multiple studies have demonstrated that there is a strong link between the quality of college student advising, student retention rates and student satisfaction. This study investigates variation in students’ experiences with College of Arts and Sciences (CAS) advising. Preliminary evidence collected from an online survey suggests that students’ advising experiences vary greatly based on factors such as their class year, their academic and career goals and the advisor to whom they are assigned. The product of this research will contribute to our understanding of college academic advising at NYU as well as offer new perspectives on academic advising more broadly.

How Do Infants at High Risk for Autism Spectrum Disorder Match Primate Vocalizations to Primate Faces?
Gabrielle Marczak, Psychology
Sponsor: Professor Athena Vouloumanos, Psychology

Typically developing infants show sophisticated inter-modal matching skills, matching human speech to human faces and monkey calls to monkey faces. How do infants at high risk for Autism Spectrum Disorder (ASD)—the younger siblings of children diagnosed with ASD who have difficulty with language and social communication—match primate vocalizations to primate faces? This study examined how high-risk infants identify the sources of primate vocalizations compared to low-risk infants. To test this, the looking patterns of 18-month-old low- and high-risk infants were analyzed using offline coding. During testing, the author first displayed a human and monkey face side-by-side on a screen in silence to provide a baseline measure of infant looking to each face type. The author then presented the same human and monkey faces paired with one type of vocalization either human speech or monkeys calls. To quantify infants’ ability to match primate vocalizations to faces, baseline looking time was subtracted from looking time to the corresponding human or monkey face when the vocalizations were played. Increased looking to the corresponding face, relative to the baseline, reflects matching. Low-risk infants matched human faces more than monkey faces. High-risk infants did not match human faces but did match monkey faces, which may reflect an aversion to the socially stimulating human faces and speech or an increased interest in the unfamiliar monkey calls and faces. The ability to match speech to human faces could help infants identify individuals and vocalizations relevant for communication, and its absence could impair social and language development.

Transparency Rewarded: The Relationship between Autocratic Disclosure and Official Developmental Assistance Inflows
John Martin, International Relations
Sponsor: Professor B. Peter Rosendorff, Politics

Over $135 billion dollars in official developmental assistance (ODA) was allotted to 138 countries in the year
The Effect of Similarity Feedback on Liberals’ and Conservatives’ Political Attitudes

Carson Martinez, Neural Science
Sponsor: Professor Tessa West, Psychology

The goal of the present research was to examine how liberals and conservatives respond when their motivation to be similar to or unique from politically like-minded others (e.g., fellow liberals) is threatened. In particular, the author examined whether informing liberals and conservatives that they are either similar to or unique from politically like-minded others leads them to change their political attitudes. The study consisted of two parts. In the first part of the study, participants reported their attitudes toward several different political issues, and then estimated the percentage of like-minded others who shared their stance on the issues. In the second part of the study, participants were randomly assigned to receive feedback that they either underestimated or overestimated the percentage of like-minded others who shared their beliefs. Results indicated that liberals who received feedback that they underestimated (vs. overestimated) similarity to other liberals adopted political attitudes that more strongly challenged the status quo. In contrast, conservatives who received feedback that they overestimated (vs. underestimated) similarity to other conservatives adopted political attitudes that more strongly supported the status quo. These findings shed light on how goals to connect with and differentiate oneself from like-minded others shape political attitudes.

Optimizing Psilocybin-Assisted Psychotherapy for Alcohol Dependence

Adu Matory, Psychology
Sponsor: Professor Michael Bogenschutz, Psychiatry, NYU School of Medicine

Psilocybin (a hallucinogen), has been used for spiritual and therapeutic purposes for centuries if not millennia. It is both non-addictive and non-toxic. Recently, researchers have demonstrated its efficacy to cause long-lasting positive changes to mood, personality and behavior. Psilocybin in combination with psychotherapy may be particularly efficacious in treating alcohol dependence. However, the pharmacodynamics of psilocybin are still largely unknown and the phenomenology of the mystical experience (ME)—an experience robustly associated with psilocybin—is still disputed. This study contributes to the debate by offering a new model for understanding MEs, integrating the current popular, yet unreliable models. This integrative model’s implementation may elicit longer lasting abstinence from drinking in patients. It may be useful to clinicians and therapists for measurement construction and further development of psilocybin-assisted psychotherapies.

Mothering Across Borders: Mexican and Central American Experiences of Transnational Motherhood

Chelsea Meacham, Social and Cultural Analysis, Spanish
Sponsor: Professor María Josefina Saldáña, Social and Cultural Analysis

This project traces the contours of Latina transnational motherhood—both how it comes to be and what it looks like in everyday life. The author explores the effects transnational motherhood has on Latina women who have been separated from their children—both during separation and, in some cases, after reunification with their children. How do Latina transnational mothers negotiate their realities with ideals of motherhood in the United States and in their countries of origin? In spite of the challenges of transnational motherhood, what is to be gained from redefining what it means to be a successful mother? Through primary interviews and a wealth of secondary literature, the author analyzes the experiences of women who migrate to the United States and leave behind children in their home countries in Mexico and Central America. Exploring the specific social, emotional and political dynamics that shape the experience of Latina transnational motherhood, it was found that this type of transnational motherhood pushes up against both Latin American and US ideals about motherhood. This research shows that transnational Latina mothers are forced to create their own meanings of motherhood that transcends borders. Lastly, the author examines how the children of transnational Latina mothers understand and articulate their experience of separation from their mothers. This project

2013 alone, with a large amount of recipient states led by autocratic regimes. Many known determinants of foreign aid inflows could be classified as relatively uncontrollable economic and cultural factors, such as GDP per capita, ethnical diversity and access to education. Nevertheless, foreign aid provides autocrats with money that they can use to pay off rival elites and boost their survivability in office, which creates an incentive for autocrats to influence the levels of ODA they receive. Previous literature implies that higher governmental transparency can be an effective tool for autocratic leaders to increase the amount of foreign aid supplied to their state, which will ultimately help them stay in office longer. A two-staged least squares regression, with changes in government expenditure as the instrumented variable, is employed to test this hypothesis using data from 89 autocratic states between the years 1980–2008. The results indicate a positive relationship between transparency and ODA in autocratic states, meaning that autocratic regimes that disclose more information end up receiving more foreign aid.

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Chelsea Meacham, Social and Cultural Analysis, Spanish
Sponsor: Professor María Josefina Saldáña, Social and Cultural Analysis

This project traces the contours of Latina transnational motherhood—both how it comes to be and what it looks like in everyday life. The author explores the effects transnational motherhood has on Latina women who have been separated from their children—both during separation and, in some cases, after reunification with their children. How do Latina transnational mothers negotiate their realities with ideals of motherhood in the United States and in their countries of origin? In spite of the challenges of transnational motherhood, what is to be gained from redefining what it means to be a successful mother? Through primary interviews and a wealth of secondary literature, the author analyzes the experiences of women who migrate to the United States and leave behind children in their home countries in Mexico and Central America. Exploring the specific social, emotional and political dynamics that shape the experience of Latina transnational motherhood, it was found that this type of transnational motherhood pushes up against both Latin American and US ideals about motherhood. This research shows that transnational Latina mothers are forced to create their own meanings of motherhood that transcend borders. Lastly, the author examines how the children of transnational Latina mothers understand and articulate their experience of separation from their mothers. This project

2013 alone, with a large amount of recipient states led by autocratic regimes. Many known determinants of foreign aid inflows could be classified as relatively uncontrollable economic and cultural factors, such as GDP per capita, ethnical diversity and access to education. Nevertheless, foreign aid provides autocrats with money that they can use to pay off rival elites and boost their survivability in office, which creates an incentive for autocrats to influence the levels of ODA they receive. Previous literature implies that higher governmental transparency can be an effective tool for autocratic leaders to increase the amount of foreign aid supplied to their state, which will ultimately help them stay in office longer. A two-staged least squares regression, with changes in government expenditure as the instrumented variable, is employed to test this hypothesis using data from 89 autocratic states between the years 1980–2008. The results indicate a positive relationship between transparency and ODA in autocratic states, meaning that autocratic regimes that disclose more information end up receiving more foreign aid.

The Effect of Similarity Feedback on Liberals’ and Conservatives’ Political Attitudes

Carson Martinez, Neural Science
Sponsor: Professor Tessa West, Psychology

The goal of the present research was to examine how liberals and conservatives respond when their motivation to be similar to or unique from politically like-minded others (e.g., fellow liberals) is threatened. In particular, the author examined whether informing liberals and conservatives that they are either similar to or unique from politically like-minded others leads them to change their political attitudes. The study consisted of two parts. In the first part of the study, participants reported their attitudes toward several different political issues, and then estimated the percentage of like-minded others who shared their stance on the issues. In the second part of the study, participants were randomly assigned to receive feedback that they either underestimated or overestimated the percentage of like-minded others who shared their beliefs. Results indicated that liberals who received feedback that they underestimated (vs. overestimated) similarity to other liberals adopted political attitudes that more strongly challenged the status quo. In contrast, conservatives who received feedback that they overestimated (vs. underestimated) similarity to other conservatives adopted political attitudes that more strongly supported the status quo. These findings shed light on how goals to connect with and differentiate oneself from like-minded others shape political attitudes.

Optimizing Psilocybin-Assisted Psychotherapy for Alcohol Dependence

Adu Matory, Psychology
Sponsor: Professor Michael Bogenschutz, Psychiatry, NYU School of Medicine

Psilocybin (a hallucinogen), has been used for spiritual and therapeutic purposes for centuries if not millennia. It is both non-addictive and non-toxic. Recently, researchers have demonstrated its efficacy to cause long-lasting positive changes to mood, personality and behavior. Psilocybin in combination with psychotherapy may be particularly efficacious in treating alcohol dependence. However, the pharmacodynamics of psilocybin are still largely unknown and the phenomenology of the mystical experience (ME)—an experience robustly associated with psilocybin—is still disputed. This study contributes to the debate by offering a new model for understanding MEs, integrating the current popular, yet unreliable models. This integrative model’s implementation may elicit longer lasting abstinence from drinking in patients. It may be useful to clinicians and therapists for measurement construction and further development of psilocybin-assisted psychotherapies.

Mothering Across Borders: Mexican and Central American Experiences of Transnational Motherhood

Chelsea Meacham, Social and Cultural Analysis, Spanish
Sponsor: Professor María Josefina Saldáña, Social and Cultural Analysis

This project traces the contours of Latina transnational motherhood—both how it comes to be and what it looks like in everyday life. The author explores the effects transnational motherhood has on Latina women who have been separated from their children—both during separation and, in some cases, after reunification with their children. How do Latina transnational mothers negotiate their realities with ideals of motherhood in the United States and in their countries of origin? In spite of the challenges of transnational motherhood, what is to be gained from redefining what it means to be a successful mother? Through primary interviews and a wealth of secondary literature, the author analyzes the experiences of women who migrate to the United States and leave behind children in their home countries in Mexico and Central America. Exploring the specific social, emotional and political dynamics that shape the experience of Latina transnational motherhood, it was found that this type of transnational motherhood pushes up against both Latin American and US ideals about motherhood. This research shows that transnational Latina mothers are forced to create their own meanings of motherhood that transcend borders. Lastly, the author examines how the children of transnational Latina mothers understand and articulate their experience of separation from their mothers. This project
hopes to capture the dynamic experience of transnational familial formations and the way various actors negotiate and define love, caregiving, motherhood and family.

Shortage in Tech Professionals Propels the Tech Industry toward Public Immigration Reform Advocacy

Pilar Melendez, Journalism, Politics
Sponsor: Professor Brooke Kroeger, Journalism

The Bureau of Labor Statistics reports that by 2020 the United States will have 1.2 million openings in the technology profession that require at least a bachelor’s degree. And yet the country, at its current pace, will not produce even half the number of qualified graduates needed to fill these positions. This disparity now has the US tech industry dependent on foreign-born talent but also blocked from recruiting the number of internationals it needs. During last year’s H-1B cap lottery selection process, the US Citizenship and Immigration Services approved entry visas for only 40% of those who applied: 85,000 workers in the tech sector against some 233,000 high-skilled foreigners. That quota was met in less than one week. US visa policy has not been updated since 1990, the same year the Internet came into being. The tech industry’s need for foreign talent over and against the lack of movement on immigration reform has pushed the sector into funding advocacy efforts for immigration reform that support a general rise in the H-1B lottery cap. The newfound political influence of the high-skilled sector has invited criticism from the more established immigration advocacy groups that specialize in middle- and low-skilled foreign workers. The happy medium between raising the cap on H-1B visas and providing opportunities for all levels seems to center around increasing US opportunity for foreigners in STEM education to remain in the United States after they finish school. Experts say that finding a way to meld tech-backed immigration reform, overall immigration reform and an emphasis on STEM education could be key to finding solutions to a range of technology, social, political and economic issues.
Anthropomorphizing Loneliness with Spontaneous Trait Inference
Emily Miller, Psychology
Sponsor: Professor James Uleman, Psychology

People make unconscious judgments of personality every day, known as Spontaneous Trait Inferences (STIs). Those who cannot maintain social links with other humans may try to alleviate the pain of isolation by projecting human characteristics on non-human objects, known as anthropomorphizing. This study explores whether loneliness leads to anthropomorphizing through using STIs as an indicator. It was hypothesized that while people will make more STI attributions to human faces than non-human faces, people who feel lonelier will actually make more STIs to both types of faces in a desire to connect. We asked participants to study behavior-face pairs (with a varying degree of “humanness”) and respond if a trait word appeared in the presented pair. Those who falsely remembered an implied trait meant they made an STI. At the end of the study, participants filled out the NTBS and 3-Item Loneliness Scale to measure loneliness. A main effect of humanness and a significant interaction was found for humanness and trial type interaction. Unfortunately, there was no significant interaction between humanness, trial type or loneliness. As technology grows, it will be interesting to see how these results change over time. Anthropomorphizing gives lonely people the power to populate their world with necessary social connections albeit sometimes non-human ones.

The Politics of Food Distribution in India
Arnav Mody, Economics, International Relations
Sponsor: Professor B. Peter Rosendorff, Politics

In policies concerning redistribution of resources to subnational states within a federal system, governments have a tendency to make decisions that increase their political support on different levels. Changing inter-party alliances, the political business cycle and importance attributed to individual states impact the distribution of centrally administered food grains. This paper explores the question of distributive politics within the government-sponsored Public Distribution System (PDS) in India, which provides subsidized food grains to a large section of the population. Findings from the research show that the incumbent central government favors states that are governed by the same party as or a party that is allied with the central incumbent when distributing subsidized wheat and rice. These results hold true for states that are deemed “important” for electoral strategy through proxies such as swing states or states with a larger representation in the lower house of parliament.

Gender Conformity Predicts Evaluations of Transgender People
Caitlin Monahan, Psychology
Sponsor: Nadav Antebi-Gruszka, Sociomedical Sciences, Columbia University

This research examines how evaluations of transgender faces can be explained by endorsements of gender roles. Previous research has shown that violations of gender conformity norms ultimately yield discrimination and social punishment. In particular, women who violate gender norms are expected to experience the most backlash. The current study focuses on evaluations of transgender people whose biological sex does not match with their gender expression and identity. Transgender people experience a disproportionate amount of stigma and discrimination. To assess whether negative evaluations of transgender people are influenced by violations or endorsements of gender conformity, participants decided to “friend” or “not friend” transgender people using mousetracking software. Results showed that gender nonconforming faces were overall more disliked than gender conforming faces, regardless of gender identity. In addition to proportions of friend responses, an implicit measure of area under the curve (AUC) showed that participants were more decisive to make a friend response after knowing the stimuli were of transgender people. Thus, evaluations occur rapidly and implicit bias plays a role in social evaluation of transgender people.

The Effect of the Affordable Care Act on the Shift from Employer-Sponsored Health Insurance Towards an Individual Exchange
Shivani Mulji, Economics
Sponsor: Professor Kevin Thom, Economics

Most working Americans purchase health insurance through their employers and are offered a limited selection of plans. The Affordable Care Act (ACA), on the other hand, allows individuals to participate in individual health exchanges, custom-tailor plans and gain more individual ownership of insurance coverage. Policymakers believe that the ACA can either 1) shift responsibility away from the employer and towards the employee or 2) allow employers to further penetrate the market by redefining their roles in insurance coverage. This paper seeks to determine whether small and large firms started to adjust employer-sponsored health insurance (ESI) offerings after the ACA was passed in anticipation of the employer mandate, individual premium tax credits and small firm tax credits. The difference-in-differences technique was utilized to compare pre- and post-policy periods and to isolate the effects of each policy. The first analysis indicates that large firms started to prepare for the employer mandate by offering ESI to more of their employees after the ACA was passed. This increase in ESI
was not accompanied by a decrease in wages. The second analysis suggests that small firms offered ESI to more of its low-income workers after the ACA was passed. The third analysis shows that the Small Firm Tax Credits policy was not effective. Growing health-care costs burden individuals, employers and the federal government alike. This paper seeks to provide insight on the future direction and evolution of both the US health care industry and businesses.

In Hot Water: Climate Change and the American Lobster
Scott Mullen, Biology, Journalism
Sponsor: Professor Brooke Kroeger, Journalism

The southernmost of the two breeding stocks of American lobster (H. americanus) in US waters has suffered a dramatic decline in health in recent years, plunging to its lowest estimated abundance in three decades. Recent research conducted by organizations such as the Atlantic States Marine Fisheries Commission (ASMFC) suggests that this deterioration is linked to an increase in the annual number of days when water temperatures exceed 20 degrees Celsius. When inland waters off Southern New England (SNE) are warmer than this threshold, the lobster population loses reproductive stability and becomes threatened by increased disease occurrence and expanded predation on the southern fringe of its natural range. Furthermore, rising average temperatures in the region’s oceans, spurred by global climate change, are pushing the overall species significantly farther north. In states such as New York, Connecticut, Rhode Island and Massachusetts, which have historically supported an important and thriving lobster industry built around the SNE stock, the collapse has created economic hardship, especially in costal communities that previously depended heavily on lobster fishing. Unfortunately, based on current assessments, it does not seem that the negative trend in the SNE lobster stock’s health will reverse in the future despite efforts to ease environmental stress, signaling an early casualty of manmade global warming.

The Absentive in German
Hanna Muller, Language and Mind
Sponsor: Professor Stephanie Harves, Linguistics

A novel grammatical category known as the absentive has been proposed for a variety of European languages including German but remains understudied and relatively unexplained. Absentive constructions convey, in addition to the overt information expressed by subject and predicate, that the entity denoted by the subject is absent from a pragmatically-determined location. A key characteristic of these constructions is that they lack overt lexical material corresponding to absence. In German, this construction takes the form of the verb sein (“to be”) and an infinitival verb, for example Hans ist lesen (“Hans is-to-read” / “Hans is off reading”). The question of the syntactic representation of such sentences is further complicated by German’s lack of a fully grammaticalized progressive form. This study uses both traditional linguistic data gathered through interviews with native speakers and experimental data collected online to evaluate several syntactic properties of the German absentive construction such as stativity and the verbal status of the infinitive. On the basis of these properties, the author argues that three existing proposals for absentives fail to account for the German data and instead favors a syntactic account involving a silent element corresponding to “away.”

Mounting Evidence of the False Consensus Effect in Male Bodybuilders
Andre Nakkah, Psychology
Bryan S. Nelson, Psychology
Ward Pettibone, Neural Science
Sponsors: Professor Pascal Wallisch, Psychology; Professor Tom Hildebrandt, Psychiatry, Icahn School of Medicine at Mount Sinai

The False Consensus Effect is an overestimate of the prevalence of one's own behaviors and beliefs in a population. Previous research on the False Consensus Effect has shown that it is almost universal to the human condition, whether it involves underage drinking, video game use, etc. Whereas the False Consensus Effect has also been studied in a general risk behavior and risk-taking framework, there have been no studies on this effect with regard to steroid use and bodybuilding specifically. Here, the false consensus effect was investigated in a sample of 441 male bodybuilders recruited in online fitness forums. Participants were divided based on whether they had ever used anabolic steroids as well as if they had taken fat burners. They were then asked what percentage of frequent exercisers they believed used steroids, whether or not they supported the legalization of steroids, and at what age they believed bodybuilders should first consider steroid use. Participants that had taken anabolic steroids reported higher estimates of steroid use prevalence, were more likely to support steroid legalization and believed athletes should consider taking steroids at a younger age than nonusers. Similarly, fat burner users gave higher prevalence estimates of steroid use and were more likely to support steroid legalization compared to fat burner nonusers. The authors interpret these relationships as evidence that the false consensus effect exists in anabolic steroid users and that there is a halo-effect in the general bodybuilding community regarding steroid use.
Exploring Psychological and Behavioral Outcomes of Steroid Use

Bryan S. Nelson, Psychology
Sponsors: Professor Pascal Wallisch, Psychology; Professor Tom Hildebrandt, Psychiatry, Icahn School of Medicine at Mount Sinai

Previous research has uncovered psychological side effects of anabolic-androgenic steroid (AAS) use, but the relationships between AAS use and other risk-taking behaviors as well as psychopathic tendencies remain understudied. To explore these potential relationships, 441 male participants from bodybuilding forums were anonymously surveyed. Adjusting for covariates such as age, race, education, exercise frequency, caloric intake and lean BMI, bodybuilders with prior history of AAS use exhibited significantly and substantially heightened odds of psychopathy (OR = 1.84), severe risk-taking behaviors (OR = 3.91), severe anger problems (OR = 2.24) and moderate physical side effects (OR = 3.62) compared to those with no history of AAS use. These results are discussed in terms of a risk-taking framework as well as future prospective research.

Predicting Anabolic Steroid Use in Males

Bryan S. Nelson, Psychology
Sponsors: Professor Pascal Wallisch, Psychology; Professor Tom Hildebrandt, Psychiatry, Icahn School of Medicine at Mount Sinai

Anabolic-androgenic steroid (AAS) use is a growing public health risk. Most research has focused on demographic factors to predict AAS use. Here, a diverse range of psychological risk factors and risk-taking behavior were explored as predictors of anabolic steroid use in male bodybuilders. Using a large sample (n = 441), the odds of AAS use were analyzed on a continuum from low-risk nonusers to high-risk nonusers and subsequently from high-risk nonusers to AAS users. Participants that were likely psychopaths, engaged in largely strength-based exercise, had a history of fat burner use, had a history of stimulant use, felt badly about their appearance in the past month or spent 120 minutes or greater exercising had independently higher odds of being a high-risk AAS nonuser compared to a low-risk AAS nonuser, while participants attempting to lose weight had significantly lower odds of being high-risk nonusers. Meanwhile, participants that placed high importance on macronutrients, that were attempting to gain weight, were likely psychopaths, were attempting to lose weight, had a history of fat burner use or had a history of stimulant use exhibited independently higher odds of being an AAS user compared to a high-risk AAS nonuser. However, participants with depression, with history of marijuana use, younger than 25, that exercised for 120 minutes or greater or that engaged in largely strength-based exercise had significantly lower odds of being an AAS user. It was concluded that the prediction of anabolic steroid use critically relies on moderating factors that are both psychological and risky in nature.

Financial Behavior of Parents with Undocumented vs. Documented Children in New York City

Bryan S. Nelson, Psychology
Sponsor: Professor Hiro Yoshikawa, Applied Psychology, Steinhardt School of Culture, Education and Human Development

Many of the 11 million undocumented immigrants in the United States pay taxes from which they do not benefit. A large factor influencing this participation in the economy is having children, whether documented or undocumented. The present pilot study investigates possible differences in psychological state, economic status and utilization of resources by child’s immigration status in a sample of adult Hispanic undocumented immigrants living in New York City. Generally, participants earned an average of $15,000 per year while working 50-hour work weeks. Those with documented children reported less than 10% of the total savings as those with undocumented children ($32 vs. $370), tended to be a few years older than those with undocumented children and had lived in the United States for two years longer. Those with undocumented children tended to utilize emergency room services and used individual tax identification numbers (ITIN) more often than those with documented children. Both sets of parents reported similarly elevated feelings of discrimination and fears of deportation for themselves and their children, which are likely ceiling effects. The study discusses possible ways that a child’s immigration status relates to the psychological well being of their undocumented parent and how this in turn relates to their tax participatory behavior.

A Proposed Study of Visual Attention in Psychopaths when Assessing Emotions

Bryan S. Nelson, Psychology
Iman Thambi, Psychology
Sponsor: Professor Pascal Wallisch, Psychology

Psychopathy is a personality disorder characterized by flat emotional response and cold affect. The psychopath often displays atypical responses to the emotional cues of others. In particular, these individuals tend to miscategorize distress cues (such as displays of anger or sadness) and exhibit markedly deficient (although intact) processing for warm and happy emotional displays. The authors hypothesize that these deficiencies are related to improper emotional evaluation techniques by the psychopath and propose a study of visual attention to determine ways in which psychopathic and non-psychopathic individuals...
differ in judging emotional states. For example, the psychopath may attend to a target’s eyes to assess emotional state with infrequent success, while a non-psychopath may attend largely to the same target’s mouth with frequent accuracy. To do this, participants’ eye movements will be tracked while they perform an Affective Go/No-Go task, which requires rapid judgments of emotional states. This study will be largely exploratory and will provide valuable insights into the ways that psychopathic individuals attempt (and perhaps fail at) empathy.

Quick to Compensate, Slow to Punish: Intuitive Responses to Fairness Violations against Oneself and against Others
Andrea Ng Wen-Xin, Economics, Psychology
Sponsors: Dr. Oriel FeldmanHall, Psychology; Professor Elizabeth Phelps, Psychology

Prior research suggests that victims are less retributive than third parties when responding to fairness violations. What prompts such divergent responses? Dual-process theories suggest that victims’ compensatory choices and third parties’ retributive responses may recruit two different reasoning processes (Stanovich and West, 2000). Here, it was hypothesized that compensatory choices rely on fast, automatic processes and retributive responses depend on slower deliberative processes. This study examined choice behavior under forced deadlines to decompose whether automatic and deliberative processes primarily enhance compensatory or retributive responses for victims and third parties. Participants’ provisional commitments to different choices during the decision-making process were also tracked using their mouse trajectories on each trial. Participants responded to a range of unfair offers in the Justice Game (FeldmanHall, Sokol-Hessner et al., 2014) either as a victim or as a non-vested third party and either under time pressure (3 seconds) or no time pressure (10 seconds). Results reveal that time pressure elicits overall greater compensatory responses toward fairness violations, surprisingly enhancing compensatory behavior on behalf of others more than for oneself. Conversely, participants in both roles punished more without time pressure. Mouse trajectory analyses of participants’ spatial attractions added to these findings, showing greater response conflicts when punishing for others under time pressure and compensating for oneself without time pressure. Together, these findings suggest that compensatory methods of justice restoration recruit automatic forms of decision-making—more so as third parties than as victims—while inclinations towards punitive options rely on reflective deliberations.

Food Security in Rwanda: A Collaboration of the Public and Private Sector
Anne-Marcelle Ngabirano, Economics, Journalism
Sponsors: Professor William Easterly, Economics; Professor Shaghayegh Harbi, Environmental Studies

Despite the billions of dollars in foreign aid that have been funneled into developing nations, many citizens of these countries are still living well below the poverty line. Charities, NGOs and religious organizations have teamed up to provide relief to the world’s most underprivileged but have often failed to provide long-term relief. Rwanda’s effort to strengthen the country’s agricultural productivity has heavily contributed to their sustained GDP growth of an average 7% since the mid-2000s. The recent Crop Intensification Program, an initiative launched by the Rwandese Ministry of Agriculture and Animal Resources, successfully increased national agricultural productivity and improved food security by cutting starvation rates by more than half. Through these homegrown efforts, Rwanda has seen a level of development at a rate faster than the world. Through qualitative interviews, questionnaires and economic analysis from the available literature, this study will determine the effects of the crop intensification program on the improved access to finance for small holder farmers in Kayenzi, Rwanda.

Children and the Famil(ies) in Swedish Cohousing
Mohit Nihalani, Metropolitan Studies
Sponsor: Professor Sukhdev Sandhu, Social and Cultural Analysis

Collective housing, or cohousing, in Sweden is often referred to as suitable for children. It considerably liberates parents of housework responsibilities by collectivizing spaces such as the kitchen and the dining room (while maintaining a private living space for each family), providing them with more time to take care of their children. Still, although children’s care is of extreme importance in any society, it only shows the adult’s perspective. Children’s lives are not just about being taken care of: their autonomy needs to be recognized. There is a need to go further and understand children’s perspectives—with all the intersectionalities of gender, class, ethnicity, religion, sexuality—and how to empower them to actively participate in the city and in their own culture. By studying the concept of collective housing in Sweden, and specifically two cohouses in Stockholm, the aim of this project is to evaluate the suitability of cohouses for children and how collective housing can educate and influence their conception of work, consumption, space, privacy, family, gender, collectivity and collaboration.
Environmental Effects on Infant Locomotor Exploration
Sinclaire O’Grady, Psychology
Sissat Islam, Psychology
Sponsor: Professor Karen Adolph, Psychology

What incites infant locomotion? Recent research suggests that locomotor exploration is more haphazard than goal directed (Cole et al., 2015). This study asks whether toys designed to encourage locomotion (stroller, ball, etc.) lead to more locomotor activity than an empty room. Preliminary findings from 20 15-month-olds (range in walking experience = 2.1-5.5 months) suggest that space to move in a large empty room is sufficient to elicit locomotion. Overall, infants take the same number of steps per hour in an empty room (M = 4142.21) as when the room is filled with “mobile” toys (M = 4362.10). However, the fact that most walking bouts involve toys when they are available (M = 72.05% of bouts). In fact, the same infants moved just as fast with toys (M = 10.47 steps per second) and without toys (M = 10.43 steps per second) as without toys (M = 2.42 steps per second) as when the room is filled with toys (M = 2.43 steps per second). Infants moving with toys had marginally longer bouts (M = 10.17 steps per bout) than infants moving without toys (M = 8.39 steps per bout). However, steps per second of movement (t(13) = -1.114, p = .285) and steps per bout (t(13) = -2.41, p = .013) were equivalent in the empty room and toys conditions. Further analyses will test whether the availability and use of toys influences the area infants cover and the shape of their walking paths.

Content Analysis of Targeted Food and Beverage Advertisements in an African American Neighborhood
Yrvane Pageot, Psychology
Sponsor: Professor Marie A. Bragg, Population Health, NYU School of Medicine

Obesity and diabetes are among many health concerns that affect racial/ethnic minority groups disproportionately. Further, research shows that food and beverage marketing can be a strong influence on diet-related diseases (e.g. obesity and diabetes). Studies show that exposure to food advertisements often leads to increased, short-term consumption among children and adults (Institute of Medicine, 2006). The present descriptive study aimed to 1) quantify the number and types of advertisements in an African American neighborhood in a large, urban city and 2) catalogue the targeted marketing themes used in food and beverage advertisements. All outdoor advertisements were photographed in a neighborhood where more than 60% of residents identify as African American. Content analysis was used to assess the marketing themes of ads including references to African American culture and food or beverage type (e.g. sugar-sweetened soda). The majority of ads did not target African American people, specifically. However, most of the food and beverage ads promoted unhealthy products likely to be seen by residents of all ages, many of whom are African American. Findings suggest a need for more comprehensive health promotion efforts in predominately African American neighborhoods.

The Impact of Reservation of Female Leadership on Local Level Health Policy in Indian Villages
Yun Joo Park, Political Science
Sponsors: Professor Nathaniel Beck, Politics; Professor Oeindrila Dube, Politics

Does reserving political positions for disadvantaged groups, such as women, lead to the adoption of different health policies that can disproportionately favor women? To answer this question, the author exploited a unique natural experiment, as already done by previous researchers, established by India’s 1993 constitutional amendment which ruled that a random one-third of village council leaders, or Pradhan, positions would be reserved for women. It can be seen that reservation leads to an increased political participation of women and that politicians adopt policies that reflect a certain gender bias. Therefore, this could potentially lead to statistically significant differences in the healthcare provisions and campaigns provided by the local village depending on the gender of the village leader. Regressions show statistically significant increases in some of the health-related campaigns such as campaigning for leprosy, undertaken by the Pradhan in villages with reservation. However, regressions also showed significant decreases in other campaigns such as contraception. These findings suggest that reserving the position of Pradhan for women might possibly lead to gender-specific health campaigns that could potentially favor the preferences of women. This might indicate that a politician’s identifying factor, such as gender, can influence their policy decisions. Such gender-biases might aid in the improvement of gender imbalances in India and this debate of reservation is important due to the current Women’s Reservation Bill being debated in India’s Parliament.

Russia’s HIV Epidemic
Katerina Patin, Comparative Literature, Journalism
Sponsor: Professor Brooke Kroeger, Journalism

As HIV infection rates around the world drop, even in some of the most severely affected regions, Russia’s infection rates are exploding. Federal Russian HIV experts say that some 1–3% of the country’s sexually active population is infected with the virus, the majority of whom are unaware of their condition. The staggering statistics have been growing for years yet the Kremlin’s pivot to traditional, Orthodox social values is not compatible with the
open recognition of a health crisis spread by hard drug use and unprotected, pre- or extra-marital sex. In a time when enemies outside of Russia’s borders in Ukraine, the West and Syria dominate the public debate, to speak up about domestic social issues has become increasingly problematic. Interviews with dozens of substance abuse specialists, activists (most of whom are HIV positive themselves) and HIV denialists (who claim the disease is yet another prong of an American information war against Russia) present a troubling picture of a country in regression. Shame, silence and stigma have fueled the medical disaster. This project explores the stories of individuals determined to somehow quell the infection’s spread.

**Translanguaging French/English Children’s Books and the Role of Illustrations**

*Alexa Pearce, Art History, French*

*Sponsor: Professor Heather Woodley, Bilingual Education and Foreign Language Education, Steinhardt School of Culture, Education and Human Development*

This research project examines the teaching potential of translanguaging French/English children’s picture books in both the bilingual and monolingual classroom, especially the effect of the visual in aiding vocabulary and grammatical comprehension. “Translanguaging” is a pedagogical theory allowing for the mixing of languages within the context of the classroom. While this practice is avoided in schools to prevent inadequacy in the grammar and lexicons of individual languages, translanguaging is modeled after the belief that the alternation of fluent bilingual speakers does not demonstrate insufficiency but rather accessibility to greater communicative functions. Integrating this practice with the visual cues of culture-bridging visuals, this research uses the format of an illustrated children’s book to teach elementary French and English simultaneously. The book (*Anne & Charles*) alternates languages from page to page, avoids mixing within sentences and lacks the direct translations of all current bilingual books, forcing more active reading. Each vocabulary word/idiom used in one language on a given page is emphasized visually and then repeated textually in the second language later in another context. The book will be tested qualitatively at Lyceum Kennedy, with reading groups in grades 2–4. These and later readings in Parisian classrooms will help inform the refinement of text/illustration for a final version. The project should establish the benefits and didactic limits of using translanguaging and explanatory illustration together in the French and/or English elementary classroom, which can later be expanded to countless combinations of languages.

**A Temporal Analysis of Ecological Variation in East Turkana, Kenya: Implications for Hominin Evolution**

*Amy Peterson, Anthropology*

*Thomas Rohrer, Biology*

*Sponsor: Amelia Villasenor, Center for the Advanced Study of Human Paleobiology, George Washington University*

Analysis of our early ancestors’ environment is crucial to understanding their evolutionary context. The Koobi Fora region of Northern Kenya is one of the best-known early human fossil sites, but its ecological context is not well resolved. This study focused on variation through time in environments within two geological time periods of Koobi Fora Formation: The Lokochot and Tulu Bor geological members of the Formation. Three different paleontological sites were used, two in the Upper Lokochot member (3.6-3.42 Ma) and one in the Tulu Bor member (3.42-3.22 Ma). Data consisted of large mammal fossils and carbonate nodules from fossil soil. These soil carbonates were used to derive carbon (13C) and oxygen (18O) isotopes to reconstruct the vegetation and climate of the region in that particular time. The mammal fossils, meanwhile, were identified to the most specific taxonomic level and analyzed using chi-squared tests, one with all specimens that could be identified to a taxonomic family (*n* = 404) and another for tribes within the heavily-represented family Bovidae, with antelopes and other ungulate species (*n* = 42). The isotope data was analyzed with t-tests (*n* = 83). The chi-squared tests showed a statistically significant turnover in taxonomic families (*c2* = 55.8, *p* < 0.001), though not within the family Bovidae. The t-tests showed a statistically significant increase in both d13C (*p* < 0.001) and in d18O (*p* < 0.001). The significance of this study is that the isotope data points to significant vegetation and climatic change through time within the Koobi Fora Formation. The fossil data, meanwhile, points to what may have been the response to these environmental changes: turnover and change in the composition of the mammal community, which would have included hominin populations.

**Anglicizing Spanish /a/: Implications of Statistical Distribution and Language Experience on Non-Native Pronunciation**

*Kira C. Prentice, Spanish and Linguistics, Computer Science*

*Sponsor: Professor Lisa Davidson, Linguistics*

Native English speakers must adopt words of Spanish that enter the lexicon into English sound categories. This study uses statistical distributions to predict vowel pronunciation of hypothetical new English words and examines if perceived source language or L2 experience affects these pronunciations. The Spanish vowel /a/, which is generally mapped to English vowel categories /æ/ and /ɑ/ was selected for its orthographic ambiguity and high frequency in loan
words. Statistical calculations based on a phonetic dictionary of English words formed initial guesses on how English speakers might pronounce “a” in a variety of surrounding consonant contexts. Two types of participants—with and without Spanish L2 experience—were presented with two categories of made up words and told some were from a “Spanish” source, some from an “English” source. The study found a significant difference in pronunciation of these words based on primed language. L2 experience in Spanish also had a significant effect on pronunciation. The statistical calculations did not accurately predict pronunciation of the “a” vowel. This study concludes that L2 experience changes how a speaker perceives and borrows L2 sounds into their L1. Perceived foreignness of a word also affects pronunciation, indicating that even with no Spanish experience, English speakers have an underlying concept of a Spanish language sound system that differs from English.

Institutional History and Its Effects on the Current Côte d’Ivorian Economy
Jacob Priley, Politics
Sponsor: Professor Alex Scacco, Politics

This study follows the political and economic history of Côte d’Ivoire’s tax collecting institutions as a method of explaining the current macroeconomic conditions within the country. From the formation of the French umbrella organization “Afrique occidentale française” (AOF) and its “head tax” to current President Ouattara’s administration of International Monetary Funds’ (IMF) structural adjustment policies, mobilizing tax revenue is an important instrument of economic and political power. Côte d’Ivoire “became a model of political stability and economic prosperity” following its independence in 1960 primarily due to the capitalistic prescriptions of President Félix Houphouët-Boigny. Compared to the country’s West African neighbor, Ghana, Côte d’Ivoire took a far more liberal approach, in the economic sense of the word, to avoid the pitfalls many post-colonial countries experienced following independence. In practice this meant loose tax policies for private enterprises, particularly French companies, weak economic institutions that were unable to extract wealth from excess capital that left its borders and centralized political institutions that favored decision-making authority over democratic representation. The decline of Côte d’Ivoire’s economy coincided with the rise of John Williamson’s “Washington Consensus” reform model. With this understanding, the study then analyzes the current and past IMF policy recommendations for improvements to historically relevant tax collecting infrastructures as neocolonialist in nature.

“So, What’s It Like to Be a Woman in Comics?” The Poorly Chronicled Rise of Women in the Medium
Nicole Puglise, Journalism, Psychology
Sponsor: Professor Brooke Kroeger, Journalism

With its muscular men, sexy women and historically male-dominatedstaff, it’s not hard to imagine why the genre of superhero comic books is known as a “boys club” or is derided as a “male-power fantasy.” But female creators of these popular action heroes have indeed made inroads into the field over the past half-century or more. Women currently make up 15% of the creative staff at the “Big Two” publishers of Marvel and DC—that’s about a hundred each—compared to the 1950s, when only two women were credited as artists in superhero comics. Despite that progress, acknowledgment of their presence is virtually invisible. While women can now be counted among some of the most successful creators in the business, their inclusion as featured speakers at comic conventions often wreaks of tokenism: most commonly as part of gender-based discussions. They are constantly treated as an anomaly, forever plagued with the question that should long ago have been put to rest: “What is it like to be a woman in comics?”

Effect of Time and Lexical Frequency on Memory
Ashley Quinto, Communicative Sciences and Disorders
Sponsor: Professor Susannah Levi, Communicative Sciences and Disorders, Steinhardt School of Culture, Education and Human Development

Previous research has shown that high frequency words yield more accurate recall than low frequency words, but this advantage is restricted to word list tasks that neglect the effect of time delay between stimuli exposure and recall. The current study investigated the effect of lexical frequency and time delay on memory recall in a more naturalistic story retell task in order to understand how lexical frequency may affect memory in a different context. Fourteen pairs of words were manipulated based on lexical frequency to create a high frequency condition and a low frequency condition (house vs. cottage). In addition to manipulating frequency, the author also manipulated whether the story retell was performed immediately or after a 30-minute delay. Results revealed that participants in the high frequency condition were more accurate, confirming results of previous studies. Surprisingly, there was no effect of delay on story retell performance. While participants in the low frequency condition were less accurate, a chi-square analysis revealed that these participants were more likely to recall the low frequency word, thus their lower accuracy was not merely the result of defaulting to the high frequency word. We will discuss how these results could be used to understand how lexical frequency impacts language acquisition.
Atypical face preference in infants may be linked to later
9 months; however, at 6 months, there is a difference.

Differences in face preferences may provide an early marker for ASD, which could enable earlier diagnosis and interventions.

The Development of Racial Essentialism in White and Black 5- and 6-Year Old Children
Gabrielle Ranger-Murdock, Psychology
Sponsors: Dr. Tara Mandalaywala, Psychology; Professor Marjorie Rhodes, Psychology

Racial essentialism involves viewing race as informative, inflexible and biologically based. Thus, expecting members of one race to be more similar to each other than members of other races. Children develop essentialist beliefs about social groups, such as race, in early childhood, but with variation in the strength of these beliefs.

Policing Women: Race and Women’s Implicit Associations towards the Police
Meghan Racklin, Politics, Psychology
Sponsor: Professor Patrick Shrout, Psychology

Police violence towards communities of color has made national headlines and garnered attention from political figures. Dialogue around this issue has focused on Black male victims, neglecting the experiences of women of color. The research literature also neglects to investigate the ways in which being both female and of color might impact a person's attitudes towards the police. This paper looks at the implicit attitudes that women of color hold towards the police, and how their attitudes compare to those of White women. An implicit association test was used to assess the strength of the association between the police and threat (relative to safety). Women of color associated police with safety more strongly than did White women. These findings indicate that the intersection of race and gender has an impact on implicit attitudes.

Can Preferences for Human and Monkey Faces at 6 and 9 Months Predict Later ASD Diagnosis?
Tazmin Rahman, Psychology
Sponsor: Professor Athena Vouloumanos, Psychology

Within their first year of life, typically-developing (TD) infants learn socially-relevant information from the people around them by attending to faces. Individuals with Autism Spectrum Disorder (ASD), who show deficits in social interactions and communication, attend to and process faces differently than their TD peers. Is this difference observable in infants as young as 6 months old? This study examined whether 6- and 9-month-olds later diagnosed with ASD attend to faces differently than TD infants. The author assessed infants’ preferences for primate faces (either human or monkey) over a non-face by measuring their looking behavior. At 6 months, TD infants showed a stronger preference for both primate faces over the non-face. ASD infants only showed a stronger preference for human faces compared to the non-face. However, both groups showed a stronger preference for human faces over the non-face compared to monkey faces over the non-face. At 9 months, TD infants showed a stronger preference for both primate faces over the non-face, while ASD infants did not show a preference for either. TD infants also showed a marginally stronger preference for human faces over the non-face compared to their preference for monkey faces over the non-face. ASD infants, however, showed equal preference for both human and monkey faces compared with the non-faces. These results show that there is no difference between TD and ASD infants’ face preferences at 6 months; however, at 9 months, there is a difference.

Impairments in face processing. Differences in face preferences may provide an early marker for ASD, which could enable earlier diagnosis and interventions.

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Pooled Estimates of the Return to Schooling and Analysis of Publication Bias in Previous Studies
Justin Rashtian, Economics
Sponsor: Professor David Cesarini, Economics

This project represents an update on Orley Ashenfelter et al.'s 1999 study, A Review of Estimates of the Schooling/Earnings Relationship, with Tests for Publication Bias. The author analyzed 42 different Ordinary Least Squares (OLS) and Instrumental Variables (IV) estimates from 23 different studies in order to test for what Ashenfelter terms the “filedrawer effect,” which is essentially publication bias. Upon plotting the estimates against their respective standard errors, both the OLS and IV plots displayed significant positive linear correlations, to p-values > 0.01. By displaying increasing effect sizes over increasing standard errors, the results confirm reporting bias in both the OLS and IV estimates but to a greater degree on the IV estimates.
Although the Ashenfelter et al. study only found bias in the IV estimates, this study overall confirms that publication bias in the returns to schooling literature is still an issue in both OLS and IV studies. This further solidifies that publication bias is a large part of the reason why IV estimates are unexpectedly higher than OLS estimates in most of the return to schooling literature. This study also pooled OLS and IV estimates in order to deduce a weighted average for the return to schooling with respect to the group of countries included in the study. The OLS pooled average is $7.51\% \pm 0.02\%$ The IV pooled average is $9.21\% \pm 0.02\%$. These pooled averages are slightly higher than those in the Ashenfelter et al. study.

**Psychological Factors Affect Health-Seeking Attitudes and Behaviors in White and Black American Adults**

Faith E. Robinson, Global Public Health/Prehealth
Sponsors: Dr. Tara Mandadiyala, Psychology; Professor Marjorie Rhodes, Psychology; Dr. Azizi Seixas, Population Health, NYU School of Medicine

Across the United States, racial health disparities between Black and White individuals are commonly attributed to systemic and institutional factors; however, psychological factors, such as racial essentialism, are likely to contribute also. Racial essentialism involves viewing race as an informative category marker in which group members share certain characteristics and traits (e.g., disease prevalence and health outcomes), which are fixed and stable across time and context. The present study investigated whether greater racial essentialism predicts worse attitudes towards and decreased willingness to engage in health-seeking behaviors, particularly in Black individuals who, as a racial group, are more likely to view poor health and chronic disease prevalence as an immutable consequence of being Black. The author recruited 597 adult participants (Black: 295; White: 302; Mage: 36.1 years) on Amazon’s Mechanical Turk to assess racial essentialism, participants’ attitudes and behaviors regarding healthcare seeking as well as the extent to which participants identified with their self-reported race. An interaction of participant race and racial essentialism on health attitudes and behaviors was found, such that Black participants with greater racial essentialism also exhibited more positive health-seeking attitudes and behaviors. No such relationship was found in White participants. In Black participants, this positive relationship was mediated by stronger racial identification. These results suggest that essentialism might contribute to better health attitudes and behaviors by protecting Black individuals from potentially harmful messages equating race and negative health outcomes and increasing motivation and self-efficacy to engage in pro-health behaviors.

**The Effects of Female Appearance in STEM**

Odile Rodrik, Psychology
Sponsor: Professor Tessa West, Psychology

This study investigates how appearance is associated with perceptions of female intelligence and social interaction (amount of partner liking) within STEM fields. Two factors of appearance, attractiveness and weight, are known to affect judgment of intelligence and social rapport. Research has demonstrated two competing findings on how appearance affects intelligence: some findings argue that more attractive individuals are judged to be intelligent, while other research posits that less attractive individuals are judged to be more intelligent. Other research has shown that weight stigmatization leads to judgments of intelligence and personality, specifically showing that higher BMI individuals are judged to be less intelligent and lazier than their lower BMI peers (Puhl and Hueuer, 2009). The current study intends to combine these relevant areas of literature by examining how female appearance affects perceptions of their intelligence and subsequent social interactions in STEM fields in a situation mirroring a natural and realistic work environment such as an interaction eliciting real-world effects. The present study utilizes male-female and female-female dyads in a math-based setting in which they are asked to rate their partner’s perceived intelligence and social rapport. Males, but not females, were found to rely heavily on their female partner’s appearance when judging their intelligence and how much they liked them. These results represent an unfair disadvantage that women face in STEM regarding their appearance. These results are increasingly important in order to have an open conversation about how to bridge the lack of gender diversity in STEM.

**The Influence of Moralization on Partisan Bias Detection**

Rachel Rondon, Psychology
Sponsors: Professor David Amodio, Psychology; Anne Hill, Psychology

Nowadays, identifying as a Democrat or Republican is the same as rejecting the opposing party. The increase in polarization and animosity between Democrats and Republicans over the past two decades may explain the increase in prejudice between the two parties (Pew Research Center, 2014). However, it does not account for the increase in discrimination that extends beyond the political domain to affect everything from whom we socialize with to whom we want to work with. In an effort to explain this phenomenon, this study proposes that moralizing one's political ideology—i.e., viewing political issues in terms of what is fundamentally right and wrong—results in the perception that the opposing political party’s values conflict with one's own values. These perceived value violations...
may then justify the expression of bias towards political out-group members (Crandall and Eshleman, 2003). It was here hypothesized that individuals with a high tendency to moralize political issues are less likely to detect partisan bias than those with a low tendency to moralize political issues. Participants were asked to complete an online survey in which they read scenarios depicting bias from a political in-group member towards a political out-group member. Measures of fairness, justification, attitudes towards political out-groups and propensity to moralize were collected in order to test the hypothesis. Using a Generalized Estimating Equations analysis, it was found that individuals with negative attitudes towards the opposing political party and a high propensity to moralize their political ideology—as opposed to individuals with a low propensity to moralize—were less likely to detect bias in the depictions of discrimination. These results imply that viewing political issues in abstract, moral terms may increase discrimination between Democrats and Republicans by decreasing the perception of partisan bias.

The (Un)Changing Media Discourse of Climate Migration
Tessa Rosenberry, Environmental Studies

Sponsor: Professor Jennifer Jacquet, Environmental Studies

Since its introduction into international policy and public attention, the idea of climate-change-induced migration has developed significantly in visibility, complexity and influence. A variety of research has looked at the implications of discourse used to contend with issues of climate change—and to a lesser extent, climate migration—and the effects that such discourse can have. However, there remains significant progress to be made in analysis of discourse around climate migration, and its relations to and impacts on other facets of society such as international law. Through content analyses of popular media sources relating to climate migration published in the past 7 years, this paper will explore trends in representation and treatment of the phenomenon through four major frames. It investigates the gap in representation of climate migration between peer-reviewed literature and popular media by comparing identified trends in discourse use and contextualizing them on a global scale. Its findings and discussion seek to address this gap, and its conclusions recommend a representative diversification of popular media reportage on climate migration.

Recycling Signage and Behavior Change
Tessa Rosenberry, Environmental Studies
Richard Davis Saltonstall, Economics, Environmental Studies
Justin Turlip, Environmental Studies

Sponsor: Professor Katie Schneider Paolantonio, Biology

Universities across the country are struggling to reduce the amount of waste they send to landfills and incinerators. Although some schools have managed to make groundbreaking improvements in waste management over the past few decades, many schools are still lagging to make ground. Schools like NYU only divert about 30% of waste away from landfills but have the potential to recycle as much as 90–100%. This study seeks to build an understanding of the sociological impact of signage updated with weekly feedback on recycling behaviors at NYU. The authors aim to determine the efficacy of a new recycling bin design for sorting waste and to evaluate a new signage method for its ability to increase diversion and sorting accuracy rates. It is hypothesized that the new bin and signage design will significantly increase recycling rates 10% or more.

Dissociating Two Forms of Altruism: How Do Humans Compute the Value of Someone Else’s Happiness?
Jonathan Rosenthal, Neural Science

Sponsor: Professor Jay van Bavel, Psychology

Humans regularly engage in altruistic behavior and even intrinsically value benefitting other people without indirect egoistic motivations, like reciprocity later. When internally computing how valuable acting altruistically is, however, subjects have at least two options: they could use their own preferences or they could use the recipient’s preferences. This study develops a human decision-making task and model to quantify the extent to which one’s own and one’s target’s preferences are represented in altruistic decision making. The author then examines how well different computational models predict human behavior to understand the abstract computations occurring in human altruistic decision-making. Ultimately, it was found that people rely both on their own and on their recipient’s preferences when making altruistic decisions, integrating these two into a final subjective value of the altruistic choice. Further, a model that differentially incorporates subject and target preferences based on context predicts subject choice best of all the models. This gives insight into how representations of others’ mental states may influence computations of value in vmPFC (ventromedial prefrontal cortex) and helps to add to the neural understanding of altruistic and pro-social decision making.
Human Craniofacial Morphology Variation Among Subsistence Groups in Hyper-Arid Climates

Katharine G.J. Ryan, Anthropology
Sponsors: Professor Susan C. Antón, Anthropology; Dr. Marisa Macias, American Museum of Natural History

Homo sapiens are the only primates to have successfully inhabited almost every type of climate on earth. Not only do humans modify their diets and behaviors in order to subsist in these environments, but over many generations physical features also change in response to the environments and different subsistence strategies. Many previous studies have identified global trends of this variation in the human head, which this study tests to see if they hold true under an extreme environmental condition. The author chose two archaeological populations from hyper-arid climates: Egyptians (agriculturalists) (N=40) and Australian Aboriginals (hunter-gatherers) (N=34). The author took standard craniometric measurements of the crania and mandibles using spreading calipers. The following trends were tested: Upper-Facial Height (NPH), Maximum Cranial Breadth (XCB), and the Bigonial Breadth (BGO) are significantly greater in agriculturalists than hunter-gatherers, while Maxillo-Alveolar Breadth (MAXB) is greater in hunter-gatherers. T-tests showed NPH (p < 0.0001), XCB (p < 0.0001), and BGO (p=0.016) were significantly greater in Egyptians, supporting expectations. However, MAXB (p=0.351) failed to reach significance. This could be because the palate, acting as the floor of the nasal cavity, is responding more strongly to the hyper-arid climate. An exploratory comparison to a third subsistence type, pastoralists from the American Southwest (N=40) showed affinity to the other two types except for MAXB which showed no significant difference among all three populations. This has promising implications for the interrelationship between subsistence and climate in craniofacial variation.

An Ethnographic Study of Modern Interspecies Relations in Costa Rica

Celia Salisbury, Sociology
Sponsor: Professor Colin Jerolmack, Sociology

Throughout history, animals have played a vital role in the progress of humanity. As the human population and industrialization has grown, so has the potential for new human-animal relationships. From the use of animals for food and protection, to using their strength in building towns and cities, to experimenting on them for medicine, humans’ ever-developing relationships with animals have become an unavoidable side effect of human development. With a merging of realities humans have lost sight of what animals and nature really are in their own right. Recently, many people have begun to work to reinvent more positive relationships with nature and animals under a realization of our inherent connection and our evident separation. Where the relationships have been tattered so severely, this reestablishment of meaning is forming new and confusing relationships. This research project seeks to begin to understand some of the relationships that have formed between humans and animals in modern day society and the impacts those relationships have on each party. In a two-week ethnographic study of Rainsong Wildlife Rescue in Cabuya, Costa Rica, the author was witness to and participated in various meaningful relationships with animals. In the end, two major themes arose: the romanticism of animals by humans and the growth of activism as byproducts of human-animal connections. Both themes represent complex associations between humans and animals. Furthermore, they lead to conclusions about two distinct forms of relationships: one that works to establish connections based on the objective worth of animals and one that seeks to fill a personal void with these connections. Driven by modern reenchantment, these relationships are potentially problematic and should be recognized as important areas of study for the animal and environmental protection movements.

The Suitability of the Taylor Rule as a Means of Monetary Policy

Maximilian Lord Schmitt, Economics
Sponsor: Professor Jess Benhabib, Economics

The purpose of this research paper is to address the suitability of the Taylor Rule as a means of monetary policy. By parameterizing an IS-LM model, this empirical analysis quantifies the impacts of misestimating the output gap on the stipulated nominal interest rate thereby measuring the impacts on output, inflation and employment levels. The analysis, which utilizes data from the Great Moderation, implies that contemporaneously misestimating the output gap value does not prove detrimental to the usage of Taylor-type principles in the short or long run, at least tentatively. However, given recent developments of monetary economics in light of the Great Recession, the paper opens a theoretical discussion on the role of monetary policy at the zero lower bound (ZLB) and on the possible interactions between Taylor-type principles and quantitative easing (QE). In conclusion, this paper resolves to maintain the importance of preserving a policy rule, even when certain economic conditions make doing so impossible. Moreover, as quantitative easing remains largely untested as a monetary policy tool, it becomes rather difficult to completely preclude the Taylor Rule from monetary policy discourse.
Improving Cultural Competencies in Public Policy to Reduce Native American Health Care Disparities
Anna Shellkin, English
Sponsor: Ann Neumann, Center for Religion and Media

Previous research indicates that “connection to one’s culture and community” can enhance health, but the current legal and medical climates inadequately accommodate non-White cultures (Horowitz, 2012). This academic study focuses on a legal, cultural and medical analysis of the ways Native American populations navigate federal healthcare policy. Through historical analysis of federal treaties with Native American tribes and US Civil Rights Commissions, it is apparent that “even laws that had nothing directly to do” with health care have “efficiently created different health incomes” specifically faced by minority populations (Matthew, 2015). This study includes an assessment of the National Museum of the American Indian’s ongoing exhibition, “Nation to Nation: Treaties Between The United States and American Indian Nations,” located in Washington, DC. The exhibit traces the “increasingly grim” chronicle of treaties between Native American tribes and the federal government and elevates the perspective of Native Americans in a national venue (Rothstein, 2014). This assessment, in conjunction with academic research and personal interviews, examines particular health care crises as they affect Native Americans and their ramifications in the general population in order to recommend policy changes to reduce cultural incompetencies.

Religiosity as a Confound to Selectorate Theory
Sepand Soheili, Politics
Sponsor: Professor B. Peter Rosendorff, Politics

Religion predates the modern nation state, but its effect on government policy and civil society has not been well documented. This paper explores the effect the relative degree of religiosity of a given country has on policy in the realm of public goods spending (particularly social insurance and social security spending). Academics such as Sherlock (2008), have argued that religion often serves the role of a public good. Scheve and Stasavage (2006) demonstrated a significant substitution effect with regards to religiosity and social insurance spending. This paper frames these studies in the context of Bueno de Mesquita et al.’s Selectorate theory in order to determine the effect religiosity has on social security and social insurance spending within regimes of varying Selectorate sizes. To determine the causal direction of this relationship, this paper also conducted a survey to measure the effect religiosity has on social insurance attitudes. The findings of this paper reveal a significant and perhaps causal negative relationship between religiosity and social security spending, as well as the need for further research.

Antibiotic Resistance as Pollution
Kristina Sokourenko, Anthropology, Environmental Studies
Sponsor: Professor Jennifer Jacquet, Environmental Studies

The medical importance of antibiotics is undeniable, but the rise of antibiotic resistance threatens the role that these drugs play in our current healthcare system. The majority of antibiotics (80%) in the United State are used in livestock production. Factory farms use antibiotics in sub-therapeutic doses as a preventative measure, creating ideal conditions for breeding resistant strains of bacteria. The spread of farm-bred resistance to humans in the form of drug-resistant infections has been confirmed, but the majority of research has been focused on the direct mode of transmission: the consumption of tainted meat, farmer carriage and community proximity to farming areas. This study is focused on the indirect spread of antibiotic resistance and aims to fill a gap in the literature regarding the environmental spread of antibiotic resistance from farms to society. Along with the animal products that a factory farm produces, the waste that it generates has been identified as a concerning reservoir of resistant strains. Animal manure is discharged into waterways without treatment and is repurposed as a fertilizer input in agriculture. This study investigates the existing body of research on environmental reservoirs of farm-bred antibiotic resistance determinants and residual antibiotics. Results show that the discharge of farm waste into waterways results in observable contamination downstream and that the use of animal manure in agriculture causes antibiotics and resistance determinants to persist in soil. Findings imply that the safety of the water and food supply may be threatened by the use of antibiotics in farms. The majority of research has taken place abroad, and additional environmental research must be done in the United States to understand whether farm practices are to blame for the rise of drug resistance and the decreased effectiveness of antibiotics in healthcare.

Musical Trailers: Methods for the Principled and Unbiased Selection of Stimuli for the Cognitive Study of Music
Stephen Spivack, Psychology
Sponsor: Professor Pascal Wallisch, Psychology

An active area of research in music perception involves correlating musical preference with personality traits such as extraversion and openness to experience. While some studies establish musical preference using self-report methods (Rawlings and Ciancarelli, 1997), others are interested in directly probing listening behavior in response to short clips from a variety of different genres (Rentfrow, Goldberg et al., 2011). Although the latter approach has been used extensively to establish that musical preference has a robust
underlying structure that maps onto personality, it is here argued that this method for selecting stimuli is inherently flawed due to its subjectivity. Because these music clips were arbitrarily chosen and assumed to represent music as a whole, this study is interested in how clip selection influences subsequent appraisal ratings. To test this, the author pooled together music from Rentfrow, Goldberg et al. (2011), the Billboard Hot 100 and expertly chosen “iconic” songs from which clips are systematically selected and then presented to participants. The author hypothesizes that depending on where within a song each of the clips are selected, subsequent appraisal ratings will differ in a statistically significant manner. If this is correct, it will help establish a better method of selecting musical stimuli for future studies interested in how music relates to brain and behavior.

**Power, Politics and Representation: The Effect of Women in Politics on Reported Crimes Against Women in India**

*Anjana Sreedhar, International Relations*  
*Sponsor: Professor B. Peter Rosendorff, Politics*

Increased political representation of minority groups has been touted as a solution to improving policy outcomes for that particular group. This paper explores the relationship between increased political representation for women at the administrative constituency level in India and reported crime rates against women including reservation as a mechanism to do so. The number of women who win close elections is used as the independent variable to strengthen causal specification and to counter endogeneity issues that come with the selection effects of preferring female to male leaders. Ultimately, it was discovered that there is a minor statistical connection between the proportion of women winning close elections and the reported crimes against women per district, indicating that increased political representation is an important mechanism to improve reporting rates of crimes against women. However, it is also argued that there needs to be better data-collecting methods and more solutions that use social development as a tool of empowerment for India, thereby decreasing actual crime rates against women.

**“Yes” and “No” as Sluicing**

*Cam Sweeney, Linguistics and French*  
*Sponsor: Professor Stephanie Harves, Linguistics*

Cushing (1972) and Sailor (2012) both propose that the polarity item “so” in sentences such as “I think so” is a sentential proform, which gets its meaning not from any internal structure but from context. According to Sailor, if “so” is a CP, thus in complementary distribution with the complementizer “that,” this would explain the ungrammaticality of “I think that so.” However, it is difficult to see how this proposal can be generalized cross-linguistically. In German, the polarity particle *schen* “so” has been observed to co-occur with *dass*, a complementizer equivalent to English “that.” Furthermore, it is unclear what Sailor’s and Cushing’s proposals have to say about Romance and Slavic languages that require an overt complementer with embedded polarity particles. To express “I think so,” at least Spanish, Catalan, Russian, Hebrew, French, Polish, Bosnian and Romanian use a construction that translates word-for-word to “I think that yes.” Sailor explicitly rejects an ellipsis analysis of “so” and “not” in the style of Kramer and Rawlins (2009), who argue a TP always follows “yes” and “no,” whether pronounced or elided. His opinion on the status of “yes” and “no” as proforms in English and cross-linguistically, however, remains unclear. This study adopts the ellipsis account of Kramer and Rawlins (2009) and Holmberg (2013) and extends it to the embedded particles “so” and “not.” It also adopts Holmberg’s treatment of “yes/no” as focused phrases and applies it to the embedded “so/not.” Specifically, it is argued that ellipsis after polarity particles is sluicing, a form of TP ellipsis occurring after focused elements most often wh- phrases. This study addresses the complementary distribution of polarity particles with focused phrases and demonstrates several syntactic similarities between the two. Finally, the author presents independent syntactic evidence that there is silent material in sentences like “I think so” across Germanic, Romance, and Slavic.

**Natural and “Unnatural” Disasters in Nepal**

*Dewi Tan, Anthropology, Art History*  
*Sponsor: Professor Anne Rademacher, Anthropology*

On April 25, 2015, a 7.8 magnitude earthquake struck Nepal, leaving more than 8,000 dead and 600,000 homes and infrastructures destroyed. There is a common misconception that biophysical events such as earthquakes are disasters when it is often man-made sociopolitical productions of vulnerability that result in the destruction of infrastructure and the loss of lives. This paper focuses on three main ongoing “unnatural” disasters present within Nepal’s 1) system of governance, 2) developmental apparatus and 3) quality of life. This research seeks to gain insight on the ways in which these three pre-existing forms of “unnatural” disasters are perpetuated and intensified by the earthquake. Interviews were conducted with earthquake survivors and workers in non-profit organizations such as House with Heart and S.O.S Village Kathmandu, and fieldwork in Nepal assessed how communities dealt with their intensified socioeconomic positions of vulnerability in the earthquake aftermath and how individuals and communities in an ecologically vulnerable nation like Nepal can learn
To Catch a Killer: Diagnosing Psychopathy from Nonverbal Signals: A Pilot Study
Iman Thambi, Psychopathology
Sponsor: Professor Pascal Wallisch, Psychopathy

This study explored whether psychopaths can be distinguished from non-psychopaths based on nonverbal signals—particularly eye movements—alone. Other disorders, such as autism and schizophrenia, have displayed characteristic oculomotor signatures, but this has remained unexplored in psychopathy. Thus, this study looked at a small sample of psychopaths and nonpsychopathic controls to determine whether they can be distinguished on the basis of various eye movements. It was found that this is the case. In particular, psychopaths displayed shorter inter blink intervals Therefore, it was concluded that it is possible to distinguish psychopaths from controls on this basis. These results are consistent with behavioral literature suggesting that psychopaths are more volatile in general, which seems to be reflected in low-level motor actions. This research opens up an avenue for more objective, large-scale diagnostics of psychopaths based on nonverbal signals that require no cooperation from the participant, as psychopaths are known to be able to manipulate verbal diagnostics.

The Production of Native and Non-Native Consonant Clusters
Tappy Tong, Communicative Sciences and Disorders
Sponsor: Professor Adam Buchwald, Communicative Sciences and Disorders, Steinhardt School of Culture, Education and Human Development

This study aimed to understand the nature of speech production by investigating how native English speakers learn to produce non-native consonant sequences (e.g., “fnob”). To address this issue, speakers produced both forms with native consonant clusters (e.g., “snob”) and non-native clusters clusters (e.g., “fnob”) as well as singleton consonants (e.g., “sob,” “knob,” and “fob”). The author measured and compared acoustic properties (i.e., durations) of the singleton consonants to the consonants in both native and non-native clusters. Previous research has shown that the individual sounds in native English clusters are shorter than the same sounds produced as singletons (e.g., the /s/ in “sob” is shorter than the /s/ in “snob”). Preliminary results replicated this finding with native clusters but found smaller differences between singletons and sounds in non-native clusters. This indicates that speakers produce native consonant sequences with greater coordination and overlap than nonnative clusters. These findings contribute to our understanding of the principles of speech production and can be used to understand speech production of impaired populations and second language learners.

A Program to Prevent Postpartum Depression: Enrollment Patterns
Lauren Kincal Veznedaroglu, Psychology
Sponsor: Professor Bonnie Kerker, Child and Adolescent Psychiatry, NYU School of Medicine

This pilot study examined enrollment rates of pregnant women at high-risk for developing postpartum depression (PPD), who were offered an educational program designed to reduce stress and increase social support during pregnancy. A recent study showed that an intervention focused on social support during pregnancy (called “Reach Out Stay Strong Essentials,” or ROSE), yielded positive results in a group format among a diverse population of women in multiple locations, indicating a decrease in prevalence of postpartum depression after delivery (Zlotnick, Miller et al., 2006). This model however, has not been implemented in an individual format or with a stepped-care design, which integrates health services with primary medical care in a step-treatment based on patient symptom severity (Bower and Gilbody, 2005). As early enrollment factors offer strong evidence for the success of research interventions (Haidich and Ioannidis, 2001), factors were assessed that predicted enrollment, hypothesizing that increased patient depressive symptomatology would be related to lower rates of enrollment in the intervention. The results of the pilot study will provide helpful information to predict the effective implementation of a modified ROSE protocol at a large, inner-city public hospital.

Explanation and Market Prediction of Bubbles in Chinese Tea Market
Yuwei Wang, Economics and Mathematics
Sponsor: Professor Boyan Jovanovic, Economics

The price of vintage Pu’er tea in China has been soaring in the last decade. This study presents a model to explain tea producers’ incentive to storage, which generates a speculative economic bubble in the current market as well as the behavior change under stochastic demand. It also provides method of a test using price, consumption and output to determine whether the bubble exists or not, which would serve as a general way to observe bubbles in other reproducible resources. By data regression and comparison to other famous economic bubbles in history, the author depicts the trend of prices as well as market behavior in the next few years and predicts a bubble crash.
Unconscious, Arbitrary Visual Symbols as a Cue for Phonoeme Identification

Lena Warnke, French and Linguistics, Psychology
Sponsors: Professor Alec Marantz, Linguistics and Psychology; Laura Gwilliams, Psychology

Acoustic properties of speech perception vary along a continuum, yet phoneme perception is categorical. The perceptual system uses various cues to aid this categorization (Repp, 1979; Ganong, 1980; Gick and Derrick, 2009), voice onset time (VOT) being a particularly robust example. In English, if voicing starts before 40ms after the release of the consonant, a phoneme will be classified as voiced (e.g., /b/); however, if it starts after 40ms, it will be classified as voiceless (e.g., /p/). This study examines 1) whether listeners can create an association between an unconscious, arbitrary visual cue and a phoneme category and 2) if this association can shift the boundary between phonemes. In a pre-test, the boundary between phonological categories was identified. Native English speakers performed a two-alternative-forced-choice consonant identification task (2AFC). Stimuli were spoken syllables varying along an eleven-step VOT continuum (e.g., /ba/-/pa/). Reaction times increased at the boundary between phonological categories, indicating categorical consonant perception. In the main experiment (data collection in process), stimuli will be a series of five-step syllable continua, each step determined by the proportion of voiced vs. voiceless selections from the pre-test. Before hearing a voiced phoneme, Symbol 1 will appear on the screen for 33ms (too fast for conscious awareness), and before hearing a voiceless phoneme, Symbol 2 will appear. Before hearing an ambiguous phoneme, Symbol 1 will appear half of the time and Symbol 2 the other half. Participants again performed a 2AFC task. If the categorization of an ambiguous phoneme differs depending on which symbol was presented, this would confirm that participants integrated unconscious visual information during auditory speech perception. Furthermore, this would support the idea that the perception of phonetic categories can be manipulated by artificial, arbitrary cues, suggesting that the system utilizes and integrates all available cues to aid speech-sound categorization.

How Anxiety and Racial Bias May Enhance Task Performance

Trina Wijangco, Psychology
Sponsor: Professor David Amodio, Psychology

Although the United States has made great strides towards egalitarian values, racial tensions and prejudice still persist. Research suggests that performance suffers in race-related tasks when people are anxious about their automatic, racial biases. In the present study, participants completed both a modified Stroop task and a Lexical Decision Task (LDT) that measured reaction times to Black stereotype-related words. Half of the participants were informed that a discussion regarding their racial biases would occur at the end of the study. In both tasks there were no differences in task performance or attention to the stereotype words between conditions. However, participants who reported higher ratings of anxiety displayed longer reaction times and attention to stereotype-related words. Although a clear link between intergroup anxiety and task performance has yet to be found, these findings further support cognitive depletion theory.
The Nationwide Teacher Shortage: Understanding the Causes and the Reforms That Educators Want
Emily Wood, Journalism, Psychology
Sponsor: Professor Brooke Kroeger, Journalism

The severe shortage of K–12 public school teachers is a well-documented problem in districts across the country, particularly in special education, math and science. This work provides an analysis of the nationwide teacher shortage, with an emphasis on an explanation of the events precipitating the shortage, how severe it is today and a look at the small but innovative programs trying to address the issue. Investigative journalism methods including qualitative interviews with experts and educators supported by published academic research and federal Title II data reveal that the teacher shortage is actually a collection of enmeshed problems in teacher education and placement. It stems from insufficient financial assistance to get into the field, low pay once there, lack of autonomy and respect that other professions demand, poor mentorship opportunities and training that does not prepare fledgling teachers for the challenges of teaching in Title I schools, where they increasingly begin their professional careers. This work provides an overview of the shortage situation and includes advice from teachers and education experts as to the changes that must occur in the teaching profession in order to renew interest in the field.

The Asian American Studies Experience: A Bicoastal Comparison
Iving Xu, Social and Cultural Analysis
Sponsor: Professor Jack Tchen, Social and Cultural Analysis

A relatively new academic field of study, Asian American Studies was born out of the 1968 San Francisco State University and 1969 University of California, Berkeley, Third World Liberation Front Strikes that called for the institution of ethnic studies. Though the field was first established and centered in California, the last four decades have seen the rise of Asian American Studies on college campuses across the United States. This study seeks to chart what differences, if any, have emerged between Asian American Studies programs as they have similarly migrated from one coast to another. Specifically, the focus of this project is a comparative analysis of the Asian American Studies Program at the University of California, Los Angeles, and the Asian/Pacific/American Studies program at New York University using historical and archival research to uncover their developmental context as well as interviews conducted with enrolled students in order to gain further insight into how program structure and experience varies across campus. Though geographic location has some role to play in the historical development and trajectory of these programs, the differences between the two instead stem largely from institutional variations such as departmental decision making and campus resources. This project has the potential to inform the development of new Asian American Studies programs, especially important given the current resurgence of student activism for the institution of these kinds of programs as well as the growth of the A/P/A Studies program here at NYU.

Do Attitudes Towards Obesity Vary with Ethnicity?
Farzana Ibat Yaseen, Sociology
Sponsor: Professor Iddo Tavory, Sociology

Previous studies have shown that stigma associated with weight influences how people view their own weight and the weights of others. People interpret their body weight status not according to physiology but through interaction with others. Existing literature emphasizes the role of Western media and its propagation of a thin ideal as responsible for this now global prevalence of stigma and consequently discrimination. Many communities that once saw fat bodies as valued or neutral now prefer thinness in response to Western beauty standards. Few studies, however, have looked into the Bangladeshi population. Consequently, the question of this study was, “Do students at the University of Dhaka have different attitudes toward obesity than students at New York University?” The author deployed a comparative survey approach that found that while stigma was present to some degree in both samples, nearly all of the significant data indicates a more negative attitude towards obesity in Bangladesh than in Americans, particularly among Bangladeshi females. Understanding cultural attitudes toward obesity and other conditions as such elucidate how international medical reports and discrimination play out in different environments and the possible reasons behind it, paving the way for better psychosocial initiatives that cater to different populations.

Trading Favors: Implication on Urban-Rural Divide and the Limit of Exchange
Zhemin Yuan, Economics
Sponsor: Professor Boyan Jovanovic, Economics

Following Hauser and Hopenhayn (2010), this paper defines “trading favors” as “cooperation without immediate reciprocity.” In particular, this paper investigates the pattern of “trading favors” under the existence of outside trading options. The demand for favors is modeled as a Poisson process to ensure asynchronous reciprocity. The meeting rate with potential partners is modeled as an exponential distribution to reflect the cost of waiting. Contrary to the literature of “thick market externality” (Diamond, 1982; Pagano, 1989), this model predicts that larger pool of potential partners will exert a negative externality over “trading favors,” i.e., higher meeting rate with outside options will
inhibit trading relationships. Previous authors who have studied the negative externality of market size are Cooley, Marimon et al. (2004), but their focus is on the emergence of new technology and limited contract enforcement. The data on community involvement in the state of Kansas generally fit the model, where the level of community involvement in the rural areas could be almost 40% higher than that in the urban areas (Greiner et al., 2004). In addition, the entry and exit conditions for “trading favors” are endogenously derived.

The Inability of the Arts and Antiquities Community to Combat the Crisis of Looting by ISIS in the Middle East
Marina Zheng, Art History, Journalism
Sponsor: Professor Brooke Kroeger, Journalism

Beyond claiming loud credit for destroying precious Islamic artifacts, ISIS is also the source of a black market antiquities trade that extends through the Middle East into the United States and Europe. This irony places curators, dealers, collectors, auction houses and other antiquities specialists in a terrible quandary. On the one hand, Islamic artifacts are highly desirable objects whose preservation is of vital importance to the region and the world. On the other, their purchase creates and expands a market that can encourage further, even greater acts of looting as it puts the purchasers in the position of effectively funding terror. This situation pits would-be allies against one another. While archeologists oppose any purchase of Islamic antiquities, museums and auction houses contend that this is an unrealistic response to the realities of the market. This conundrum has proved to be a challenge to the museum and dealer community. Purchase often happens through a long chain of intermediaries, making it difficult to identify the original seller. How should the international art community approach the matter of provenance and acquisition? What are the different perspectives of various antiquities experts as they navigate the possibility of sale or acquisition in the absence of a standardized approach to the problem? The urgency of the situation has prompted art historians and archeologists to propose possible solutions to the problem, but there is as yet no consensus on a common plan of action.

Acoustical Characteristics of Speech as Indicators of Psychopathy
Yanli Zhou, Mathematics, Psychology
Sponsor: Professor Pascal Wallisch, Psychology

Few personality disorders are more socially malignant than psychopathy. However, all diagnostic tests of psychopathy currently available consist of semi-structured interviews or self-reports (Buzina, 2012), which are problematic due to their subjective nature. Therefore, it is crucial to explore the possibility of developing more efficient and objective alternatives to identify psychopathic tendencies. As a reflection of emotional detachment, the voice of psychopaths is often characterized as monotonic and flat. This study asked the question whether the nonverbal behavior of psychopaths, in particular the tone of their voice, is really significantly different. The author performed Fourier Transform of voice samples of both known psychopaths and non-psychopath and analyzed acoustic characteristics including power spectral density, frequency and amplitude modulation using MATLAB programs developed by the author. It was found that psychopathic individuals exhibit less variation in tone and prosody, which was reflected through a lowered variance of the power signal over time than the control group. These findings are consistent with the theory proposing a dissociation of affective and semantic components of words in psychopaths (Cleckley, 1976). The development of a speech-analyzing algorithm that can effectively detect psychopathic tendencies is therefore worth exploring.
The role of a liberal arts education is to give broad knowledge to students to prepare them to face the world. Students can often graduate from college without gaining the most basic understanding of the sciences. Some may even prefer this, believing that science is reserved for a specific segment of our society. In fact, since Leonardo da Vinci, science has been infiltrating all aspects of society, from communication to energy to medicine, from the vineyards of Bordeaux to the classrooms where philosophical debates take place. Thus, scientific knowledge and an understanding of the basic principles of how it is obtained is absolutely essential for anyone hoping to understand and contribute to the world. As the ultimate goal of a university is to spread and foster knowledge and truth, it must provide a strong scientific education to all students.

—Claude Desplan, Professor of Biology

NATURAL SCIENCES

Design of a DNA Rhombohedron That Is Expected to Self-Assemble into a 3D Crystal
Hatem Abdallah, Chemistry, Nutrition
Matthew Zhao, Chemistry
Sponsor: Professor Nadrian Seeman, Chemistry

The self-assembly of three-dimensional crystalline structures is one of the main goals of structural DNA nanotechnology (Seeman, 1982). The first successfully designed self-assembled 3D DNA crystal was the two-turn tensegrity triangle (Zheng, Birktoft et al., 2009; Liu, Wang et al., 2004). The tensegrity triangle is a robust motif consisting of three double helices organized in an over-and-under three-fold pattern. It self-assembles into three-dimensional rhombohedral crystals via designed sticky ended cohesion. The purpose of this work is to expand the control of the system and self-assemble the rhombohedron as a stand-alone molecule via the fusion of 8 unique tensegrity triangles. The fused rhombohedron was designed by first fusing the 24 helical strands of eight tensegrity triangles to produce 12 unique helices corresponding to the twelve edges of the rhombohedron. Fusing the 24 crossover strands of eight triangles resulted in 6 unique single-crossover strands, 3 unique doubled crossover strands and 3 unique quadrupled crossover strands. The crossover strands were fused where the 5' end and 3' end of adjacent crossover strands were oriented adjacent to one another. Attempting to create an asymmetric rhombohedron out of eight different tensegrity triangles would require 56 unique strands, however the fused rhombohedron requires only 32 unique strands. Looking ahead, the crystallization will not be dependent on the eight triangles finding each other in solution: it will be possible to proceed directly to the crystallization self-assembly. It is also possible to use the rhombohedral unit to house large guests that can be placed there reliably before the crystallization self-assembly step.

Numerical Evaluation of Stable Probability Distributions
Sebastian Ament, Computer Science, Mathematics
Sponsors: Professor Michael O’Neil, Mathematics; Professor Margaret Wright, Computer Science

Stable distributions are an important class of probability distributions, which includes the well-known normal distribution. All stable distributions satisfy a generalized central limit theorem that provides theoretical reasons for
their practical importance. Even disregarding the well-known normal distribution, stable laws find many applications, most famously in physics, engineering and economics. However, with the exception of the normal, Cauchy and Lévy distributions, stable distributions cannot be expressed explicitly. Instead, they are defined by their characteristic function. As a consequence, computing values of stable density and distribution functions involves the computation of the inverse Fourier transform of the characteristic function. This is expensive in practice and limits the size of simulations involving stable laws. Making this computation fast and accurate was the goal of this work. To reach this goal, a number of series representations were derived that can be used to evaluate stable distributions efficiently. In the parameter ranges for which series representations fail, specialized quadrature rules were constructed to compute the Fourier transform integral quickly. The combination of these techniques made the evaluation of stable distributions over the whole parameter space possible. Depending on the specific parameter choice, the resulting speedup over previous approaches is between two and three orders of magnitude.

The Role of the Zelda Protein in Transcriptional Activation
Zerina Balic, Biology
Sponsor: Professor Christine Rushlow, Biology

One of the major events of early embryogenesis is the maternal-to-zygotic transition whereby control of development is transferred from the maternal genome to the zygotic genome. A key protein involved in this transition in Drosophila is Zelda (Zld), a transcription factor that is uniformly expressed throughout the embryo and binds to the regulatory regions of early developmental genes (Liang et al., 2008). The mechanism by which Zld interacts with the transcriptional machinery is still unclear. Zld is known to act on the machinery indirectly by increasing DNA accessibility (Foo et al., 2014) thus facilitating the binding of other transcription factors to regulatory genes. It may also act in a direct manner via the recruitment of RNA polymerase II (Pol II) to the promoters of regulatory genes. This project addresses the latter question by testing how Zld interacts with different core promoters to activate gene transcription. Using transgenic lines that carried varying numbers of Zld binding sites, different core promoters and a yellow reporter gene, the author tested for activation of the reporter with in situ hybridization. It was found that in all cases Zld binding sites alone were both necessary and sufficient to mediate transcriptional activation in the embryo. Because Zld has a key involvement in the regulation of development, elucidating its mechanism of action allows further insight into the developmental process. Given the conservation of a number of developmental genes and underlying transcriptional mechanisms between Drosophila and humans, this research could have an important role in increasing our understanding of human development and related developmental abnormalities.

Using CRISPR-Cas9 Technology to Investigate the Role of ERGIC-53 in Glycoprotein Trafficking to Exosomes
Salankara Bandyopadhyay, Biology
Sponsor: Professor Lara Mahal, Chemistry

Exosomes are membrane-bound vesicles secreted by a variety of cell types and have been observed to shuttle proteins, nucleic acids and other signaling biomolecules between cells, facilitating intercellular communication. Recent research has shown that N-linked glycosylation motifs, such as high mannose, play a significant role in glycoprotein trafficking to exosomes (Liang et al., 2014). The mechanism behind recruitment of glycoproteins to exosomes, however, has not yet been fully elucidated, although it is thought to be mediated by glycoprotein-lectin oligomerization interactions. ERGIC-53, a membrane lectin that binds high mannose motifs, is a candidate protein that could be involved in high mannose glycoprotein recruitment to exosomes. This study utilizes CRISPR-Cas9 technologies to knockout ERGIC-53 in HEK293T cells in order to determine its possible effects on high mannose glycoprotein recruitment to exosomes. This is an important area of research because ERGIC-53 has been seen in HIV-1 particles that are secreted from infected HEK293T cells. If ERGIC-53 is proven to have a role in high mannose glycoprotein recruitment to exosomes, this recruitment mechanism could then be manipulated to prevent HIV-1 from recruiting host glycoproteins into its secreted viral particles, thereby allowing for the creation of novel anti-HIV therapeutics.

Validation of AlphaSpace Through the Synthesis of a KIX/MLL Inhibitor
Viktoriya Berdan, Chemistry
Sponsor: Professor Paramjit Arora, Chemistry

Misregulated protein-protein interactions (PPIs) can lead to the expression of genes that cause various cancers and other diseases and are ideal targets for small molecule inhibitors. Some challenges involved in designing small molecule inhibitors for PPIs include lack of specificity and weak binding (Mapp, Pricer et al., 2015). The goal of this project is to design a potent inhibitor that binds specifically at the mixed lineage leukemia (MLL) transcription factor binding site of the KIX binding domain of the coactivator protein p300 (Majmudar, Hoffeldt et al, 2012; Denis, Chitayat et al., 2012). MLL mimics were designed based on analysis of the KIX surface with a new mapping program called AlphaSpace, (Rooklin, Wang et al., 2015). Predicted
peptide sequences were synthesized using solid phase peptide synthesis and purified using high performance liquid chromatography. The binding affinities of the MLL mimics for KIX were tested via a competitive binding assay. MLL mimic 14 (MLL14), which is a twelve residue long peptide and contains five mutations compared to the native sequence, proved to be the strongest binder. Current work is assessing the importance of each mutation through alanine mutational analysis.

Self-Inflating Colloidal Capsules
Rohit Bhan, Chemistry
Sponsor: Professor Stefano Sacanna, Chemistry

This study reports on a synthetic methodology to fabricate bulk quantities of micrometer-sized oil droplets that, upon a chemical stimulus, self-inflate into highly uniform microcapsules. The inflation mechanism is driven by a chemically generated internal osmotic pressure that forces water molecules to diffuse into the oil droplets. These water-filled oil shells are then fixed via a free radical polymerization that hardens the oil phase. The mechanical properties of the resulting polymeric capsules can be tuned, and range from soft and flexible to hard and brittle. Furthermore, it is shown that solid materials can be encapsulated with 100% efficiency.

Dosage Compensation Complex Localization in Caenorhabditis elegans
Krishna Bikkasani, Biology
Sponsor: Professor Sevinc Ercan, Biology

Condensins are evolutionarily conserved protein complexes that regulate chromosome condensation in eukaryotes. The mechanisms of condensin binding and spreading along chromosomes remain unknown. Most metazoans contain two types of condensins: Condensin I and II. In Caenorhabditis elegans, a third condensin complex known as the dosage compensation complex (DCC) specifically binds to both X chromosomes in hermaphrodites and represses transcription by half to equalize hermaphrodite (XX) and male (XO) X-expression. Two modes of DCC interaction with the chromosome have been identified: recruitment and spreading. While recruitment is understood, the biochemical mechanics of DCC attachment and spreading are not. DCC, which preferentially localizes to the X, differs from Condensin I by a single subunit: the SMC (structural maintenance of chromosomes) protein DPY27. Based on these structural features of the DCC, it is hypothesized that DPY27 directly confers X chromosome localization. To investigate the mechanisms by which DPY27 directs DCC to the X chromosome, the author generated transgenic strains of C. elegans containing mutagenic variants of the dpy-27 gene via MoSCl insertion. DCC ChIP-seq experiments will be used to see how mutations in different domains such as the catalytic ATPase head domain of DPY27 affect DCC binding and spreading across the genome. Increased DCC binding to its recruitment sites or decreased DCC spreading from its binding peaks due to ATPase mutations of DPY27 would suggest that DCC spreading across the chromosome is ATP-dependent. Alternatively, no deviation from the normal DCC binding profile would suggest that spreading is independent of ATPase activity. This analysis directly links DCC binding and spreading along the chromosome with structural features of the condensin complex. Determining the mechanisms of condensin spreading is important for understanding how condensins regulate chromosome structure.

The Role and Positioning of the Extracellular Matrix Relative to Migrating Cardiac Progenitor Cells in Ciona intestinalis
Saahil Brahmbhatt, Biology, Religious Studies
Sponsor: Professor Lionel Christiaen, Biology

Collective cell migration is important for cardiac development: migration errors can lead to fatal conditions such as cardiabifida. The invertebrate chordate Ciona intestinalis provides a simple model of collective cell migration as only two pairs of bilateral cardiac progenitors called trunk ventral cells (TVCs) stereotypically polarize and migrate away from the tail towards the ventral trunk in response to external signals. The extracellular matrix (ECM) facilitates migration of the TVCs through TVC-ECM adhesion via collagen receptors. Previous studies found that blocking total endodermal secretion caused migration defects as well as loss of discoidin domain receptor (DDR)—a collagen receptor—activity on the ventral surface of TVCs. Thus, a predicted position of the ECM proteins, secreted from the dorsally located endoderm, is on the ventral side of the TVCs. Yet, it is unknown if the TVCs are surrounded by the ECM on their dorsal and ventral surfaces or if the ECM surrounds only one side of the TVCs because the ECM has not been visualized until now. Determining this will inform previous findings of ventral DDR localization in the TVCs. Here the endoderm’s role in creating and positioning the ECM relative to the migrating TVCs was studied. In order to visualize the ECM, the author designed and cloned COL-9A1, a collagen secreted from the endoderm and into the ECM, driven with an endodermal enhancer (Ttf1) and fused to a fluorescent marker and co-visualized TVC migration. It was confirmed that the ECM surrounded the TVCs’ ventral surfaces and ongoing studies are assessing the effects of collagen loss on TVC migration. These findings will illuminate our understanding of the ECM’s role and interactions during TVC migration.
The Dynamics of Water Storage over Lake Eyre, Australia, Observed by Satellite Data
Obeng Kwaku Buo, Borough of Manhattan Community College, CUNY
Sponsor: Professor Kibrewassen Tesfagiorgis, Science, Borough of Manhattan Community College, CUNY

This study investigated the dynamics of water storage over Lake Eyre, Australia, using Polarization Ratio Variation Index (PRVI) values from The Advanced Microwave Scanning Radiometer (AMSR-E) and precipitation rate from the Tropical Rainfall Measuring Mission (TRMM). Lake Eyre, the largest lake in Australia and 18th largest in the world, is an ephemeral lake that fills up on rare occasions. Satellite microwave data such as PRVI values from AMSR-E are sensitive to surface change which helps to monitor soil surface wetness from space to detect inundation, hence, in this study the PRVI values were used to observe the water storage variation in Lake Eyre. Monthly satellite precipitation rate from TRMM and PRVI from AMSR-E were examined for the time frame of three years (2008–2010) to analyze the links between rainfall rate and water storage dynamics in the lake. Overall results show that high rain rate in the lake’s watershed is followed by high values of PRVI indicating water storage in the lake. High values of PRVI are observed from April to November 2009 that is consistent with recorded rise of the lake’s level by about 1.5m during the same period. During dry seasons, there is a high possibility of drought in the lake’s basin.

Novel Genes in LNvs Contribute to Regulation of Circadian Rhythms
Hon Hei Chau, Biology
Sponsor: Professor Justin Blau, Biology

The study focuses on Drosophila melanogaster (fruit flies) exhibit circadian rhythms (~24 hours) in activity similar to sleep-wake cycles in humans. These circadian rhythms are governed by a set of master pacemaker neurons, the lateral ventral neurons (LNvs), whose signals to other clock neurons are critical for maintaining precise circadian rhythms. The activity of LNvs is regulated by a core clock consisting of a transcriptional feedback loop involving Clock, Cycle, Period and Timeless. Although this core clock has been well characterized, LNv-specific RNA microarrays have identified numerous additional genes whose RNA levels oscillate with a 24-hr rhythm. Here, the author shows the importance of three of these genes—nAcRalpha-7E (which encodes a subunit of the nicotinic acetylcholine receptor), rush hour (which encodes an endosomal protein) and actin-5c—in maintaining 24-hr rhythms. It was found that mis-expression of these genes in the LNvs either lengthens or shortens period length. The current work is focused on understanding how these genes contribute to normal 24-hr rhythms. This will broaden current understandings of how the pacemaker LNvs help the brain keep track of time.

Investigation of Anti-Mesenchymal Glycogenes
Kimberly Chen, Biochemistry
Sponsor: Professor Lara K. Mahal, Chemistry

Carbohydrates play a significant role in altering biological function, especially through the posttranslational modification process known as glycosylation. A significant portion of all cell surface proteins is glycosylated. Glycans are found on receptors, cytokines, lipids, extracellular matrix proteins and other components of the cell. Prior work by the Mahal Lab identified a panel of glycosylation enzymes under the control of the microRNA (miR) 200 family that are capable of regulating epithelial to mesenchymal transition (EMT). EMT is a cellular process that is generally associated with embryogenesis and organ development but is also found in cancer metastasis. As it is under the control of multiple signaling pathways, EMT is complex to study and remains poorly defined. The prior work with the miR-200 family prompted the author to mine the cancer cell line panel NCI-60 for genes that favor an epithelial phenotype, which were termed anti-mesenchymal genes. A shRNA knockout of one gene, B3GNT3, induces EMT and transcriptional reprogramming in the epithelial lung cell line A549, suggesting that those genes could be integral components of the EMT regulatory network. TGF-β1 treatment of the epithelial cell line MCF10A revealed that three of those genes—B3GNT3, FUT1 and FUT2—were downregulated in MCF10A cells undergoing EMT. Further experiments are necessary to validate the anti-mesenchymal properties of these glycogenes. The significance of this work lies in the role of EMT (as well as the reverse process, MET) in wound healing, acquisition of stem-like properties as well as cancer migration.

The Role of Co-Agonist Self-Peptides in Enhancing T-Cell Responses to Agonist Peptides
Yuwen Cheng, Biology
Sponsor: Professor Michelle Krogsgaard, Pathology, NYU School of Medicine

Adaptive immune responses are triggered by T-cell receptor (TCR) recognition of agonist peptide-major histo-compatibility complex (pMHC) on antigen presenting cells. Appropriate self-peptide MHC (self-pMHC) interactions are crucial for T-cell selection and homeostatic signaling but also have been shown to enhance CD4+ T-cell response to foreign agonist peptides. Non-stimulatory self-peptides that enhance T-cell response to agonists are known as co-agonists. In an effort to understand the mechanistic basis of co-agonism, preliminary research identified self-peptides exhibiting a range of co-agonist potentials for CD8+ T-cells.
In this study, 8 representative self-pMHC were produced, and their low affinity pMHC/TCR interactions were measured using a highly sensitive binding assay. The results revealed that self-pMHC/TCR affinity is positively correlated with co-agonism potential, suggesting that self-peptides mediate coagonism through pMHC/TCR interactions. Through this work, the author hopes to ultimately provide insight into the role of self-peptides in enhancing immune responses to cancer or pathogenic antigens.

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

*Diane Choi, Biochemistry*

*Sponsor: Professor Claude Desplan, Biology*

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

**Temporal Integration Windows in (E)motion Perception**

*Silvia Choi, Psychology*

*Sponsor: Professor Jonathan Winawer, Psychology*

Meaningful and stable perception of visual stimuli depends on accumulation of sensory information over time. There appear to be multiple temporal scales at which the visual system integrates information. The duration over which features are combined has been called the temporal integration window (TIW). Here, the idea was tested that temporal integration of simple visual features occurs in much shorter TIWs than integration of more complex features. Two kinds of visual stimuli were used: motion (Experiment 1) and facial expression (Experiment 2). Experiment 1 is a replication of past work (Burr and Santoro, 2001). For Experiment 1, subjects judged the direction of moving dots presented in brief trials, ranging in duration from 27ms to 3400ms. The difficulty of the task was controlled by either manipulating a simple feature (the contrast of the dots) or a complex feature (the percentage of dots moving in the same direction). When varying contrast, performance improved up to ~150ms; however, there was no further improvement beyond 150ms, indicating a TIW of about 150ms. When varying the percentage of dots moving coherently, performance improved up to ~1000ms, indicating a TIW of 1s for motion coherence. For Experiment 2, similar methods were applied on a facial expression task: either manipulating the contrast of the faces, or the level of emotion (by morphing between a very happy and very sad face). The results anticipated are that the TIW for contrast, a relatively simple visual feature, is very shorter (~150ms) and for the morph condition is much longer (~1 second). Together, the results suggest that the human visual system analyzes images in multiple stages, with simple features like contrast analyzed in brief windows and more global features like motion coherence and facial expression integrated over longer time scales.

**Selective Hippocampal-Accumbal Plasticity in a Rodent Model of Addiction**

*Andrea Cumpelik, Neural Science*

*Sponsor: Professor Lucas Sjulson, Neuroscience and Physiology, NYU School of Medicine*

Addiction is a prevalent mental health disorder for which no effective treatment exists, mainly because its underlying mechanism has not been well described. Conditioned place preference (CPP) is a simple rodent model of addiction, used to evaluate reward value of a drug. Although this is a commonly used model in addiction research, its biological mechanism has not been well described. It is here hypothesized that a key component of this model is a pathway between two brain regions, the hippocampus and the nucleus accumbens, and that the acquisition of a CPP effect is correlated with selective strengthening of hippocampal inputs to the nucleus accumbens. To test this, neural activity from both brain regions will be record simultaneously, and changes in firing before, during, and after the animal is conditioned will be analyzed. It is expected that as a CPP effect is acquired, a subset of accumbens neurons will show a stronger response to the same input from the hippocampus, suggesting that this connection has become strengthened. Although conditioned place preference is a simple model compared to addiction in humans, identifying the groups of neurons involved and understanding their circuitry will provide groundwork to understanding this complex psychiatric disorder.
Identifying Novel Genes Modifying JAKSTAT Tumorigenicity
Atish De, Biochemistry
Sponsor: Professor Erika Bach, Biochemistry and Molecular Pharmacology, NYU School of Medicine

The JAK-STAT biochemical signaling pathway plays a key role in cellular growth, differentiation and proliferation of animal cells. The pathway consists partly of a cytokine-activated Janus kinase (JAK), which binds and dimerizes Signal Transducers and Activators of Transcription (STAT proteins), which then induce transcription of target genes. Drosophila melanogaster (fruit flies) contain a single JAK, called hop. A mutation to hop, known as hop tumorigenicity in Drosophila and thereby to create a baseline for future research into the exact nature of this pathway and its targets in hematopoiesis and cell proliferation. Specific regions on the third chromosome of Drosophila have been identified as containing these tumorigenic modifiers and are being narrowed down to individual modifying genes. The ultimate goals of this project are to identify Drosophila genes involved in tumor formation in order to understand potential genetic factors in human myeloproliferative neoplasms (MPNs) such as leukemia, myelofibrosis and polycythemia vera, which are often caused by similar JAK mutations. This endeavor may lead to new genetic targets for treatment of these diseases.

First-Principles Investigation of Segregation Effects in Metal Alloys
Rron Dedushi, Borough of Manhattan Community College, CUNY
Sponsor: Professor Daniel Torres, Science, Borough of Manhattan Community College, CUNY

Metal alloys such as brass or bronze are materials that have been employed since ancient times, made by combining two or more different metals. These alloys have applications in the field of manufacturing and are also employed extensively in the chemical, pharmaceutical and petrochemical industries. In an alloy, the chemical composition at the surface usually differs from that in the bulk, and hence one of the alloy components enriches the surface region. This phenomenon, known as surface segregation, strongly impacts the chemical properties of the alloys. In this project a database of the surface segregation energies in transition-metal alloys was presented that will provide information as to which component enriches the surface region of the alloy. This will be done by means of Density Functional calculations, a quantum mechanics-base modeling technic extensively employed in chemistry and materials science. This database, providing detailed atomistic structure of metal alloys, will ultimately help materials scientists synthesize better alloys.

Study of the Relay of Olfactory Sensory Input to Behavioral Output in Drosophila Larvae
S. Nathasha Egodage, Physics, Economics
Sponsor: Professor Marc Gershow, Physics

Drosophila larvae detect and respond to spatial and temporal gradients of odorants. Larval navigation consists of runs and turns, with head-sweeps orienting them in favorable directions within their environment. By tracking larval movements, it is possible to observe the decisions they make on turn rate, size and direction in relation to the stimulus provided. In place of controlling odor gas flows into the system (dish with living larvae), optogenetic activation is used, which makes it possible to activate individual olfactory receptor neurons using red light. Manipulating the activity of various sensory neurons, it is then possible to distinguish between those that mediate attractive and aversive chemotaxis.

Food Restriction-Plus-Exercise Induced Plasticity of Noradrenergic Axons in the Hippocampal Hilus of Adolescent Female Rats
Aja Evans, Neural Science
Sponsor: Professor Chiye Aoki, Neural Science

Anorexia nervosa is a disorder characterized by intentional food restriction, excessive weight loss and over exercise and often presents with comorbidity to anxiety and depression. The onset of this disorder is adolescence, a period of heightened neurogenesis, yet little is known about the structural and developmental impact the disease has on the brain. Norepinephrine (NE) is a neurotransmitter and hormone released during exercise and activity and is known to both stimulate and inhibit appetitive behavior. What has been shown is a perturbation of the peripheral norepinephrine system in diagnosed anorexia patients. However, whether the pattern of innervation by noradrenergic neurons within brain is also perturbed has never been examined. The cell bodies of the noradrenergic (NA) fibers are concentrated in the locus coeruleus and project to the hilus, an area of the brain dense in NA fibers. They are responsible for mediating the downstream impact of NE throughout the hippocampus. Because of the high innerva- tion of NA fibers in the hilus, this research focused on food restriction-plus-exercise induced plasticity of NA axons in this region. The behavioral and physiological impact of the disease was investigated using a vetted model of anorexia in rats, activity-based anorexia (ABA). After completion of the
behavioral assay, antibodies were used to visualize NA varicosities within the hilus. Varicosities are sites specialized for neurotransmitter release. NA varicosities are enriched in dopamine beta hydroxylase (DBH), the synthetic enzyme responsible for conversion of dopamine to norepinephrine. Plasticity of NA axons in the hilus was marked by a significantly larger number of varicosities along the axons of ABA animals as well as decreased interval space between varicosities along ABA axons. This study gives new insight into the role of anorexia and NE production in modulating changes along NA fibers within the hippocampus.

The Effect of Transforming Growth Factor Beta (TGFβ) Inhibition on Notch Signaling in Glioblastoma Stem Cells
Kush Fansivala, Economics
Sponsor: Professor Mary Helen Barcellos-Hoff, Radiation Oncology, NYU School of Medicine

Despite improvements in radiation treatment and surgery, Glioblastoma Multiforme (GBM) remains the most aggressive and common form of brain tumor in humans. It is incurable, and life prospects remain short. Prior research shows that inherent molecular mechanisms present in Glioblastoma Stem Cells (GSC) confer resistance to conventional treatment using radiation or chemotherapy. The cytokine TGFβ regulates mechanisms of radiosensitivity in GBM. The TGFβ signaling pathway promotes repair of DNA damage and decreases radiosensitivity of cells. Therefore, TGFβ seems to be a potential target for cancers insensitive to radiation therapy. This research seeks to understand the effect of TGFβ inhibition on GSC, which is responsible for the self-renewal ability of GBM, in vitro using patient cell lines. The experiments focused on the Notch signaling pathway, which has been implicated in neural stem cell renewal. Through the use of a novel Notch lentiviral reporter, flow cytometry experiments were performed to determine the effect of TGFβ inhibition on stem cell populations under various treatments, including radiation therapy and temozolomide, a chemotherapy drug. These preliminary experiments showed TGFβ inhibition decreases Notch stem cell populations under certain conditions, suggesting a possible therapeutic benefit by reducing self-renewal in GSCs. Future experiments will be performed using mice models to determine whether the effect is maintained in vivo.

Chemical Exchange Saturation Transfer (CEST): An Endogenous Contrast Agent for Imaging Protein Aggregation
Chaim Feigen, Chemistry
Sponsor: Professor Alexej Jerschow, Chemistry

Traditional MRI contrast techniques rely on the relaxation parameters of magnetic spins in the presence of a strong field. Recovery parallel to the field is accelerated in fatty environments, enabling anatomical differentiation. Magnetic decay perpendicular to the field is proportional to electrolyte concentrations, allowing for tumor detection. The current standard for MRI of specific biomarkers, however, relies on the introduction of metal agents that bind to the target. An alternative method for metabolite-specific contrast is based on how water interacts with that particular species. Each hydrogen attached to a biomolecule has a specific frequency of precession about its magnetic moment axis. Hydrogen populations can be selectively, magnetically deactivated on the basis of these signature frequencies. For a short period of time, this magnetic saturation can be transferred to the surrounding water. An evaluation of the overall sample water magnetization can reveal the degree of interaction. This study examines how chemical crosslinking of bovine serum albumin affects the ability of water to interact with saturated protons on the proteins. This research is important because chemical crosslinking is implicated in the formation of plaques in the cerebral cortex that lead to symptoms of Alzheimer’s. Accordingly, any initiative to image these plaques in vivo without the introduction of toxic metals across the blood brain barrier requires an improved understanding of the interactions between chemically immobilized carrier proteins and their surrounding aqueous media. Results show that while proton exchange decreases between solvent and crosslinked solute, the polypeptide backbone nonetheless experiences a stronger overall magnetic coupling to local water molecules.

The Hunt for Magnetic Monopoles in the Milky Way Galaxy
Felix Feist, Physics
Sponsor: Professor Glennys Farrar, Physics

Experts in particle theory tend to believe in the existence of a particle which acts like a magnet with just one pole, called the “magnetic monopole”—yet no magnetic monopole has ever been found. Monopoles likely take too much energy to create in a lab, which limits the search to monopoles which already exist somewhere in the Milky Way Galaxy. This project examines the behavior of magnetic monopoles traversing through the galaxy. Would the monopoles be quickly forced out of the galaxy by the omnipresent magnetic field? Is there an opportunity for them to form stable orbits? How likely is it for a monopole to hit the earth, if it came from a random direction? These questions are addressed through computer simulations of monopole trajectories using a model of the magnetic field (Jansson and Farrar, 2012).
Identification and Characterization of Otd-Dependent Enhancers

Alexander Ferrena, Biology
Sponsors: Dr. Rhea Datta, Biology; Professor Stephen Small, Biology

Transcription factors play a central role in the embryogenesis of the fruit fly, Drosophila melanogaster (Lelli, Slattery et al., 2012). One transcription factor, Bicoid (Bcd), is of vital importance and is referred to as a master regulator (Driever and Nüsslein-Volhard, 1988). However, the presence of Bcd is limited to certain species of flies (Lynch and Desplan, 2003). Another vital transcription factor is Orthodenticle (Otd), which is related to Bcd. In fruit flies, Otd plays a role in the regulation of head development. However, unlike Bcd, Otd is well conserved across a broad range of phyla. Furthermore, in other insects, Otd’s role is similar to that of the master regulator activity played by Bcd in fruit flies (Lynch and Desplan, 2003; Schroder, 2003). While Bcd’s activity in fruit flies is well understood, Otd’s role has not been studied in such detail. Thus, given the importance Otd has in other organisms and the lack of research into its activity in fruit flies, the goal of this project is to reach a deeper understanding of this transcription factor. In order to study the role of Otd, a two-part strategy was devised. First, Otd-dependent enhancer lines were generated. DNA-binding data for Otd was acquired by ChIP-seq. The portions of DNA found to be bound by Otd were then used to generate reporter gene constructs that were directly injected into fly lines. These lines were allowed to lay embryos. After collecting the embryos, in-situ hybridization was performed to identify the genetic expression patterns. This part of the project is ongoing. The second part of the project’s strategy will be to cross each of these Otd-dependent lines with a mutant line lacking Otd. After crossing, embryos will be collected and in-situ hybridizations will be performed. The resulting embryo patterns will then be compared to the corresponding enhancer line before the genetic cross. Comparing these will confirm the true role of Otd for each putative enhancer.

Inducible Protein Synthesis Inhibition

Alexandra Gastone, Neural Science, Psychology
Sponsor: Dr. Prerana Shrestha, Neural Science

Extensive studies have shown that de novo protein synthesis is necessary for memories to be stored as long term. Finding ways to manipulate protein synthesis would therefore not only elucidate the mechanisms underlying normal memory processes but also help better understand malfunctions of the system leading to memory-related diseases. However, past pharmacological approaches in protein synthesis inhibition have had off-target toxic effects. To address this problem, a new temporally and spatially selective tool is here provided: an inducible protein synthesis inhibition system (PSI). Protein synthesis is tightly regulated at the protein translation initiation step, which is itself dependent on dephosphorylated translation initiation factor eIF2. This system targets translation and thereby protein synthesis by pharmacologically inducing the kinase domain of protein kinase R (PKR), responsible for phosphorylating and thus inactivating eIF2. A cell type specific (Cre-dependent) and temporally selective (drug-inducible) system was therefore developed. The effectiveness of the system was confirmed with biochemical and behavioral assays. Indeed, pharmacological induction of PSI was correlated with markedly lower de novo protein synthesis translation levels in vitro. As for behavioral effects, mice were tested in a fear conditioning paradigm: the consolidation of said fear memory into long term has been established to be dependent on a new wave of protein synthesis. It was possible to effectively and reversibly block that wave of de novo protein synthesis using the PSI system: experimental Nestin-Cre (pan-neuronal) PSI mice exhibited significant memory impairments following PSI induction correlated with markedly lower translation rates in ex vivo slice preparations as well. This system has proven successful and will next be applied to specific subsets of neuronal populations. This will therefore allow a better understanding of the role of different cell populations in the consolidation of memory.

Measuring the Rate of Gene Deletion Using a Novel Selectable System

Saraj Gourkanti, Biology
Sponsor: Professor David Gresham, Biology

Patterns of genomic changes across generations provide significant information on the evolution of populations and their homologous genes in other organisms. The budding yeast, Saccharomyces cerevisiae, is an ideal model organism to study these genome changes in response to selective pressure. Nutrient limitation leads to single nucleotide polymorphisms (SNPs) and copy number variants (CNVs), which include duplication and deletions of large genomic segments. Previous work from this laboratory identified a deletion event for the general amino acid permease (GAP1) that arises in response to glutamine limitation (Gresham, Usaite et al., 2010). GAP1 is excised from the genome through homologous recombination between flanking long terminal repeats (LTRs) and can form a self-replicating extrachromosomal element known as GAP1circle. Currently, no method exists to measure the deletion rate of GAP1. To address this, a construct has been generated that enables the rate of genomic GAP1 deletion to be measured. Insertion of the GAP1 gene, approximately 4.4kb, between the constitutively expressed TEF promoter and the KanMX resistance gene interferes with
the expression of KanMX. When GAP1 is excised from the genome, a hybrid LTR sequence of 400bp remains and KanMX is expressed. Using selective media containing G418 provides a means of determining the rate at which this deletion event occurs. This genetic tool can be used to quantify both the spontaneous rate of GAP1 deletion and how this rate changes in response to environmental stress.

Examining ArfGAP W09D10.1 for a Role in Contact-Induced Polarization of Early Embryos
Angelica Guercio, Biology
Sponsors: Professor Jeremy Nance, Developmental Genetics, NYU School of Medicine; Diana Klompstra, Developmental Genetics, NYU School of Medicine

Polarization of embryos is a crucial developmental event that lays out the body plan of the organism. One type of polarization is that induced by cell-cell contacts. Contact-induced polarization is a process in which proteins are restricted to—or from—cell contacts to polarize the embryo, differentiating contacted from contact-free surfaces. The mechanism of contact-induced polarization in C. elegans is driven by the recruitment of the RhoGAP protein PAC-1 to cell contacts. PAC-1 recruitment results in subsequent asymmetric localization of PAR proteins, which are crucial in elaborating polarity. PAC-1 localization is dependent on the cell adhesion protein E-cadherin (Klompstra et al., 2015) as well as an uncharacterized E-cadherin-independent mechanism. W09D10.1 is an uncharacterized ArfGAP protein that physically interacts with E-cadherin, the PAC-1 recruiter. In mammals, Arf-GTPases interact with and cause Golgi-localization of ARHGAP10/21, a PAC-1 homolog. Since W09D10.1 has a putative ArfGAP function, and Arf-GTPases are regulated by ArfGAPs, localization of W09D10.1 to the Golgi suggest that it may function in PAC-1 recruitment, possibly assisting in the shuttling of the PAC-1 protein from the Golgi to contact-free surfaces. It was found that W09D10.1 does significantly colocalize with Golgi markers, putting W09D10.1 in the right place to regulate the localization of PAC-1 and its homologs, and thus potentially regulate contact-induced embryonic polarity. This hypothesis is being tested by examining whether PAC-1 localization is perturbed in a W09D10.1 deletion mutant, as well as a W09D10.1 E-cadherin double mutant. Elucidating the localization and function of W09D10.1 will provide a more complete understanding of the mechanisms of contact-induced polarity in the early embryo.

Testing the Application of a Time-lapse Quantification Tool Used to Reveal the Dynamic Qualities of Plant Movement
Angelica Guercio, Biology
Sponsor: Professor Eric Brenner, Biology

A common misnomer is that plants only move through growth-related processes. Growth-independent movements exist as well but are hard to observe. While time-lapse imaging can record these movements, previously it was not easily accessible. As a result, a program called Plant Tracer has been developed that takes time-lapse movies recorded through Apps on mobile devices and quantifies various aspects of plant movement. Plant Tracer uses movement capture technology to produce a graphical tracing of the movement and from this measures the rate, period, amplitude and angle of bending. Using Plant Tracer the author explored the gravitrophic responses of Arabidopsis thaliana Columbia versus PGM-1 mutant strain. While it is known how starch statolith settling in the roots results in gravitrophic responses and how mutants such as PGM-1 can retard these responses, what is still misunderstood is the dynamism of these responses, i.e., the differing movements of each plant. The results show that not only was PGM-1 gravitrophic response retarded compared to wildtype but it also had a significantly smaller angle of inclination as well as apex movement rate. These results extrapolate on which movements are altered by gravitrophic mutants and can offer a greater understanding for how mutants affect gravitrophic response. In addition, the author designed the Plant Tracer software so it is also able to analyze other plant movements such as circumnutation. The future goal is to examine the circummutatitic movements of the plant as a sensory system via testing Arabidopsis in a number of different environments to see if it can sense and adapt to its neighbors.

Analyzing Growth Rate of E. Coli Flagella
Jonathan Ha, Physics
Sponsor: Dr. Linda Turner Stern, The Rowland Institute, Harvard University

Bacterial flagella provide the primary mode of transportation for many different types of bacteria, including many virulent strains such as Vibrio cholerae (which causes cholera), Salmonella and Escherichia coli. The presence of a flagellum is an important factor in evaluating the virulence of bacteria because more motile bacteria are generally more virulent. Understanding the biophysics of the bacterial flagella can lead to a deeper understanding between the relationship of the presence of a flagellum in a bacterium and the virulence of a bacterium. The classical theory, nicknamed “tread-milling,” describes the growth of a flagellum as a product of random diffusion. The flagellum
is constructed as a cylinder with a “perfectly absorbing boundary”: anything that touches the circular face of the cylinder will be absorbed and subsumed into the flagellum. In addition, the basic building blocks of the flagellum randomly dissociate at a rate not necessarily associated with the absorption rate. This model predicts the exponential decay in the speed of growth as flagella become longer. In this study, experiments directly measured the growth rate of these flagella using a series of staggered time-delayed photographs. It was found that E. coli flagella do not seem to grow in the presence of unfiltered mercury light. Once a blue light filter was added to the microscope relay system, E. coli flagella seemed to grow as demonstrated over a series of 4-hour photographs. At the time of writing, data are still being gathered and analyzed to determine the exact rate at which flagella grow.

**Envelope Residue 375 Substitutions in Simian-Human Immunodeficiency Viruses Enhance CD4 Binding and Replication in Rhesus Macaques**

*Paul Hahn, Biology*

**Sponsor:** Professor George Shaw, Cell and Molecular Biology, Perelman School of Medicine at the University of Pennsylvania

Chimeric simian-human immunodeficiency viruses (SHIVs) for the study of pathogenesis and assessment of HIV-1 vaccines in non-human primate models are a high priority for HIV-1 research. However, most SHIV’s expressing Env glycoproteins derived from HIV-1 fail to adequately infect rhesus macaques in vivo. Here, it is hypothesized that changing a key residue (S375) at the CD4 binding site of HIV-1 Env to naturally occurring SIV Env residues might enhance viral entry and replication in vivo. SHIVs containing Transmitted/Founder (T/F) HIV-1 Env proteins with genotypic variants (S, M, Y, H, W, F) at residue 375 were constructed and analyzed in vitro and in vivo. Substituting large hydrophobic and basic residues for the hydrophilic S375 enhanced viral entry into rhesus macaque CD4 (rhCD4) and viral replication in rhCD4 T-cells in vitro. Upon inoculation of rhesus macaques with SHIVs containing different Env375 variants, all animals became productively infected, and SHIVs replicated persistently at titers comparable to HIV-1 in humans. Additionally, SHIVs elicited autologous neutralizing antibody responses in rhesus macaques, also typical of HIV-1 infections in humans. Seven of the twenty-four animals acquired and succumbed to AIDS. These results demonstrate that Env-rhCD4-375 is a key site and determinant for productive SHIV infection in rhesus macaques and validate a novel strategy for the production of SHIVs to be used in HIV-1 research. Altogether, these findings promote a new paradigm for SHIV design and modeling with important applications to HIV-1 cure, vaccine and pathogenesis research.

**Investigating the Role of the Prefrontal Cortex in Human Fear Regulation**

*Mathew Hakimi, Psychology*

**Sponsors:** Professor Elizabeth Phelps, Psychology; Dr. Marijn Kroes, Psychology; Dr. Joseph Dunsmoor, Psychology

Aversive events can trigger a range of psychopathological diseases such as anxiety disorders. The primary treatment for such disorders is cognitive behavioral therapy. Cognitive regulation training (CRT), a component of cognitive behavioral therapy, teaches people to reinterpret an aversive stimulus in a more positive way, reducing their negative emotional responses to that stimulus. While previous research indicates that there is a correlation between lateral prefrontal cortex (lPFC) activity and use of cognitive regulation, the aim of this project was to determine whether the lPFC is necessary for cognitive regulation. To establish necessity, patients with lPFC damage were compared to matched controls. All participants underwent a fear conditioning task where they learned that one image (CS+) predicted mild electrical shocks to the wrist while another image (CS-) did not. Afterwards, the experimenter taught participants how to regulate fear responses to the CS+ through CRT. Participants’ regulation skills were then tested by repeating the fear conditioning task. To determine whether patients showed impaired cognitive regulation of fear, self-report measures were used to assess the intensity of subjective fear and skin conductance response as an index of fear arousal. The self-report results indicated that patients could not regulate subjective fear intensity while controls could. Analyses of skin conductance responses, however, were inconclusive due to high patient variance. The results provide initial evidence that the lPFC is necessary for cognitive regulation of subjective measures of learned fear. These findings increase the understanding of the neural basis of cognitive regulation and suggest that lPFC functioning could determine the effectiveness of cognitive treatments for anxiety.

**Synthesis of Chiral Triazabicyclodecene (TBD) Derivatives as Catalysts for Organic Syntheses**

*Tyler Heitmann, Biochemistry*

**Sponsor:** Professor Tianning Diao, Chemistry

The concept of chirality is influential in organic synthesis, biological functions and many other fields. An object is chiral when its mirror image is non-superimposable on itself. These two mirror images are known as enantiomers. A challenge in many synthesis projects is to create one enantiomer over the other, also known as asymmetric synthesis. Oftentimes one enantiomer of a drug will act on its target successfully, while the other is ineffective or harmful. Therefore it is critical to produce the drug in its enatio-pure...
An Extragenic Hawaii-Derived X-Linked Suppressor of the N2-Derived Rol-1 Gene in *C. elegans*

**James Hong, Biology**

*Asif Miah, Biology*

**Sponsor:** Professor Matthew Rockman, Biology

Suppressors can alleviate or even fully restore wild-type function of a mutated gene in organisms. This process occurs through two possible methods: 1) suppressors that act on the same gene as the mutation do so through intragenic suppression or 2) suppressors that lie on a different gene but can still operate on the mutation through extragenic suppression. Normally, the suppressor is another mutation that acts on the mutation of interest. However, there is evidence for a natural extragenic suppressor segregating in wild strains that alleviates the characteristic movement of rol-1 *C. elegans* mutants. Through linkage and association mapping, the author anticipates uncovering the chromosomal location of the suppressor that acts on the rol-1 gene that governs the variation in phenotypic movement in these worms. Through crosses involving the rol-1 strain BE22 and chromosome X substitution strain WE5241, the suppressor was determined to be a bypass extragenic suppressor. In finding a natural suppressor, it is possible to delve into the evolutionary implications of having a natural suppressor acting on the rol-1 mutation in *C. elegans*. Furthermore, it is potentially possible to provide a model for disease studies that can help elucidate mechanisms by which different organisms are variably affected by the same disease.

**Probability Information in Short Term Memory**

*Maija Honig, Biology, Psychology*

**Sponsors:** Professor Weiji Ma, Neural Science, Psychology; Professor Daryl Fougnie, Psychology, NYU Abu Dhabi

Memory is extremely variable even for simple features such as color. If a person is asked to remember a specific shade of red their estimate could be a crimson, pink or orange. Current theories of short-term memory assume that this variability is due to noise in the memory storage or recall process and that memory is a point estimate (e.g., a specific color value). There is, however, another possibility that memory is not just a point estimate but rather is more complex perhaps containing a probability distribution over possible colors that people can use with other information to make decisions. To test this, an experiment was conducted where people were asked to view many trials of sets of colors on a computer and report the color they saw and a metric of confidence by clicking a color wheel (~2000 trials). Furthermore, to examine whether probability information stored in memory could be integrated with other prior information expectations were introduced about the viewed colors on some trials such that some colors were more frequent than others. It was found that participants had higher error when lower confidence was reported, suggesting that they possessed meta-knowledge of their memory quality. Furthermore, on trials where some colors were more frequent participants were biased towards the most frequent colors with bias increasing with decreasing confidence. This data is consistent with mathematical models that suggest memory stores probability information and this probability information can be combined prior knowledge in a Bayesian manner to make decisions.

**An Investigation on Tesla’s Valvular Conduit Design: Creation of a One-Way Valve with No Moving Parts**

*Dean Huang, Mathematics, Physics*

**Sponsor:** Professor Leif Ristroph, Mathematics

Valves are an integral part of human history, from the development of simple water pumps to modern citywide water pipe labyrinths. However, one thing nearly all valves hold in common is the incorporation of moving parts. The issue with moving parts is that whenever a knob is turned or a flap opened, the valve’s functionality deteriorates. Therefore, the main goal of this project is to develop a valve design that utilizes no moving parts. The concept of such a valve has been proposed before by Nikola Tesla but has never been used or tested in a research environment. Currently, the project consists of obtaining experimental measurements for the comparative resistance (by measuring and comparing the resistance along each direction of the valve). Later on, the author will conduct experiments to refine the features that cause a greater resistance, find a
mathematical model for the flow through the valve and test applications for everyday life. There are many engineering applications such as using the valve in microfluidics to develop a computer that runs on water rather than electricity. There are also applications in biology such as using the mathematical model to explain respiratory systems in complex organisms.

Determining Scene Recognition Through Analysis of Eye Scanning Patterns
Surya Ierokomos, Economics, Mathematics
Sponsors: Professor Wendy Suzuki, Neural Science; Dr. John Sakon, Neural Science

The scan path of eye movement, which is referred to as the eyetrace, has a vast array of uses for fields as diverse as psychology and marketing. In particular, eyetrace analysis offers a powerful way to non-invasively study cognition, specifically with regards to attention, within both animals and humans. Typically, for studies in animals and infants a comparison of looking times is used as a proxy for recognition of previously seen or novel visual stimuli. However, this simple metric often fails to accurately classify such recognition signals, which has led to the creation of more sophisticated correlational and edit length methods that implement spatiotemporal information from subjects’ eyetraces. Building upon existing methods, a novel method, TrackPaths, was here created. The method incorporates both sequential and spatial information from eyetraces through the strategic placement of Gaussian kernels over an attention map. TrackPaths outperforms previous techniques of identifying recognition of repeated or novel videos shown to both animals and humans.

Cells in Motion: The Role of Endocytic Trafficking in Regulating the Migration of Precardiac Cells in Ciona intestinalis
Tanim Jain, Biology
Sponsor: Professor Lionel Christiaen, Biology

Collective cell migration is essential for proper cardiac development. Two pairs of bilaterally symmetric cardiac progenitor cells termed trunk ventral cells (TVCs) in Ciona intestinalis, a chordate closely related to vertebrates, provide the simplest model for the study of collective cell migration and polarity. TVC migration is regulated by the function of receptor tyrosine kinases (RTKs), specifically DDR, VEGFR and FGFR. Prior investigations indicate that RTKs’ regulation of cell migration is coupled to their own intracellular trafficking and localization, processes that are controlled by Rab GTPases. The subcellular localization and trafficking patterns of these regulatory RTKs in actively migrating TVCs have not been previously described. Due to the membrane localization of both protein families and distribution of Rab proteins to specific vesicular membranes, a co-localization analysis of fluorescently tagged RTKs and Rabs indicated how the RTKs were distributed subcellularly. Through this analysis using Imaris software, it was
found that VEGFR and FGFR are significantly associated with degradation in actively migrating TVCs and DDR is both recycled and degraded. Additionally, disrupting certain Rab GTPases’ activities using dominant negative mutations resulted in TVC migration defects, further illustrating the importance of endocytic recycling pathways on cell migration. Therefore, it was concluded that regulation of RTK trafficking, degradation and localization by Rab proteins is integral to proper TVC migration. These results provide a better understanding of the role of RTKs and Rab GTPases on collective cell migration and set the basis for further investigations into cardiac developmental defects caused by a disruption of migratory regulation.

**Retrieval-Induced Memory Enhancement Is Accompanied by an Increase of NPAS4 in the Medial Prefrontal Cortex**

*Dana Kapeller-Libermann, Neural Science  
Sponsor: Professor Cristina Alberini, Neural Science*

Understanding the mechanisms of memory formation and enhancement is important for both healthy conditions and diseases. Using rat inhibitory avoidance (IA), a context-dependent fear memory task, the Alberini Lab previously showed that three brief reactivations of a recent IA memory enhance memory strength (Inda et al., 2011). Further analyses found that this memory enhancement is accompanied by bidirectional changes of excitatory and inhibitory synapse markers in the medial prefrontal cortex (mPFC). Neuronal PAS domain protein 4 (NPAS4) is a transcription factor, which regulates inhibitory/excitatory synapse balance during development (Lin et al., 2008). It is hypothesized that NPAS4 regulates inhibitory and excitatory synapse formation during retrieval-dependent memory enhancement. The current study examined whether and in which mPFC neuronal subtypes NPAS4 expression changes following training and retrievals. Hence, NPAS4 levels in the following groups of rats were quantified: untrained controls ( naïve, N) rats, rats which received IA training (non-reactivation, or NoR) and rats which underwent IA training followed by three 10-second re-exposures to the training apparatus (3Rs) as previously established (Inda et al., 2011). Using immunohistochemistry, it was found that 3Rs significantly induce NPAS4 levels in the mPFC compared to N and NoR conditions, which expressed similar levels of NPAS4. The increase was of similar magnitude for the mPFC subregions (IL) and prelimbic (PL) cortices. This finding was further confirmed by western blot analysis of NPas4 in mPFC extracts. In addition, co-staining with inhibitory neuronal marker glutamate acid decarboxylase 67 (GAD67) and excitatory neuronal marker calcium calmodulin protein kinase II (CAMKII) revealed that NPAS4 induced by 3Rs was mostly localized in excitatory neurons. Thus, retrieval is accompanied by increased NPAS4 levels in mPFC excitatory neurons, suggesting a role of NPAS4 in retrieval-induced memory enhancement. Further studies will establish the causal link between NPAS4 induction and memory enhancement and/or memory consolidation.

**Holographic Microscopy in Diffusive Light Scattering Media**

*Priya Kasimbeg, Economics, Physics  
Sponsor: Professor David Grier, Physics*

Holographic microscopy is a technique that uses the wave property of light to analyze micro particles. Unlike conventional light scattering techniques holographic microscopy can simultaneously determine the size and index of refraction of micro particles, yielding the capability to distinguish between same size micro particles. The technology has been proven to be extremely accurate in suspensions in clear media. However, particles suspended in cloudy media have shown to be a bigger challenge for the technology due to light scattering of the medium itself. The objective of this project is to improve the computational component of this technology by examining the properties of the noise caused by the light scattering media. The properties of the noise distribution imply it is possible to create pixel-selecting algorithms that only analyze part of the particle holograms where the effect of noise is minimized. Improving the technology in this area is critical to its success and applicability because if corrected it can be applied to a very wide range of naturally cloudy substances like pharmaceuticals, food products and technological materials to monitor their safety and quality.

**Distributed Systems and Cryptography for Electronic Voting Systems**

*Danna Kelmer, Computer Science  
Sponsor: Professor Victor Shoup, Computer Science*

As recent history has demonstrated, voting systems in the United States do not come close to meeting modern technological standards. Voting machines are outdated, expensive to maintain and often cause significant problems on election days including inaccurate vote counts. This project posits an alternative electronic voting system aimed at alleviating these issues. Security and reliability are fundamental tenets of this improved voting system. Security is guaranteed by cryptographic protocols that maintain privacy and verifiability. Voters are thereby able to remain anonymous, yet confident that their votes are being counted properly. Reliability is guaranteed by a non-deterministic distributed system. This protects against election tampering by ensuring every vote that is cast is saved for tallying without deletions or omissions of any votes. The non-determinism aspect of the storage system also ensures
that the system will not get stuck while saving votes. This distributed system can also be used for other applications that require stable data storage. This project demonstrates that the aforementioned elements of this system are marked improvement over current ones.

**Studying the Mechanism of Fluorescence Quenching in Diels Alder Cycloadditions**

*Sameer Khan, Biochemistry*

**Sponsor: Professor Daniela Buccella, Chemistry*

Inverse electron demand Diels-Alder reactions between tetrazines and strained alkenes have extensive applications from bioconjugation of fluorophores to the functionalization of surfaces. The attractiveness of these reactions is, due to their fast kinetics, the generation of only one by-product (N2) as well as their potential fluorogenic properties, which creates a luminescent product from non-emissive starting materials. The fluorogenic nature of this reaction originates from the ability of tetrazines to quench fluorescence of various fluorophores prior to reaction. This project explores the mechanisms of fluorescence quenching by tetrazines and the reaction products, specifically focusing on electron transfer. In this research, the author will study the behavior of different Coumarin- and BODIPY-based dyes in presence of different quenchers and correlate the quenching efficiency with the electrochemical properties of the fluorophores. Fluorescence spectroscopy, lifetime and electrochemical studies will be used to establish this correlation and elucidate what type of quenching mechanism is taking place. It is hypothesized that photoinduced electron transfer (PET) is the mechanism responsible for the fluorophore quenching. Understanding of the PET quenching mechanism involved may lead to better fluorogenic reactions with maximized emission of the conjugated fluorophores. This will have an important impact in providing a controlled way of turning on and off the fluorescence emission of probes based on dye-tetrazine combinations within the cell.

**Characterization of Single Nucleotide Variants in the Human elf2α Kinase GCN2**

*Mark Khoury, Neural Science*

**Sponsor: Professor Eric Klann, Neural Science*

Autism spectrum disorder (ASD) is a complex developmental disorder. Recent evidence suggests that one possible underlying mechanism is dysregulated protein synthesis. In mice, mutations in genes encoding translation initiation regulatory proteins recapitulate several cellular and behavioral phenotypes characteristic of human ASD patients. A critical step in translation initiation is the recruitment of eIF2, which brings the initiator methionyl tRNA to the ribosome. eIF2 is a heterotrimeric GTPase composed of three subunits (α, β, γ) and is regulated by four kinases. Phosphorylation of eIF2 on the α subunit leads to global protein synthesis inhibition and enhanced translation of specific mRNAs with 5' upstream open reading frames (5' uORFs) such as ATF4 and BACE1. GCN2 is one of these four kinases and phosphorylates eIF2α in response to accumulation of uncharged tRNAs during amino acid starvation. Using the Simons Simplex Collection (SSC) several ASD-associated single nucleotide variants (SNVs) in GCN2 were identified. Two ultra rare missense mutations, A1347T and P1272L, have a high probability of damaging its protein structure and function. The in vitro data demonstrates that A1347T and P1272L are gain and loss of function mutations respectively. Additionally, both mutations result in altered GCN2 amino acid sensing capability, eIF2α phosphorylation and steady state protein synthesis levels. Together, the data demonstrate that two ultra rare ASD-associated SNVs impair GCN2 function, alter protein synthesis and further support the importance of dysregulated translational homeostasis in ASD. These results, for the first time, implicate GCN2 as a novel ASD risk factor gene, encouraging future studies on its role in neural development.

**Bridging the Gap: Serum-Stimulation Demystifies the Relationship between Platelets and the Endothelium in Lupus, Further Links Rheumatologic and Cardiovascular Diseases**

*Kristen Lee, Biology*

**Sponsor: Professor Jeffrey Berger, Medicine and Surgery, NYU School of Medicine*

Platelet activation plays a crucial role in hemostatic pathologies and has been linked to increased risk of cardiovascular disease in Systemic Lupus Erythematosus (SLE). The relationship between the platelet and the endothelium is important in understanding these roles, but this relationship is poorly understood in the setting of SLE. Using megakaryocytes, the platelet precursor from which the anuclear platelet inherits its genetic material, and collagen-coated coverslips, as well as ex-vivo platelets and endothelial cells, systems were created to resemble in-vivo blood vessels in SLE patients and healthy controls. While it has been previously shown that activated platelets adhere more readily to the endothelium, it is shown here that sera from SLE patients can induce adhesion of platelets and megakaryocytes, whereas sera from healthy controls cannot. In addition, it is shown that incubation with SLE sera can up-regulate expression of inflammatory, adhesion and cytokine genes in endothelial cells and megakaryocytes. It is also suggested that these effects are due the platelet-specific induction of the IL-1β signal cascade. It is concluded that platelets are important mediators in understanding the risks of cardiovascular disease in patients with SLE. This study
will begin to provide evidence for clinical trials testing IL-1β pathway antagonists or anti-platelet medications to alleviate these risks.

**Helicity Estimation of 2’-Fluoro-DNA/DNA Hybrids**

*Benjamin Ley, Biochemistry*

*Robert Tseng, Biochemistry*

*Sponsor: Professor Nadrian Seeman, Chemistry*

Structural DNA nanotechnology uses reciprocal exchange between DNA double helices to produce branched DNA motifs (Seeman, 2003). These motifs are combined using sticky-ended cohesion to produce specific structures. 2’-Fluoro-DNA is a nucleic acid variant that assumes only the A-form and is thought to have dominant helicity when hybridized with standard DNA. This has potential use in DNA nanotechnology: DNA can assume the A-form or the B-form or others, and the ability to control the helical form would introduce another feature which can be used to build more diverse structures. However, many of the properties of 2’-Fluoro-DNA that make it useful to DNA nanotechnology currently remain uncharacterized. Here, a system composed of two double crossover (DX) tiles constructed from a hybrid of 2’-Fluoro-DNA and normal DNA have been used to determine the helicity of the hybrid (Fu and Seeman, 1993; Lukeman, Mittal et al., 2004). The resulting 2D arrays were visualized using atomic force microscopy. The helical repeat of a 2’-Fluoro DNA/DNA hybrid duplex has been determined to be 12.1 nucleotide pairs per turn (Winfree, Liu et al., 1998). Oligonucleotides containing 2’-fluoro groups have been reported to increase the melting temperature of duplex DNA by 1.3°C per insertion. Relative to DNA-DNA duplexes a hybrid 2’-Fluoro-DNA–DNA duplex is also more resistant to modification or cleavage by enzymes (Cummins, Owens et al., 1995).

**Validation of Acute Proteomic Changes in Hippocampal and Cortical Lysates of ASD Model Mice**

*Derek Lin, Neural Science*

*Sponsor: Professor Eric Klann, Neural Science*

Fragile X Syndrome (FXS) is the most common known cause of inherited intellectual disability and single genetic cause of Autism spectrum disorders (ASD). FXS is caused by a mutation in the FMR1 gene, specifically the mutative over-abundance of CGG repeats (normal: <50 repeats; full mutation: >200 repeats), which leads to hyper-methylation and gene silencing. Although there have been many studies of FXS to date, the exact mechanisms underlying the disorder remain unclear. One cellular process that has been implicated in FXS is inappropriate protein synthesis that can lead to the cellular and synaptic network defects that characterize some of the ASD phenotypes observed in both patients and FXS animal models. To date, few studies have placed an emphasis on identifying and examining specific transcript changes at the proteomic level in ASD mouse models. With this goal in mind, a combinatorial proteomic technique was utilized, i.e., BONLAC (bioorthogonal noncanonical amino acid tagging (BONCAT) and stable isotope labeling by amino acids in circuits (SILAC)), to measure acute proteomic changes in hippocampal slices of ASD model mice and their wild-type counterparts. Specifically, the Fmr1 KO mouse model was utilized in the current analysis, and both steady-state and activity-induced changes in translation were examined.

**From Snail Toxin to Therapeutic Drug Design: Computationally Investigating α-Conotoxin, α-GID, as a Drug Precursor to Treat Neurological Disease**

*Xiaofei Lin, Biology*

*Sponsor: Professor Richard Bonneau, Biology*

Conotoxins are small disulfide-rich peptides from the venom of marine snails of the genus Conus. They have been used as highly effective research tools to characterize ion channels to understand the molecular mechanisms of the brain and treat neurological disease. The conotoxin of interest for this project is the neuronal nicotinic acetylcholine receptor (nAChR) targeting α-conotoxin, α-GID, functionally characterized to target the α4β2 receptor subtype. Previous studies have suggested that GID’s unique four residue N-terminal tail is functionally crucial to its selectivity for the α4β2 receptor. However, the molecular mechanisms of this toxin/receptor interaction are unknown. Using Rosetta macromolecular modeling suite, the role of this GID tail in selectivity for the α4β2 receptor was computationally investigated. To address the lack of an experimental co-crystal structure, the author generated computational homology models of the GID toxin bound to the α4β2 receptor for analysis. Based on residue proximity, homology models predicted the GID tail to be primarily α subunit facing, with specific proximity at a α loop motif. When analyzing energetics, electrostatic interactions were identified that are crucial for stabilizing the GID tail with the α4β2 receptor. Lastly, Rosetta was used to redesign the 4 residues of the GID tail to produce a GID mutant predicted to have a higher affinity for prospective experimental synthesis as a drug candidate. The computational approaches used in structure-based drug design allow understanding of protein interactions when experimental information is not available and effectively improve the time and cost efficiency challenges of the drug discovery process. The methods used here are general and could be applied to other protein-peptide interactions.
Synthesis and Evaluation of Triazolamer-Based Scaffolds as Secondary Structure Mimics
Igor Maksimovic, Chemistry
Sponsor: Professor Paramjit Arora, Chemistry

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

Understanding the Role of H4K20 Monomethylation in C. elegans X-Chromosome Dosage Compensation
Nina Maryn, Biology
Sponsor: Professor Sevinc Ercan, Biology

Dosage compensation is critical for organisms that exhibit sexual dimorphism, wherein chromosome number differ between the sexes. C. elegans hermaphrodites (XX) reduce the expression of both X chromosomes by half via the dosage compensation protein complex (DCC), equalizing expression of most X-linked genes to that of males (XO), by a mechanism that is unknown. It is hypothesized that the Dpy-21 subunit of the DCC regulates H4K20me1 levels, a histone modification that is up-regulated on the X chromosome compared to the autosomes, and is responsible for DCC spreading (Vielle et al., 2012). This protein, however, has never been tagged, nor has an antibody been successfully raised against it. Therefore, its exact localization along the X-chromosome is unknown. The goal of this project is to understand how Dpy-21 modulates H4K20me1 levels on the X chromosome and how H4K20me1 affects binding of the DCC to the DNA.

The current model states that Dpy-21 represses Set-4, which converts H4K20me1 to H4K20me2 and me3. To test this, a CRISPR dpy-21 mutant will be crossed with a set-4 mutant and the double mutant will be analyzed for suppression of the dpy-21 phenotype. To test if the role of H4K20me1 is to increase DCC spreading, the author has crossed a strain of Set-4 null mutant animals with an X:V chromosome fusion strain, to see if increased H4K20me1 along the autosomal portion (due to the Set-4 deletion) will increase DCC spreading further down the autosomal chromosome in the double set-4/fusion mutant compared to the typical fusion strain, which is to be tested through ChIP-Seq.

Validation of TGIF2 Activation of FUT8 in Melanoma Metastasis
Meagan McDermott, Global Public Health/Prehealth
Sponsor: Professor Lara Mahal, Chemistry

Glycosylation is the most abundant posttranslational modification of proteins. Uncontrolled glycosylation patterns have contributed to many cancers including melanoma. The enzyme alpha (1,6) fucosyltransferase (FUT8) is responsible for installing a core fucose linkage onto proteins. Preliminary data suggest that changes in FUT8 expression levels may play a role in melanoma metastasis. Because of the connection between FUT8 and cancer, it is crucial to understand the regulation of this enzyme. Through chromatin immunoprecipitation (ChIP) experiments FUT8 has been identified as a potential target of transcription factor TGIF2. An siRNA knock down of TGIF2 was used to test if TGIF2 is able to bind to FUT8. To verify the interaction between FUT8 and TGIF2, luciferase reporter assays were created and performed. In addition, FUT8 expression was quantified using real time PCR. The results of this study will supply a better understanding of the control mechanisms of glycosylation epitopes impacting melanoma metastasis.

A Randomized Controlled Study Examining 13 Minutes of Daily Meditation Training on Attention, Mood and the Emotional Response to Acute Stress
Alexandra C. McHale, Neural Science, Psychology
Sponsors: Professor Wendy Suzuki, Neural Science; Dr. Julia Basso, Neural Science

Meditation is an ancient practice that stems from Buddhist and Hindu cultures. A major purpose of meditation is to focus the mind, clearing it of the propensity towards wandering or unfocused thought. Recent research assessing the capacity of meditation to change the brain has shown that meditation decreases stress, improves mood, boosts cognitive functioning, increases the brain’s functional connectivity and enhances alpha and theta power—brain states associated with relaxation. Few studies, however, have examined the
effects of brief, daily meditation on cognitive functions in a randomized controlled design. To address this hole in the literature, this study examines whether 13 minutes of daily meditation practice in healthy adults could improve cognitive functioning and mood as well as the emotional response to an acute stressor. In this randomized controlled study, healthy adults (18–45 years of age) with little to no experience meditating underwent either 8 weeks of a daily, 13-minute meditation practice (n=16) or listened to a Radiolab podcast (control) (n=15). Before and after the intervention, subjects completed a battery of neuropsychological tasks as well as several self-reported mood questionnaires. At the end of the 8 weeks, subjects also completed the Trier Social Stress Test (TSST), a test combining mental arithmetic with social evaluation that served as an acute stressor. Meditation significantly enhanced attention as assessed by the Stroop Test (Time x Group: F(1,28)=5.025, p=0.033, partial $\eta^2=0.152$) and decreased anxiety as assessed by the Beck Anxiety Inventory (Time x Group: F(1,29)=4.758, p=0.037, partial $\eta^2=0.141$). Additionally, compared to controls, meditators showed a significantly diminished emotional response to an acute stressor (Time x Group: F(3.316,92.843)=2.683, p=0.046, partial $\eta^2=0.087$). These results suggest that even brief, daily meditation training in healthy adults can improve attention and mood as well as decrease emotional activation to an acute stress.

**Effects of Post-Encoding Stress on Contextual and Stimulus-Response Memory**

Yeva Mendelevich, Psychology  
Sponsors: Professor Elizabeth Phelps, Psychology; Elizabeth Goldfarb, Psychology

How does acute stress affect memory after learning? Stress affects multiple memory systems in different ways, depending on the timing of the stress relative to learning. Existing literature investigating the effect of post-encoding stress on contextual (hippocampal) and stimulus-response (striatal) memory in rats has shown that subjects experiencing emotional arousal following a learning phase were later biased towards the use of stimulus-response memory in a dual-solution context (Wingard and Packard, 2008). This phenomenon may be attributed to the impairment of hippocampal memory and the enhancement of striatal memory under stress (Packard, 2009). To test the effects of post-encoding stress in humans, the author implemented a 2-day protocol in which participants underwent a stress manipulation with the cold pressor task (CPT) following completion of the visual search task (Chun and Phelps, 1999; Goldfarb et. al., forthcoming). It was expected that participants who had been exposed to stress on day 1 will on day 2 (post-stress) show impaired contextual memory on the visual search task through increased relative reaction time on contextual trials and enhanced stimulus-response memory through decreased relative reaction time on stimulus-response trials.

**Mechanisms of HIV-Tat-Induced Neuronal Excitotoxicity**

Sage Morison, Neural Science  
Sponsor: Professor Edward Ziff, Biochemistry and Molecular Pharmacology, NYU School of Medicine

Antiretroviral therapies have improved diagnoses and extended the lifespan of people living with human immunodeficiency virus (PLHIV). Consequently, the long-term effects, particularly neurologic, of HIV infection have become an important field of research. One of the most disquieting complications of HIV infection is a comorbid neuropsychiatric disorder such as depression or dementia. These comorbid complications are poorly controlled by current therapies, which cannot efficiently cross the blood-brain barrier (BBB), unlike HIV, making the brain a viral reservoir. These disorders are therefore thought to have a biological underpinning in the case of HIV comorbidity. This study focused on the HIV-associated neuronal death in the hippocampus. Though HIV can cross the BBB, it cannot infect neurons themselves but rather nearby glial cells. These glial reservoirs then release HIV-associated proteins such as Tat, an HIV-produced transactivator of transcription. Tat can induce calcium dysregulation and excitotoxic death in neurons otherwise unexposed to HIV. The study focused on the intracellular mechanism by which Tat induces excitotoxicity. Tat-induced calcium dysregulation is N-methyl-D-aspartate receptor (NMDAR) mediated, confirming its excitatory property, following which it activates the nNOS pathway. Several novel components to the known mechanism have been described. The study has implicated AMPAR recruitment to the synapse and release of internal stores of calcium in the Tat-induced calcium dysregulation. Moreover, the results confirmed the activation of protein kinase G (PKG), a downstream effector of the nNOS pathway, an activator of internal calcium channels and a stabilizer of calcium permeable AMPARs in the synapse. The study has therefore expanded the current model of HIV-Tat-induced excitotoxicity and its resultant neuronal death and proposed a possible pharmacological target to help ease HIV-comorbid depression and dementia.

**The Effects of Antibiotic Exposure on the Gut Microbiome and Its Relation to IgA Synthesis in the Murine Model**

Briana Mullins, Biochemistry  
Sponsors: Dr. Victoria Ruiz, Microbiology, NYU School of Medicine; Professor Martin Blaser, Microbiology, NYU School of Medicine

The human microbiome is the collection of microorganisms living on and within the human body. The microbiome
outnumbers human cells 10 to 1. A major component of the human microbiome is the gut microbiota. It has been shown that the microbes in the gut play an important role in early development of a host’s immune system, specifically that of antibody Immunoglobulin A (IgA). In the absence of microbiota, the immune system develops abnormally with anomalies such as underdeveloped lymph nodes, smaller spleens and longer small intestines. The effects of microbiota on the synthesis and secretion of IgA was investigated by exposing mice to various antibiotic treatments and subsequently examining IgA levels and gene expression. Antibiotic treatment was found to greatly decrease IgA levels present in fecal and blood serum samples, suggesting synthesis and secretion of IgA are both greatly decreased. Gene expression analysis of ileum tissue showed greater down-regulation of genes in the T-cell independent activation pathway of IgA secreting B-cells, with undetermined regulation in the T-cell dependent pathway.

The Effect of Cognitive Enrichment on Computerized Cognitive Training in Adults with a Traumatic Brain Injury
Koret Munguldar, Psychology
Sponsor: Professor Gerald Voelbel, Occupational Therapy, Steinhardt School of Culture, Education and Human Development

The present study investigated the effects of Cognitive Enrichment Activities on the benefits of a computerized cognitive training program in adults with Traumatic Brain Injury. Participants (N=47) were assessed with CNS-Vital Signs for Processing Speed (PS) at baseline and 12 weeks later. Experimental group (n=19) underwent 40 hours of computerized cognitive training on the Brain Fitness Program. The control group (n=28) did not receive any active cognitive tasks. All participants were surveyed weekly about how much time they spent on Cognitive Enrichment Activities. The change in mean group PS scores was non-significant (p=.25). The correlation between the change in the PS and cognitive enrichment was r=.36. A regression analyses revealed a significant interaction between group (experimental versus control) and the mean number of hours spent weekly on Cognitive Enrichment Activities predicting the change in the PS. Post-hoc analyses revealed increased time spent on Cognitive Enrichment Activities predicted an increase in PS at follow-up in both groups. However, the change in PS was greater in the experimental than the control group. Therefore, the results demonstrate the greatest gain in PS was in the experimental group who spent the greatest time on Cognitive Enrichment Activities.

Trial-and-Error Learning in Reward-Based Decision-Making
Pamela J. Osborn Popp, Neural Science
Sponsors: Professor Nathaniel Daw, Princeton Neuroscience Institute, Princeton University; Professor Peter Dayan, Gatsby Computational Neuroscience Unit, University College London

Reinforcement learning experiments investigate learning behavior by capitalizing on subjects' desire to maximize their rewards and minimize their punishments. In the current reinforcement learning (RL) study, an economic choice task was administered in which human subjects make repeated decisions between risky prospects—essentially slot machines. The amount of information provided about the prospects was manipulated in order to investigate differences between subjects’ decision-making strategies when learning from experience and when learning from description. Through computational modeling, it is possible to test specific predictions about the neural systems and processes that give way to observed behavior. The author also compared the effectiveness of existing RL models at explaining subjects’ choice behavior by using maximum-likelihood fitting and Bayesian model selection. Interestingly, in trials where subjects were able to learn from description rather than solely from experience, subjects’ data more closely followed the predictions of a “trial-and-error” learning model, indicating that they were ignoring the explicit information given. One possible explanation for this result is that trial-and-error learning conserves working memory, and its use is optimal when the energy cost associated with more complex cognitive computations outweighs the perceived worth of possible rewards. Currently data from a follow-up experiment is being collecting to determine whether it is possible to manipulate subjects’ usage of trial-and-error learning strategies with specific changes to the task structure and design. Behavioral data from such experiments can be combined with data from neuroimaging, neurobiology and neuropathology to reach comprehensive conclusions about the methods and mechanisms of learning and choice.

Creating Functional 3D DNA Crystals Using Triplex-Forming Oligonucleotides
Anthony Osuala, Chemistry
Sponsor: Professor Nadrian Seeman, Chemistry

It has been previously demonstrated that triplex-forming oligonucleotides (TFO) can bind to oligopurine-oligopyrimidine sequences embedded within the helical domains of three-turn and four-turn tensegrity triangles. Moreover, the addition of the TFO can be used to reinforce the sticky-end interaction between two-turn triangles in a self-assembled crystal. The binding of the TFO greatly improved the stability of the DNA crystals at various ionic...
strengths. The aim of this project is to use the same approach to stabilize the interactions of larger tensegrity triangles. Larger constructs have more practical applications to serve as scaffolds to host macromolecules. Experiments have shown that the resolution of self-assembled 3D DNA crystals decreases as the size of the triangle cavity increases. Here, the three-turn triangle used by Rusling et al. was redesigned by making the arms of the triangle longer and shortening the number of base pairs between the crossovers (Zheng, Birktoft et al., 2009). The three-turn triangle previously used had 17 base pairs (bp) between and 7-nt long arms. In this project the three-turn triangle was redesigned to have 7-nt between junctions while having 12-nt long arms, which accommodate a 20-nt long TFO strand. The re-designed system may allow self-assembled 3D crystals to be obtained that would diffract at a higher resolution higher than 7.5Å (resolution without the TFOs). Additionally, the four-turn tensegrity triangle has been designed to have 28-nt between junctions, which accommodate a 17-nt TFO. These X-Ray crystallography experiments could help provide extensive information for protein-based products worldwide and for applications in the medical and pharmaceutical fields.

The Neural and Perceptual Consequences of Rapid Statistical Adaptation in Humans
Ravi Pancholi, Biochemistry
Sponsor: Professor Marisa Carrasco, Psychology

Humans’ visual experience is constantly changing. To control for the wildly variable stimuli in the environment, the visual system needs a mechanism that allows for both reliable and efficient encoding. One key regulator is visual adaptation. Visual adaptation is a physiological process that scales and shifts neural response so that the vast dynamic range of most stimuli can be translated into the very limited range of neural response. Orientation-selective neurons in primary visual cortex of anaesthetized cats adapt their response properties to match a bias in the statistics of rapidly changing stimuli. Here, two novel results are shown: 1) a similar change in response properties can manifest itself in human observers as a perceptual repulsive aftereffect and 2) this distortion in perceptual reports occurs even when observers are unaware of the biased feature. This new mode of unconscious adaptation presents psychophysicists with the ability to probe the effects of adaptation on neural populations both very quickly and without the risk of observer bias. In addition, these findings may help elucidate the mechanism of adaptation in the brain, specifically the downstream cascade of distortions in early population responses and their possible compensation in higher cortical regions.
From Worker to Gamergate: Uncovering the Behavioral and Morphological Patterns Associated with Phenotypic Plasticity in *Harpegnathos saltator*

Apurva Parikh, Biology

Sponsor: Professor Claude Desplan, Biology

Across biology there are numerous examples of phenotypic plasticity, in which one genotype can give rise to multiple phenotypes based on perturbations in environmental conditions. This phenomenon has been observed in Jerdon’s jumping ant (*Harpegnathos saltator*), a eusocial ant that can transition from a non-reproductive worker caste to a reproductive caste, known as a “gamergate,” depending on the presence (or absence) of the queen through a ritualized dueling process, in which workers fight amongst themselves to establish dominance. This study sought to determine the behavioral and molecular basis for the transition to gamergate. The frequency of dueling among particular workers served as a behavioral marker of their transition to gamergates. In this study, dueling behavior and egg laying were tracked over a period of 90 days in each of three replicate *H. saltator* colonies. In each case, the distinction between worker and gamergate on the basis of dueling behavior became apparent after approximately 10 days of observation. Gamergates were defined as ants that duesled consistently and laid eggs frequently over the course of 90 days. A more careful analysis of the first ten days revealed that prospective gamergates duesled preferentially with one another following day 2 of observation. The plasticity of the transition from worker to gamergate was confirmed by a reversion experiment, in which an established gamergate was removed from a colony, isolated for approximately 14 days and policed upon relocation to a new colony consisting of established reproductives. Finally, volumetric comparisons of the medulla and lobula among callow workers, combined with differences in the expression level of vitellogenin, suggested the presence of two morphologically distinct worker subsets prior to the gamergate transition.

**Specificity of Fragile-X Mental Retardation Protein-RNA complex**

Shivali Patel, Biochemistry

Sponsor: Professor Alexander Serganov, Biochemistry and Molecular Pharmacology, NYU School of Medicine

Fragile X Syndrome is the most common heritable form of mental retardation and a known genetic form of autism. The X-linked disorder is caused by the absence of functional Fragile X Mental Retardation Protein (FMRP) encoded by the FMR1 gene. In cells, FMRP interacts with many nucleic acids and proteins and is involved in various cellular processes. One major function of FMRP is to repress translation of a subset of neuronal messenger RNAs until a specific signal is received. The loss of this translational repression is likely the underlying cause of the syndrome. How FMRP selects its mRNA targets for inhibition remains unclear. Therefore x-ray crystallography and biochemical assays were employed to study the molecular basis of FMRP binding to its RNA targets. These experiments resulted in crystallization and determination of the three-dimensional crystal structure of the RNA binding domain of FMRP bound to RNA. The structure suggests sequence specific interactions between FMRP and RNA. The findings will help define the RNA recognition pattern of FMRP, identify mRNAs bound by this protein and suggest novel targets for treatment options of the currently incurable Fragile X Syndrome.

**Visual Working Memory for Orientation Depends on Stimulus Form**

Alejandra Patino, Neural Science, Psychology

Sponsor: Professor Frank Tong, Psychology, Vanderbilt University

The goal of this study was to compare visual working memory (VWM) performance for bars and gratings, as it was hypothesized that processing multiple bars might benefit from perceptual grouping that can take place across items. Using finely tuned behavioral methods—a continuous report task and the mixture model of VWM, which accounts for the distribution of errors of the response values—this study investigated the precision and capacity of VWM. On each trial, displays of bars or gratings were presented, followed by a delay, and finally a probe at one of the item's locations. The task was to accurately remember as many items possible in order to successfully match the orientation of the item being probed to that of the original stimulus. It was found that capacity for bars was significantly larger than that of gratings across all conditions and that there was variance in precision depending on the parameters being tested (stimulus type, encoding time, set size). It was possible to rule out any advantage that bars might have in terms of the number of items to be remembered, the encoding time or retinal after image formation, all of which suggests that VWM capacity for orientation is dependent on the format in which it is presented.

**The Effect of Walking on Creativity and Memory in College Students**

Nicolette Payne, Global Public Health/Biology

Sponsor: Professor Wendy Suzuki, Neural Science; Dr. Julia Basso, Neural Science

Walking on a treadmill while studying is a tactic used by some college students to save time in their busy schedules (Narayan, 2010). A few studies suggest that walking and light exercise can have beneficial effects on cognitive tasks...
of the prefrontal cortex. Studies also suggest that walking can enhance creativity, though limited research exists on the effects of walking on both memory and creativity in healthy college students. Using a randomized controlled design, this pilot study tested whether walking on a treadmill while taking memory and creativity tests can affect those scores. The tests included the Wechsler Adult Intelligence Scale III Logical Memory test (WAIS-III), Guilford Alternate Uses test (GAU), Remote Associates Task (RAT) and an essay test. The Profile of Moods Scale (POMS) questionnaire was administered after the intervention to assess mood. The preliminary data reported here are only part of a pilot study with 21 subjects: 10 in the walking group, 11 in the sitting group. A power analysis indicates that an n of 68 is needed to establish significance. There was no significant difference in number of GAU responses (t(19)= 0.939, p= .360), POMS score (t(18)= 1.413, p= 0.175) and WAIS-III score (t(19)= -0.722, p= 0.479) between the walking group and sitting group. Although walking on a treadmill while taking cognitive tests does not improve memory recall, creativity or mood, it also does not inhibit them. Thus, walking on a treadmill while studying is an effective way for busy college students to instill healthy habits and find time to exercise without causing a deficit in their studies.

**Dosage Compensation Complex Recruitment in Caenorhabditis elegans**

*Cecilia Pellegrini, Biology, Comparative Literature*

*Sponsor: Professor Sevinc Ercan, Biology*

In *C. elegans* the dosage compensation complex (DCC) is required to equalize the expression of X-linked genes between XX hermaphrodites and XO males. The core of the DCC is a condensin complex that belongs to an evolutionarily conserved protein family essential for chromosome condensation and segregation. The DCC serves as a model for the study of mechanisms of condensin binding for the two modes of binding it enacts: recruitment and spreading. Recruitment of the DCC to the X chromosome is hypothesized to involve recruitment sequences—recruitment elements on the X, or “rex” sites—to target the complex to the correct location. Rex sites have, however, also been observed on autosomes, where recruitment is far reduced in comparison to that of rex sites on the X. As such, two hypotheses of DCC recruitment arise: either recruitment is dependent on the chromosomal context of the recruitment motifs or the recruitment sequence in itself is sufficient to enlist the DCC independent of chromosomal location. To distinguish between these two possibilities, a strong rex site (Rex-8) containing several recruitment motifs was inserted in single copy at an exogenous location on Chromosome II via MosSci injection. The transgenic line will then subsequently be subjected to ChIP analysis of DCC binding to determine if Rex-8 is capable of recruitment outside the context of the X chromosome.

**Contexts Effects on Motion Coherence**

*Richard Perez, Neural Science*

*Sponsor: Professor Tony Movshon, Neural Science*

Motion coherence is the global percept of motion derived from multiple local motion cues. It plays a large role in humans’ perception of the world—from determining which direction a stream of water is flowing, to which direction a flock of geese are flying. To investigate motion coherence, this study employed ambiguous motion stimuli so that it was possible to bias motion perception in a controlled manner. Multistable perception arises from stimuli that contain insufficient information to specify one percept over others. Multistable stimuli can be excellent tools to access the mental state of an observer since different percepts reflect internally generated brain activity. One example in the motion domain is the triplaid, a stimulus composed of 3 overlaid gratings drifting 120˚ apart in direction resulting in three motion percepts. By manipulating the contrast or the spatial-temporal properties of one of the component gratings, it is possible to bias the probability of seeing each percept. Intriguingly, when multiple triplaids are presented across visual space, they produce a coherent motion percept. This raised the question if the motion percept of a triplaid could be biased by its surrounding context, and what properties underlie motion coherence. The results showed that contrast manipulation of one component grating biased the motion percept of a triplaid. The majority of subjects were contextually influenced in a linear fashion by contrast manipulations in surrounding triplaids. Spatial properties of the context dictated the strength of the contextual influence when only one component grating was manipulated while the other two components were spatial-temporally matched with the reporting triplaid. Finally, motion signals of low temporal frequencies and of certain spatial frequencies in the context strongly influenced motion perception within the reporting triplaid even though the context triplaids and the reporting triplaid shared few to no common spatial temporal properties.

**Impact of Prenatal Exposure to Neurodevelopmental Insult Using the Gestational Methylezoxymethanol Acetate (MAM) Model of Schizophrenia**

*Maria Perica, Neural Science*

*Sponsors: Professor Andre Fenton, Neural Science; Dr. Kally O’Reilly, Neural Science*

Schizophrenia symptoms often begin in adolescence, which suggests that schizophrenia is neurodevelopmental. Exposing rats to methylazoxymethanol acetate (MAM), a toxin that disrupts cell division, on day 17 of gestation
results in behavioral abnormalities associated with schizophre
nia in humans. Gestational day 17 MAM exposure therefore pro
vides a promising animal model with which to study potential de
velopmental origins of schizophrenia. Using the MAM model, this study tested the hypothesis that prenatal insult would result in abnormal brain development. Cytochrome oxidase (CO), a metabolic marker of neuronal activity, was measured in adolescent and adult male MAM rats as a way to measure functional connectivity of brain regions. Cytochrome oxidase activity in the orbitofrontal, prefrontal (PFC) and entorhinal cortices as well as in the dorsal and ventral portions of the hippocampal formation (HF) were quantified. It was found that the functional connectivity, as measured by interregional correlations, was significantly different between the ventral HF and PFC in MAM rats compared to control rats at both adolescent and adult ages. The dorsal hippocampus also displayed hyperconnectivity in adolescent and adult MAM rats. These results suggest that exposure to prenatal insult can lead to the development of abnormal hippocampal function which persists into adulthood.

A Rodent Task for Episodic-Like Memory
Ward Pettibone, Neural Science
Rebecca Walton, Neural Science
Sponsor: Professor Adam Mar, Neuroscience and Physiology, NYU School of Medicine

Episodic memory is described as “temporally dated episodes or events, and temporal-spatial relations among these events” (Tulving, 1972). Because such evidence is generally considered to require language, episodic memory is thought of as a uniquely human phenomenon. There is evidence, however, that some animals display what is called episodic-like memory (Clayton and Dickinson, 1998). The present study describes a novel task to assess episodic-like memory in rodents. While at least one such task has already been reported (Eacott, 2004), the authors believe that particular task can be solved using other types of memory or even due simply to the rodent’s preference for novelty and is therefore unreliable as a measure of episodic-like memory. A task is here proposed that, the authors believe, is robust in its resistance to successful completion by non-episodic-like types of memory and is also fairly simple to implement, expanding its utility as a research tool. Eight mice were trained over a period of 13 days to discriminate the what (stimulus image), where (position on screen) and which (odor-based context) of a particular event. Although as of this writing, performance is at chance levels, future developments may confirm the validity of this task.

Introduction of a Triple-Crossover (TX) Motif into an Asymmetric Four-Turn DNA Tensegrity Triangle
Christopher A. Pochat, Biochemistry
Sponsor: Professor Nadrian Seeman, Chemistry

It has been previously demonstrated that 3D crystals can be formed from DNA tensegrity triangles containing 4 double helical turns per edge via sticky-ended cohesion (Liu, 2004; Zheng, 2009). Here, this study expands on this concept by adding a DNA motif to the edge of a 4-turn DNA tensegrity triangle. A 4-turn asymmetric DNA tensegrity triangle incorporating a triple-crossover (TX) motif into one of the helical edges has been designed here. A TX motif contains three adjacent double-helical domains, which can be either parallel or antiparallel and are linked together by strand exchanges spaced by either an even or odd number of half-turns of the double helix (LaBean, 2000). In the TX motif used here each helical domain is antiparallel to the adjacent domain, and the crossover points are separated by an odd number of half-turns. The nucleotide sequences used were optimized using the program SEQUIN to prevent undesired pairings (Seeman, 1990). Preliminary gel electrophoresis data have shown that the designed strands assemble into a unique structure characterized by a single band at 140 nucleotide pairs. The end goal of this project is to determine the crystal structure of the TX portion of the tensegrity triangle.

Effects of Changes in microRNA Expression on the Capacity of Primary Sensory Neurons to Generate Action Potentials
Jonathan Pan, Biochemistry
Sponsor: Professor Esperanza Recio-Pinto, Biochemistry and Molecular Pharmacology, NYU School of Medicine

Peripheral nerve injuries produce chronic neuropathic pain in a significant number of individuals. The current treatments for chronic neuropathic pain have many side effects that can oftentimes be nearly as terrible as the pain itself. The approach used is to selectively target peripheral sensory nerves with microRNAs (miRs) to treat neuropathic pain while minimizing side effects. In peripheral nerves, miR-1, miR-133b and miR-143 have been found to be upregulated in rat neuropathic pain injury models where recovery occurs and down regulated in models where neuropathic pain persists (Noricini, Sideris et al., 2014). Since neuropathic pain is associated with an increase in neuronal excitability, in this project patch clamp methodology was used to provide evidence that changes in the expression of these microRNAs affect neuronal excitability of peripheral sensory nerves. Patch clamp methodology provides the ability to directly and quantitatively measure neuronal excitability. The results of this project show that miR-1, miR-133b and miR-143 decrease the excitability of these neurons with
The specification of cell fates occurs during critical periods of development through the secretion of regional patterning signals. These signals trigger the expression of specific transcription factors (TFs) that direct cell fate. Using these extrinsic signals, current embryonic stem cell (ESC) differentiation protocols aim to replicate this in vitro environment. However, these protocols are inefficient because they rely on regional cues that are concentration and batch dependent. Forced expression of transcription factors (TFs) bypasses these regional cues and creates a cell autonomous process that generates large, homogenous cell populations. The TFs, Ascl1, Lmx1 and Pet1, are expressed in monoaminergic neurons in vivo. Therefore, Lmx1a, Lmx1b-Pet1, Ascl1-Lmx1a and Ascl1-Lmx1a-Pet1 transgene cassettes were cloned and inserted into the genome of mouse ESCs (mESCs) in order to generate monoaminergic neurons. Characterization of these lines after 48 hours of doxycycline using immunocytochemistry staining shows high induction efficiency (>90%) and the specification of neuronal fate. Furthermore, quantitative polymerase chain reaction (qPCR) for the monoaminergic markers, Vmat and TH, shows elevated expression in the induced Lmx1a relative to the non-induced Lmx1a control. This indicates that direct programming is able to specify terminal cell fate without the use of extrinsic patterning signals in this system. Further experimentation will investigate the transcriptional logic underlying this approach to better understand the combinatorial nature of direct cell programming.

The Arabidopsis response to heterogeneous nitrogen supplies is regulated and controlled by numerous transcription factors. Preliminary studies identified the RING Zinc-Finger Protein 34 (RZPF34), a RING domain-containing protein that functions as a ligase, as a transcription factor that may affect the systemic response of the plant during nutrient foraging. This study aims to examine the role of RZPF34 in systemic long distance signaling to coordinate nitrogen supply and demand in Arabidopsis. A split root system is used to investigate the response of the plant in homogenous or heterogeneous nitrogen conditions. A mutant line, SALK017562, with an insertion in the promoter region of RZPF34 was assayed along with a control wild type to compare the differences in phenotypic root growth response to varying nitrogen conditions. The root architecture was analyzed using ImageJ to compare the primary and lateral root growth from each genotype. The final analysis of the data is inconclusive in determining whether or not RZPF34 has a direct affect on nutrient foraging in heterogeneous environments. However, there is some indication that it may affect the overall root growth during starvation conditions.

The specification of neuronal fates during development occurs entirely. This variability can be significantly attributed to NER’s damage-recognition protein, Xeroderma Pigmentosum Complementation Group C (XPC), which recognizes and binds to lesions with variable affinity. Previous research studying XPC’s binding affinity to these lesions was done primarily using radioactivity as the visualization method. However, radiolabeling is dangerous, and research fields are moving away from radiolabeling towards fluorescence as the preferred detection method. Yet, unlike a P32 label, the fluorophore Cyanine-5 (Cy5) acts like an adduct itself, imposing helical distortion onto the DNA. Using Electrophoretic Mobility Shift Assays, the extent to which Cy5 acts as a substrate of XPC and its overall interference of XPC binding to labeled DNA was investigated. Indeed, XPC binds to the Cy5 labels, thus suggesting that the fluorescence labeling method may not be an optimal method for protein–carcinogen damaged DNA binding studies.

The effect of Early-Life Intestinal Microbiota Disruption on the Levels of Immunoglobulin A (IgA) in the Intestinal Lumen of C57BL/6 Mice
Olga Reykhart, Biology
Sponsor: Professor Martin Blaser, Microbiology, NYU School of Medicine

Immunoglobulin A (IgA) is an antibody that is secreted into the lumen of mammal intestines and protects the host from the numerous pathogens that may be present in the gut. In humans, low levels of IgA are associated with a number of chronic gastrointestinal diseases like Ulcerative Colitis.
and Crohn’s Disease. One of the most important functions of IgA is the interaction with the commensal microbiota of the intestines, which help the host regulate and balance its health. Previous research has suggested that the composition of gastrointestinal flora determines the levels of IgA in the gut to some extent. This study aims to decode the effects of specifically early-life microbiota disruption on the levels of IgA in the guts of mice. The microbiota was disrupted via the use of antibiotics either during the first two or four weeks of life. The results have showed that both experimental groups that received the antibiotic had noticeably lower levels of IgA compared to the control groups even when probed much later in life after the antibiotic treatment has long been ceased. Moreover, the mice that received the antibiotic in their early life had higher fat mass percentage and appeared to be more stressed in adulthood as compared to the mice from control groups. These results suggest that the disruption of the commensal microbiota in early life may permanently affect the immunological profile of the host, which could in turn lower the host’s ability to fight infections of the gut. This is especially relevant with respect to the frequency of antibiotic consumption today, as antibiotics continue to be one of the primer reasons for the early age microbiota disruption of children and should thus be treated with caution.

Resolution-Exact Algorithms for Robot Motion Planning

John Ryan, Computer Science, Mathematics
Sponsor: Professor Chee Yap, Computer Science

Path planning is a fundamental task in robotics. Here, algorithms are presented that are based on subdivision search methods that allow for resolution-exact motion planning for robots of several shapes in environments with polygonal obstacle sets. The implementation of these algorithms employs resolution-exactness by taking as input a parameter of resolution: if there is a path for the robot through the environment with respect to that resolution, the program will probably find it. The implementation has several valuable properties with respect to applied problems in robotics. First, the program is guaranteed to halt and is proven to find a path if one exists. Second, the program runs in real time and does not need to preprocess the environment input before searching for a path. Third, the program allows for a variety of global search strategies: currently, Breadth First Search, A-Star, Greedy Best-First Search and a Voronoi diagram heuristic. Furthermore, the complexity of the algorithm is not affected by the environment: for example, the program can search for a path in a room of hundreds of triangular obstacles almost as easily as in a room of only a few. Finally, the implementation works for several shapes of robots: the current version includes a disc robot and a two-link robot (whose links may or may not be allowed to cross).

The Methionine Transporter of Trypanosoma brucei brucei

Nicholas Sachs, Biochemistry
Sponsor: Professor Burt Goldberg, Chemistry

The Trypanosoma brucei brucei is a pathogenic organism that causes the disease African Sleeping Sickness (trypanosomiasis). The amino acid methionine is used heavily in T. brucei brucei’s metabolism and therefore is attractive in the search for methods to destroy the pathogen. The transporter that the organism uses to import the methionine into its cell body is unique because there is a high level of cooperativity among the methionine transporters. Analysis using Hill (log-log) analysis of the transport of methionine in T. brucei brucei yielded a Hill cooperativity coefficient (n) = 5.6 which is quite large. For example, hemoglobin has a cooperativity coefficient of ≈3.0. Elucidation of the 3D structure of the methionine transporter allows for analysis and understanding of the ways in which the individual transporters bind together to yield such a high level of cooperativity. Additionally, the 3D structure can serve as a foundation from which methionine analogs can be created that can block the metabolism of the organism resulting in its death.

The X-Factor: Probing the Mechanism of Dosage Compensation Complex Spreading across the C. elegans X-chromosome

Mohammad Sadic, Biology
Sponsor: Professor Sevinc Ercan, Biology

In many organisms, dosage compensation mechanisms exist to regulate the structure and transcription off the X-chromosome to balance gene expression between males and females. The protein complex responsible for dosage compensation in C. elegans is a modified condensin complex known as the dosage compensation complex (DCC). The DCC binds both X-chromosomes in hermaphrodites to reduce expression by half. Condensins are evolutionary conserved protein complexes important for mitotic chromosome condensation. However, the mechanisms of condensin binding remain unknown. Previous studies of the DCC revealed a two-step binding mechanism: recruitment to the X followed by spreading to promoters of highly transcribed genes. Recruitment is fairly well understood, but the mechanisms of spreading are not. Based on its structural features, it was hypothesized that the DCC slides linearly along the X-chromosome. Here, this model was tested by attempting to hinder DCC mobility using a protein block. The author targeted a catalytically inactive Cas9 endonuclease (dCas9) between a known recruitment site (rex-1) and spreading
Reactivity of Seven-Membered-Ring trans-Alkenes
John Santucci III, Chemistry
Sponsor: Professor Keith Woerpel, Chemistry

The reactivity of seven-membered-ring trans-alkenes was evaluated in three newly synthesized compounds. The seven-membered-ring of these new alkene is composed of a carbon–carbon double bond linked by three carbon atoms, one silicon atom and one oxygen atom. These alkene are destabilized by distortions of their structure, and the resulting strain can lead to increased reactivity. The system examined here allows for the amount of distortion to be adjusted by varying ring substituents. Bicyclic trans-alkenes, composed of the seven-membered-ring fused to a second ring, showed increased reactivity with specific reaction partners. Decreasing the size of the second ring increased strain and therefore increased reactivity of the double bond. Another trans-alkene, with fewer ring substituents, was also highly reactive. This less spatially congested molecule showed similar reactivity to the more strained bicyclic trans-alkene. While varying the substitution of the double bond led to drastically different rates of reaction in cycloaddition reactions, less noticeable rate differences were observed in reactions with electrophiles. These compounds may have applications in reactions that could be used to analyze biological systems because of their characteristic rapid reactivity.

Variability in Cell-to-Cell Gene Expression of S. cerevisiae in Different Media
Maya Sekhar, Biology
Sponsor: Professor Mark Siegal, Biology

Some genes are very robustly expressed, while some have highly variable expression levels. Furthermore, the variance of expression of a given gene can be environment-specific. Much previous research has addressed how the mean expression levels of genes are regulated, but very little is known about why gene expression level varies between isogenic cells. Sets of candidate genes that differed in expression variance were identified and screened to measure and analyze expression levels and variances in different environments. SLA1 was identified with these criteria in SD and SC media. The next step is to identify the external signals in the media that contribute to differences in expression variance and the genetic elements that respond to them. The ultimate goals of this project are to determine and analyze the mechanisms that regulate the variance with which different genes are expressed.

Structural Investigation of the eIF5A/DHS Complex in Entamoeba histolytica
Joanna Shaw, Biochemistry
Stephen Tan, Chemistry/Chemical and Biomolecular Engineering
Sponsor: Professor Burt Goldberg, Chemistry

Entamoeba histolytica is a one-celled parasite that causes amebiasis, a gastrointestinal disease prevalent in many countries where people do not have access to clean drinking water. There is currently no vaccine to prevent amebiasis, which is the second-leading cause of death due to parasitic organisms in the world. Two important proteins in E. histolytica are eukaryotic initiation factor 5A (eIF5A) and deoxyhypusine synthase (DHS), which form a complex. The eIF-5A/DHS complex in E. histolytica is crucial for parasitic protein synthesis, but very little is known about its three-dimensional structure and mechanism of interaction aside from its unique polyamine cofactor. By using bioinformatics approaches to study the chemistry of this enzyme-substrate complex, the authors hoped to identify characteristics that may be used to develop a drug or vaccine against amebiasis and thus eventually reduce its mortality.
rate on a population scale. Using molecular modeling software such as Swiss Model Maker, Clus Pro, and UCSF Chimera, the authors have determined probable salt-bridge interactions between these proteins. It is hypothesized that disrupting this stabilizing mechanism is incompatible with parasitic survival and is thus a possible target mechanism for treatment of amebiasis.

**The Role of the Ventromedial Hypothalamus to Midbrain Periaqueductal Grey Pathway During Intermale Aggression in Mice**

*Anjeli Song, Global Public Health/Biology*

**Sponsors:** Dr. Annegret Falkner, Neuroscience and Physiology, NYU School of Medicine; Professor Dayu Lin, Neuroscience and Physiology, NYU School of Medicine

The ventromedial hypothalamus, ventrolateral subdivision (VMHvl) has recently been identified as a critical aggressive locus in mice. Optogenetic stimulation of the VMHvl elicits attack behaviors towards males, females and even inanimate objects, with VMHvl activity also predicting both attack latency and duration. However, the mechanism by which mixed sensory, motivational and attack input in the hypothalamus is transformed into a motor attack response is poorly understood. This study demonstrated that the periaqueductal gray (PAG), a downstream target of the VMHvl, plays a major role in relaying motor information. Fiber photometry, a novel technique, was used to record neural activity of VMHvl population cells, VMHvl-PAG projecting cells and lateral PAG cells in male mice during various social behaviors such as attack and investigation of conspecifics. VMHvl neurons were active during attack and male investigatory behaviors and slightly less so during female interactions. Likewise, VMHvl-PAG neurons were active during attack and male investigatory behaviors but inactive during female exchanges. Lateral PAG cells were only active during attack behaviors. The results indicate that selective encoding of attack information occurs at the level of the PAG, as VMHvl-PAG projections do not exhibit biased selectivity during intermale encounters. Furthermore, the VMHvl-PAG pathway seems to be an intermale specific circuit.

**Position Effect in the rDNA Array of *Saccharomyces cerevisiae***

* Priyanka Srivastava, Biology

**Sponsor:** Professor Andreas Hochwagen, Biology

Genomes containing tandem repetitive DNA arrays have important roles in cell physiology and genome organization. Due to their repetitive nature, these sequences are often prone to copy number variation and changes in repeat number, which can lead to various neurodegenerative diseases. The repetitive ribosomal DNA (rDNA) array of *Saccharomyces cerevisiae* is a prime example of how repetitive sequences are increasingly unstable. It is unclear, however, whether repeats on both halves of the rDNA array are subject to similar patterns of genomic instability. Preliminary results suggest that there is a unique “position effect” (PE) in the rDNA array in which repeats located at the left border of the array are more susceptible to non-allelic homologous recombination (NAHR) and double stranded breaks (DSBs) than internally located repeats. These forms of DNA damage lead to the formation of extrachromosomal rDNA circles (ERCs), which have been indicated as a major cause of cellular senescence. Here, by creating unique insertion clones, which contain selectable markers on each half of the array, it is suggested that the left and right edges of the rDNA array may be maintained differently in the nucleolus. The results also implicate a new role for Fob1 protein, which is necessary for the formation of ERCs, during recombination. Given that the human genome also contains a high level of repetitive DNA sequences, it is anticipated that these results can serve as insight for research in human diseases related to tandem repeat stability.

**ycs4S as a Molecular Tool to Control the Dosage of Red1 Levels in *S. Cerevisiae***

*Daniel Suarez, Biology*

**Sponsor:** Professor Andreas Hochwagen, Biology

During meiosis, sister chromatids are organized into loops of chromatin that are aligned along a common chromosome axis. This chromosome axis serves as the crucial site of DNA recombination events, such as the formation and repair of double stranded breaks (DSBs) that are essential for ensuring proper segregation of chromosomes during meiosis. Condensin is a protein complex involved in the formation of DSBs as well as the association of axis proteins that lie along the chromosome axis. These axis proteins such as Red1 are known to have a crucial role in homologous recombination. Previous studies have demonstrated that a meiosis specific condensin mutant where the Ycs4 condensin subunit is tagged with a 12x-myc tag (ycs4S) affects the ability of condensin to properly associate Red1 to the chromosome axis. Here, it has been found that Red1 levels are subsequently lowered in strains containing either one or two copies of ycs4S, with the ycs4Sred1Δ/++ heterozygous mutant exhibiting the severest decrease in Red1. Furthermore, RT-qPCR suggests that ycs4S is inhibiting transcription of RED1 as the level of Red1 mRNA is lowered in mutants with the ycs4S mutation. These results suggest that ycs4S affects Red1 in a dosage-dependent manner, which can prove useful as a molecular tool to aid researcher in exploring the features and functions of condensin and the chromosome axis.
The Effect of Black Raspberry Extract and Protocatechuic Acid on Mutagenicity of Dibenzo[a,l]pyrene in Rat Oral Fibroblasts
Youngiae Sung, Biochemistry
Sponsor: Professor Joseph Guttenplan, Basic Science and Craniofacial Biology, NYU School of Dentistry

Polycyclic aromatic hydrocarbons (PAHs) are compounds found in tobacco, exhaust smoke and areas of high pollution, which have been shown to potentially contribute to oral and lung cancer. Using rat oral fibroblast cells (OFBs), the author tested the possible chemoprotective effects of black raspberry extract (BRB) on mutagenicity induced by the metabolites of the PAH dibenzo[a,l]pyrene (DBP); (+)-anti-11,12-dihydroxy-11,12,13,14-tetrahydrodibenzo[a,l]pyrene (DBP dihydrodiol), and 11,12-dihydroxy-13,14-epoxy-11,12,13,14-tetrahydrodibenzo[a,l]pyrene (DBPDE). The anthocyanin protocatechuic acid (PCA), a compound present in significant amounts in blackberries, was also tested for possible chemoprotective effects against DBP-dihydrodiol and DBPDE. It was found that BRB inhibited mutagenesis significantly in both metabolites of DBP, but PCA only inhibited mutagenesis that was induced by DBP-dihydrodiol not DBPDE indicative of a step-wise process. Also, in OFBs treated by DBP-dihydrodiol and DBPDE, treatment of PCA and BRB both showed upregulation of genes linked to detoxification and antioxidant roles in the body. Overall, PCA and BRB both showed possible chemoprotective effects on the mutagenicity of the metabolites of DBP and show potential in inhibiting carcinogenesis induced by PAH.

Time-Lapse Microscopy of Self-Assembled 3D DNA Crystals Containing LNA/DNA Hybrid Pairs
Andre Tan, Chemistry
Sponsor: Professor Nadrian Seeman, Chemistry

DNA motifs can be programmed to self-assemble into two or three-dimensional structures through Watson-Crick hybridization of sticky ends (Seeman, 1985; Winfree, 1998). A 3D crystal based on a DNA tensegrity triangle with 3-turns per helical edge with dimer sticky ends diffracted to 6.0 Å at beam line NSLS-X25 (Zheng, 1998). It was recently shown that addition of 3 LNA residues to the helical strands of the motif improves the resolution to 5.5 Å. The use of LNA in a DNA motif allows for greater binding affinity and binding specificity in a double helical context (Astakhova, 2014). Here, it is shown that LNA can be used in conjunction with DNA to allow for reliable crystal formation of the 3-turn trimer sticky end tensegrity triangle. Preliminary results show that a 3D crystal formed via this motif diffracts to 10.36 Å. However, time-lapse microscopy is being used to characterize both the length and occurrence of the temperature range of crystallization. This data allows the temperature of nucleation to be isolated and provides insight on shifting and slowing the sticky-end interactions to induce better crystal growth with more time for error correction. Preliminary experiments have shown that crystals begin growing to approximately 44 °C. Improvement in resolution of these crystals could lead to this lattice being used as a framework to host macromolecular guests (Zheng, 1998).

Detecting Cryptic Genetic Variation from Heat Stress in the Development of D. melanogaster Larvae
Andrew Tan, Biology
Sponsor: Professor Mark Siegal, Biology

Cryptic genetic variation (CGV) is genetic variation that gradually accumulates but lies dormant in the genome under normal conditions. It can be expressed under atypical conditions via a genetic or environmental perturbation increasing the standing genetic variation of a population. This may confer traits that allow a population to rapidly adapt to a new condition. Of interest here is exploring CGV that results from heat stress during development, an environmental perturbation. This study has introduced a mutant loss-of-function copy of His2av, a gene that codes for a histone protein responsible for transcriptional regulation of genes and for responding to DNA damage, into a population of Drosophila Genetic Reference Panel (DGRP) lines. The DGRP is a collection of 192 fly lines that have been inbred over many generations. The lines serve as a fully sequenced population that allows different researchers to work and collaborate on a population with the same genetic background. Here, D. melanogaster larvae were exposed to heat shock to look for variation in developmental ability between His2av mutant fly lines exposed to heat shock and His2av mutants raised in a standard environment. It was found that there is an increase in variation of the survivability of flies exposed to heat shock relative to the control, potentially indicating the release of CGV.

Exploring the Proteolytic Susceptibility of Peptoid Oligomers
Malika Tatikola, Chemistry
Sponsor: Professor Kent Kirshenbaum, Chemistry

Peptoids are an important family of peptidomimetic oligomers with significant therapeutic potential. Peptoids are constituted from N-substituted glycine units joined through tertiary amide linkages that may deter binding within the active site of protease enzymes. Currently, peptoids are believed to be resistant to all major classes of proteases. In turn, the molecule can circumvent in vivo degradation, which may enhance their pharmacological potential. As investigators evaluate peptoids as drug molecules, further investigation of mechanisms for peptoid metabolism will prove valuable. There are numerous endopeptidases
including collagenase that specifically recognize proline residues in the active site and then catalyze hydrolysis of the adjacent amide bond. Proline shares a similar N-substituted side chain structure as peptoids. Therefore, it is possible that proteases capable of cleaving at proline positions could likewise degrade peptoid oligomers. To investigate this hypothesis, the author synthesized canonical peptide substrates to proline-specific proteases along with their corresponding peptoid analogs. The susceptibility of these oligomers to enzyme-mediated hydrolytic cleavage can therefore be compared. These studies make it possible to further assess the pharmacological attributes of peptoid molecules.

**CRISPR/Cas9-Mediated Dissection of Regulatory Motifs Required for Color Vision**

*Christopher Torres, Biology*

*Sponsor: Professor Claude Desplan, Biology*

Although different animal groups have eyes of quite different shapes, the basic mechanism of how an organism detects light is very similar. In the fly *Drosophila melanogaster*, six light-sensing Rhodopsins with different wavelength sensitivities are expressed in distinct subsets of photoreceptor cells, which is a prerequisite for color vision. How is the cell-type restricted expression of Rhodopsins achieved at the transcriptional level? It has been shown that it involves compact regulatory regions (<500 base pairs) upstream of the transcription start site that are targeted by sequence-specific transcription factors. All rhodopsin regulatory regions contain the highly conserved Rhodopsin Core Sequence I (RCSI), an eleven base pair motif critical for their activation. Interestingly, different Rhodopsins have slightly different RCSI motifs, and these subtle variations are highly conserved. The goal of this project is to test whether the subtle differences in RCSI motifs of specific rhodopsin genes are crucial for their spatial expression in subsets of photoreceptors. The author will use the CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)-Cas9 system for mutating single base pairs in RCSI motifs. This will make it possible to unravel how a short regulatory motif controls the complex spatial expression of rhodopsins and thereby specifies photoreceptor identity and function. Deciphering the mechanisms that generate such complex sensory receptor expression patterns will yield important insights for the general understanding of cell-type specific gene expression.

**Self-Assembly of Asymmetric DNA Tensegrity Triangles Containing LNA:DNA Base Pairs**

*Karolina Uchman, Chemistry, NYU Abu Dhabi*

*Sponsor: Professor Nadrian Seeman, Chemistry*

Three-dimensional crystals can be self-assembled from either a symmetric or an asymmetric DNA tensegrity triangle via sticky ended interactions (Zheng, 2009; Liu, 2004). The tensegrity triangle is a robust motif consisting of three double helices organized in an over-and-under three-fold-symmetric pattern and covalently bonded by crossovers as in a Holliday junction. The asymmetric triangle contains 7 unique strands (3 helical strands, 3 crossover strands and 1 nicked cyclic strand) combined in equimolar amounts. The crystals for the two-turn asymmetric triangle diffracted to 5.0 Å resolution at beam line X-25 at the National Synchrotron Light Source at Brookhaven (NSLS). While the crystals have been designed to adopt a B-form structure, close analysis of the helical structure in trigonally symmetric crystals revealed a distribution containing both A-form and B-form nucleotides. To remedy this issue, LNA nucleotides were substituted into the helical strands of the asymmetric systems (Astakhova, 2014). LNAs are oligonucleotides containing at least one LNA monomer, which is also known as 2’-O,4’-C-methylene-β-D-ribofuranosyl nucleotide. LNA nucleosides tend to form more A-form helices in which the sugar conformation is C3’-endo, but its stereoisomer (α-L-LNA) leads to a more B-form nucleotide structure or C2’-endo. In the current project, two-turn and three-turn asymmetric triangles have been redesigned to contain, respectively, 3 LNA and 5 LNA nucleotides in one of the helical strands. The asymmetric two-turn triangle system employing LNA yielded crystals that diffracted to 4.48 Å resolution at APS-ID-19. The crystals were in the P1 space group with a = 69.14 Å, b = 67.81Å, c = 68.80 Å, α = 99.81°, β = 97.88°; γ = 98.69° and cell volume of 308324Å3. Preliminary gel electrophoresis data for the three-turn asymmetric triangle with 5 LNAs have shown that the designed strands assemble into a unique structure characterized by a single band at 93 nucleotide pairs.

**Development of New Methodology to Improve Surveillance of Influenza Virus Genetic Diversity**

*Michele Volk, Biology*

*Sponsor: Professor Elodie Ghedin, Biology*

To better understand emergence of antigenic variants and drug resistance of seasonal influenza caused by influenza type A and influenza type B, it is necessary to monitor many thousands of circulating strains by genome sequencing. Due to the significant sequence diversity between different influenza types, subtypes, and strains as well as the dynamic nature of the viral genomes, specific modifications need to be made for the genomic amplification and sequencing of viral strains. The goal of this project was to develop a robust and highly sensitive viral genome amplification method that can be used with standard high-throughput sequencing for the analysis of clinical specimens infected with all seasonal influenza viruses. Although the sequences
of influenza viruses are extremely diverse, the termini of the genomic segments are conserved within each type (A and B). By aligning all the unique sequences of seasonal influenza viruses available in GenBank, primers were designed that bind to those conserved terminal regions. This allows the universal conversion of any influenza viral genomic RNA into cDNA by reverse transcription and amplification of the DNA in subsequent PCR reactions. Since antigenic changes and antiviral resistance of influenza viruses are determined by the viral hemagglutinin (HA), neuraminidase (NA) and M2 proteins (M), it was only necessary here to focus on sequencing information from these three segments. The approach was to target these genes specifically for amplification and sequencing, thereby increasing the ability to multiplex more samples per sequencing run thus increasing throughput.

Dynamic Targets of the Master Transcription Factor bZIP1 Confirmed Using a New Inducible System in planta
Manuela von Sneidern, Biology
Sponsor: Professor Gloria Coruzzi, Biology

The family of bZIP transcription factors (TFs) controls genome-wide responses to nitrogen nutrient in plant roots. In mediating nitrogen signals, bZIP1 functions through a dynamic “Hit and Run” model of action, whereby a TF triggers the assembly of a complex that continues to activate the transcription of transient target genes in the absence of the founding TF. Due to this, the network connections associated with bZIP1 have eluded detection by assays that require stable TF binding. This project aimed to detect the regulation of dynamic bZIP1 targets in planta in the absence of stable bZIP1 binding using the GR-TF (glucocorticoid receptor hormone binding domain-transcription factor) system, in which rapid treatment with dexamethasone (DEX) induces nuclear import of bZIP1. DEX-induced perturbation of GR-bZIP1 in whole plants confirmed two induced and one repressed bZIP1 target(s). The two induced targets belong to the CYP705A family of cytochrome enzymes involved in maintaining the redox potential of the cell, meanwhile the repressed target belongs to a superfamily of invertase/pectin methylesterase inhibitors that function as regulators of enzymatic activity. Results also suggest that bZIP1 negatively inhibits its own transcription via a negative feedback loop. Altogether, the GR-TF system allowed the controlled induction of the nuclear import of bZIP1 in planta, thereby confirming the “Hit-and-Run” model of this catalyst TF and the active regulation of its dynamic targets.

Temporal Expectation Shapes Auditory Perception in the Mongolian Gerbil
Derek Wang, Individualized Major
Sponsors: Dr. Melissa Caras, Neural Science; Professor Dan Sanes, Neural Science

In general, sound detection is better if something is known about the stimulus. For example, an early study by Greenberg and Larkin (1968) found that listeners detected pure tones at an expected frequency better than unexpected tones at higher and lower frequencies. Similar results have been reported in the spectral domain (Moore et al., 1996), for sound duration (Dai and Wright, 1995; Wright and Dai, 1994), amplitude modulation rate (Wright and Dai, 1998) and spatial location (Shulman et al., 1985). While these studies clearly suggest that expectations shape auditory perception, the neural mechanisms remain poorly understood. To address this issue, Mongolian gerbils (Meriones unguiculatus) were trained on an auditory detection task. Animals were presented with near-threshold noise bursts at expected and unexpected times, and their behavioral detection capabilities were measured using a Go/No-Go paradigm. It was found that gerbils are better able to detect acoustic stimuli presented at expected onset times. These results, which parallel the human literature, suggest that the gerbil will be a fruitful model for exploring the neurobiological basis of temporal expectation.

Investigating the Effect of Metal-Coordinated Pincer-Type Complexes in Radical Polymerization
Madeleine Z. Wong, Biology
Sponsor: Professor Marcus Weck, Chemistry

A few decades ago, the study of supramolecular polymers was only a byproduct of scientific curiosity; however, the development of reversible and stimuli-responsive polymers has led to advanced applications and design for cutting-edge materials. Polymers linked via metal-coordination have been of great interest due to their capacity to participate in self-assembly to form larger macromolecules. The ability to synthesize polymers with metal-coordinated supramolecular end groups in a controlled fashion to yield uniform chain lengths is important and useful for creating materials with predictable physical properties. This study examines factors that affect the rate and degree of controlled polymerizations upon using metal-containing pincer initiators to make well-defined polymers. Atom-Transfer Radical Polymerization (ATRP) and Reversible-Addition Fragmentation Transfer Polymerization (RAFT) are employed, both of which are highly adoptable and efficient methods to making well-defined polymers. To date, controllable radical polymerization of metal-centered pincer initiators has not been reported in literature. Findings will include reproducible methods in using ATRP/RAFT to synthesize...
end-functionalized metal-coordinating polymers with well-defined and controllable chain lengths, contributing to the body of work within the pincer ligands and metallopolymers chemistry community.

**Characterization of a Small Molecule, AGX-51, That Suppresses Id1 Protein Levels and Inhibits Breast Cancer Metastasis**

*Sijia Xu, Biology*

*Sponsor: Dr. Robert Benezra, Memorial Sloan Kettering Cancer Center*

The Id family of helix-loop-helix proteins (Id1-4) plays a critical role in inhibiting differentiation during mammalian embryogenesis, and various members are re-expressed in adults in a number of pathologic states including cancer and diseases of the vasculature where their activity has been shown genetically to be essential for disease progression. A small molecule antagonist of the Id family, AGX-51, was identified in an in silico screen for compounds that could bind a hydrophobic crevice adjacent to the loop region of Id1. In vitro, AGX-51 inhibits the ability of Id1 to antagonize E protein binding to DNA thereby releasing the E proteins to activate transcription. Preliminary experiments in the murine breast cancer cell line 4T1 found that treatment with AGX-51 resulted in decreased Id protein expression, suggestive of protein degradation, and decreased cell viability. Recently the whole proteome of 4T1 cells treated with or without AGX-51 was profiled by mass spectrometry and the data showed decreased levels of 14 proteins including Id1, as was expected, as well as β-catenin, a protein that has been implicated in Id1-related molecular pathways. These changes were validated by western blot. This study investigated the specificity of AGX-51 targeting Id1. Id1 overexpressing cell lines were constructed by transducing 4T1 TF cells with a retrovirus expressing Id1. The overexpression was validated by western blot. Cell viability assays and western blots were performed to evaluate the expression levels of proteins (such as β-catenin and Cyclin D1) following AGX-51 treatment. No significant decrease in cell viability or β-catenin expression is expected to be observed in Id1 overexpressing cells following AGX-51 treatment, proving that the overexpression of Id1 can rescue the effects of AGX-51.

**Investigating the Intrinsic Resistance of Cranial Motor Neurons to Neurodegeneration in ALS and SMA**

*Ilona Yagudayeva, Biology*

*Sponsor: Professor Esteban O. Mazzoni, Biology*

Familial Amyotrophic Lateral Sclerosis (ALS) and Spinal Muscular Atrophy (SMA) are neurodegenerative diseases that induce the degeneration of spinal motor neurons (sMN) primarily. Importantly, patients with ALS and SMA retain eye movement until late stages of the disease because a subset of cranial motor neurons (cMN), oculomotor (oMN) and trochomotor (trMN) cranial motor neurons are more resistant to ALS- and SMA-induced neurodegeneration. Understanding the nature of cMN resistance to ALS promises to open a new frontier for the study of ALS pathology and the development of therapeutic strategies. However, the study of cell specific vulnerability has been limited by the access to large and homogenous populations of cMNs. Here, an in vitro disease model was established combining ESC-derived sMNs and cMNs. This model was utilized to test the response of the differentially sensitive cell types to various ALS-induced stressors in order to identify cMN-specific cellular and molecular features that might be responsible for ALS resistance. The findings suggest that cMNs may survive ALS pathology by their ability to mitigate the response to heat shock stress and ER stress and provide further evidence that the heat shock response pathway and the unfolded protein response (UPR) pathways are important in ALS pathology. Furthermore, by expressing mutant SOD1, it was possible to establish ALS pathology in ESC-derived sMNs and cMNs. Establishing an effective platform in vitro to study cMN resistance to ALS opens up many potential avenues to investigate the mechanisms of ALS toxicity and identify novel therapeutic targets to treat ALS and SMA.

**Elucidating the Role of GATA6 in Reprogramming Fibroblasts to Hepatoblasts**

*Ellen Yang, Biology*

*Sponsor: Professor Todd Evans, Cell and Developmental Biology in Surgery, Weill Cornell Medical College*

A long-term goal of regenerative medicine to provide functional mature cell types for patients necessitates the development of novel approaches towards developing these cell types. The generation of hepatic lineage cells is important for the eventual development of cell-based therapies and drug discoveries for liver diseases. While functional human hepatocytes have been derived from human embryonic stem cells (ESCs) using various differentiation protocols, efforts to generate hepatic cells by direct transdifferentiation of human fibroblasts have had limited success. Personalized cell and drug therapies would benefit from the use of patient derived fibroblasts over ESCs because cells derived from ESCs have the potential to be rejected by the host immune system. Induction of lineage specific transcription factors (TFs) can reprogram cell fate including for generating hepatocytes from fibroblasts. However, hepatocytes generated in this way are not proliferative, which poses a major limitation for using them in drug testing and cell based therapies. In order to overcome this limitation, it would be best to generate hepatoblasts, a proliferative progenitor for
hepatocytes and liver bile duct cells. To reprogram human fibroblasts to expandable hepatoblasts, the use of pioneer transcription factor GATA6 was tested here. Significantly, it was observed that the addition of GATA6 increases the levels of hepatic transcript during reprogramming.

**Why Do Males Persist: The Preservation of Mating Ability in the Androdioecious Nematode C. tropicalis**

*John Yuen, Biology*

*Sponsor: Professor Matthew Rockman, Biology*

Androdioecy—having male and hermaphrodite sexes within a population—has been studied and documented in many different species (Charlesworth, 1984). The evolution of this mating system has been investigated; however, the population genetics behind this is largely unknown. *Caenorhabditis elegans* is a widely studied androdioecious model organism, where males are quickly lost from the population. However, this study reports the unusual finding that males are maintained at a high frequency in a related androdioecious species *C. tropicalis*. This study aims to identify the genes associated with the presence of males in *C. tropicalis* using a genetic approach. To do this, the author constructed a panel of recombinant inbred lines (RILs) between 2 distinct populations of *C. tropicalis* that vary in their persistence of males. This RIL population was scored for mating ability as a target phenotype. It was then possible to do QTL mapping of the regions responsible for the variation in male mating ability. These alleles segregate epistatically in wild isolates of *C. tropicalis*. It can be concluded that mating ability is contributing to the comparatively high level of males in *C. tropicalis*. These results make it possible to infer about some of the evolutionary contributions to the maintenance of androdioecy.

**An Investigation on Stochastic Volatility in Black-Scholes Model**

*Qiushi Zhang, Economics, Mathematics*

*Sponsors: Professor Mark Wilkinson, Mathematics; Professor Lisa Larsson, Mathematics*

This project investigates option pricing models. The Black-Scholes model and the associated Partial Differential Equation are widely used for pricing and hedging of options. However, the model is derived under seven “ideal conditions” in the market for both the stock and the option. Some of the assumptions, such as constant stock price volatility and constant interest rate, are not in accordance with empirically observed features of real time series. Compared with the Black-Scholes model, the Heston model uses stochastic volatility, and it is able to better capture empirically observed phenomena in the market. The project involves deriving both the Black-Scholes and the Heston option pricing formulae with knowledge of stochastic calculus and financial theories. Matlab programs are created to compare Black-Scholes price with market price and Black-Scholes implied volatility with Heston’s implied volatility. Numerical results indicate that option price calculated using the Black-Scholes model represents market option price well but still with obvious discrepancies and that Heston’s assumption of stochastic volatility is more realistic compared to Black and Scholes assumption of volatility being constant. Given the federal funds rate was raised in December 2015, the project continues to explore the generalization of Black and Scholes assumption of interest rate being constant.

**Comparison of Electrical Techniques for Measuring Current-Induced Spin-Orbit Torques in Ultra-thin Magnetic Heterostructures**

*Xuanzi Zhang, Mathematics, Physics*

*Sponsor: Professor Andrew Kent, Physics*

Spintronic devices rely on the generation of spin-orbit torques (SOTs) to manipulate the magnetization of ultra-thin magnetic heterostructures using electrical currents. Several experimental methods to measure SOTs have been proposed and demonstrated. This paper presents a comparative assessment of two techniques: 1) in-plane dc measurement and 2) adiabatic harmonic Hall voltage measurement. Electrical methods for magnetic layers with perpendicular magnetic anisotropy rely on the anomalous Hall effect (AHE), in-plane external magnetic fields and dc or ac currents. The in-plane dc method measures the AHE to infer the change in the perpendicular component of magnetization direction in response to dc currents. The ac harmonic technique measures the first and second harmonic AHE responses to an ac current (~1 kHz). In the harmonic method, the author applied a sinusoidally varying current and measured the in-phase first and the out-of-phase second harmonic components of the Hall voltage. The effective fields associated with the SOT can be obtained by sweeping the in-plane field in a direction parallel (longitudinal) and perpendicular (transverse) to the current. Here, both types of measurements were conducted on β-Ta/CoFeB/MgO heterostructures in the form of patterned Hall bars (20 μm linewidth) and the results were compared. In both techniques, the author assumes quasi-static process and ignores thermal effects. The dc measurement offers an efficient way to measure Slonczewski-like torque. The harmonic technique is superior in determining both Slonczewski-like torque and field-like torque, but the measurement time is multiple compared to the dc method. This study unveils the possible origins of the discrepancy in results and proposes ways to improve both techniques.
Biosorption of Copper (II) Metal Ions from Solutions by Tailored Adsorbents to Enhanced Their Pollutant Affinity
Kateryna Zhdanova, Borough of Manhattan Community College, CUNY
Sponsor: Professor Abel Navarro, Science, Borough of Manhattan Community College, CUNY

The contamination of wastewaters and domestic waters by heavy metals has been around since the industrial revolution. Heavy metal ions are associated with the manufacturing industries from food additives to metal-mechanic factories. Technologies currently used to remove copper ions are expensive and produce undesired substances that need to be taken care of. A good decontaminating candidate should be eco-friendly, low-cost and capable of eliminating low concentrations of the metal. This can be achieved by chemically modifying known adsorbents to enhance their adsorption properties. This project suggests the use of chemically modified spent tea leaves of chamomile, peppermint and green tea under their thiolated, sulfonated and carboxylated forms as candidates for the removal of copper from solutions. Batch experiments were carried out to maximize the adsorption of copper (II) ions. Effects such as acidity, salinity, adsorbent dose, metal concentration and presence of surfactant were explored to optimize the uptake of Cu(II) ions in real conditions. Experimental data show that the maximum adsorption is reached at neutral pH. The results indicate that Cu(II) can be removed up to 53%, 22% and 19% with the thiolated, carboxylated and sulfonated adsorbents respectively. The maximum adsorption of copper on TPM (53%) is achieved with 150mg and decreases with the presence of salts and surfactants. Sulfonated and carboxylated adsorbent show a better adsorption in the presence of surfactants. Filtration of real wastewater will not only take care of solid wastes but also provide inexpensive and viable energy sources (biofuel production) by the use of the pollutant-loaded adsorbent.