

INQUIRY:

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† winner of Phi Beta Kappa/Albert Borgman Prize for Best Honors Thesis



INTRODUCTION:

Research as Educational Paradigm

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

NYU's College of Arts and Science has long been at the forefront of promoting undergraduate research. All of our majors, for instance, offer Honors tracks in which original inquiry is central. The College's annual Undergraduate Research Conference was established over thirty years ago and now encompasses projects in all of the humanities, natural sciences, and social sciences, as well as in creative writing. In addition, the Dean's Undergraduate Research Fund, created through the generosity of alumni, parents, and friends, provides students in the College with the material support necessary to carry out their inquiries. (A list of the research scholarships that have been endowed in the Fund appears on page 2 of this journal.) Finally, student funding is also available, particularly in the sciences, from departmental resources as well as through external grants that the institution and individual faculty members have received to promote undergraduate research experiences.

The annual journal *Inquiry* showcases abstracts of selected student research. This issue contains abstracts of projects undertaken in the 2008–2009 academic year. For the most part these abstracts represent research that was presented at the College's Undergraduate Research Conference held that spring. Some projects were supported by the Dean's Undergraduate Research Fund, and several also took advantage of research opportunities presented to students who participated in NYU's study abroad programs. But these abstracts represent only a small fraction of the research undertaken by College students, both as individuals and in groups, under the close mentorship of faculty.

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

Matthew S. Santirocco
Seryl Kushner Dean, College of Arts and Science
Associate Provost for Undergraduate Academic Affairs
Angelo J. Ranieri Director of Ancient Studies
Professor of Classics



Dean Santirocco, Professor Kiorpes, Professor Scicchitano, Associate Dean Kalb, Assistant Dean Shoemaker-Wood, and the prize winners of the 2009 Undergraduate Research Conference, College of Arts and Science, New York University.

NYU Undergraduate Research Conference, April 17, 2009 *Currently Professor of Neural Science and Psychology, Professor Kiorpes researches neural limitations on visual performance in infants and what changes take place postnatally that permit the attainment of normal adult visual function. Newborn infants see poorly and develop adult levels of visual sensitivity over a protracted time course. The broad goal of her research is to understand the neural mechanisms that underlie this developmental process. She uses a combination of behavioral, physiological, and anatomical methods to study development. Professor Kiorpes received her Ph.D. in Physiological Psychology from the University of Washington. In 1985, following three years of postdoctoral work in the Department of Ophthalmology at the University of Washington, she joined the faculty of New York University. Professor Kiorpes has been recognized for her outstanding teaching in 2001 with the Golden Dozen Teaching Award and in 2003 with the University Distinguished Teaching Award. She currently directs the CAS Women in Science Scholars Program and has served as both Director of Undergraduate Studies and Director of Graduate Studies in the Center for Neural Science.*

FACULTY PERSPECTIVE:

The Accidental Scientist: The Power of Undergraduate Research Experiences

by Professor Lynne Kiorpes

I grew up with boys. We spent most of our childhood playing games, building forts, racing go-karts, taking things apart, putting things together. To our mother's great dismay, the things we put together were not generally the same things we took apart! There was never any sense that girls couldn't or shouldn't do these things, or that I was different because I was a girl.

My first encounter with this concept was in the 8th grade. My homeroom teacher gave out schedules for the year. Along with Earth Science, Math, English, History, etc., was the cryptic notation "Home Ec." I leaned over to the kid next to me and asked, "what's Home Ec?" He said, "search me." His schedule said "Wood Shop." I raised my hand and asked the teacher, "What is Home Ec?" Home Economics: Cooking, sewing, and other home making skills was the answer. I said that I would like to take wood shop instead. Girls don't take wood shop, was the answer. When I asked why not, I was told, "Because girls take Home Ec." After several conversations of that kind with my counselor and the Assistant Principal, I took Home Ec. Predictably, I did not do very well.

Throughout high school, I found I enjoyed math and science—physics, chemistry, life science. I wasn't a great student, but I did okay. Senior year came, and it was time to apply to colleges. I did my research, made my list of schools, and took it to my guidance counselor. She looked at the list, then, looking puzzled, asked why I had chosen those schools. I explained that I had chosen them because they had engineering programs and I wanted to be an engineer. She said, "Girls don't do engineering. Maybe you should apply to some of the nice, small, liberal arts colleges", and she gave me a list. She told me that since I liked science, I could study to be a science teacher. I thanked her, and then proceeded to apply where I wanted. I was accepted to a few engineering schools and chose to attend a large, urban university in the northeast.

On the first day of class, in my very first engineering class, the teacher came in and observed that there were women in the class. He asserted that women "don't belong in engineering" and that most of us would not be there at the end of the term. Despite his best efforts, we were still there at the end of the term. A small triumph!

However, by mid-sophomore year I realized I really didn't like engineering, and I started looking around at alternative majors. I went to the college advising center and spoke with an advisor. We had several meetings, exploring different strategies. He suggested that I might enjoy doing research. He suggested Psychology as a major. I was surprised because I thought Psychology was about counseling and therapy, not about science. He told me about experimental and physiological psychology. Intrigued, I took some classes, liked them, and went back to see him the next semester very excited to try research. I asked him how to go about getting involved in research. He suggested a few people to talk to in the department, one of which was a new faculty member just starting his lab. I found myself very interested in his work on the visual system. Although he cautioned me that there was at that time "no lab" and I would have to help build it, I was on board. He liked my engineering background and I liked putting things together so we made a good team.

At first, I spent a few hours at a time in the lab, two days a week. Then I started going more often; eventually I was spending most of my free time in the lab. By senior year, we were up and running and the professor let me design my own project, which became my Honors thesis. By graduation, I knew that I wanted to spend my life doing research. This experience for me was defining. It changed my life in the most fundamental way. I had a goal and a passion. Why the "Accidental Scientist"? I had been heading in a completely different direction. Through my good fortune, I found a keen and thoughtful advisor who opened a world to me that I had not known existed. Also through my good fortune, I encountered a young, open-minded professor who was willing to give me a chance. He invited me into his lab, taught me many different things, and allowed me the freedom to learn what science was really all about. I stumbled on to a most wonderful career path without ever realizing it.

I have a few take-home messages: 1. Don't be afraid to try something new. Just because you are on a particular road, doesn't mean you have to stay there. 2. Talk to people and take advantage of the advising and mentoring available to you. 3. Don't let anyone tell you that you can't pursue an interest because you are a girl/boy. (Luckily, we don't have to worry much about this anymore!) 4. If you find something you love, do it. (As a postscript, repairing and refinishing old wood furniture is a hobby of mine, and I actually did become a science teacher, despite my best efforts!)

I hope your undergraduate research experience has been as fulfilling as mine was. I want to extend congratulations to every one of you on your accomplishments. Know that you have contributed to the wealth of knowledge in and to the progress of your field.



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*

HUMANITIES

“Beauty Appears Both Concealed and Visible”: Wonder and Awe in the Inscriptions of the Alhambra

Amanda Allen, Iberian Studies†*

Sponsor: Dr. Salvador Martinez, Spanish and Portuguese

The Alhambra was the palace of the Nasrids, who ruled southern Spain from 1238 to 1492. The palace is lavishly decorated with geometrical patterns and calligraphy, including poems written specifically to adorn its walls. I analyze four poems by Ibn al-Jayyab in the Tower of the Captive, which draw attention to important features of the surrounding art using literal description and metaphor. If the visitor reads the poems attentively, he will have a better understanding of the art. The poems also describe two different experiences of beauty, one of beholding and one of understanding, similar to the concept of wonder and awe. According to Aristotle, wonder and awe are sensations caused by something that is not completely understood, and they lead to seeking explanations and furthering knowledge. Avicenna added that wonder is pleasurable by itself. These poems describe the sensation of wonder through an eloquent speaker, who is delighted by the art but cannot describe it. In a later verse, the tower is “raised by wisdom,” alluding to knowledge beyond the sensation of wonder. By describing the art and inviting the reader to interpret it, the poems form a link between the sensory and intellectual experiences of this art.

The Regularization of Irregular Past Participles in Dominican and Puerto Rican Spanish

*Evelyn Almonte, Gender and Sexuality Studies, and
Kylie Waddy, French and Linguistics*

Sponsor: Dr. Gregory Guy, Linguistics

Like other romance languages, Spanish contains irregular past tense verb structures. Past participles such as “*hecho*” from the infinitive “*hacer*” (to do) and “*abierto*” from the infinitive “*abrir*” (to open) each diverge from the regular conjugations of verbs ending in “-er” and “-ir.” Regularization of irregular past participles is generally considered a feature of the speech of young Spanish speakers in the earliest stages of language acquisition. We document the regularization of irregular past participles among adolescent and educated adult members of the Dominican and Puerto Rican communities. To determine whether or not this is an actual linguistic shift in progress, we fashioned a survey that poses personal background questions before presenting the respondent with eight irregular past participles and their regularized realizations. The survey asks whether the respondent uses these regularizations all the time, frequently, occasionally, sometimes, or never. To date, 493 people have completed our survey. Besides displaying the classic features of linguistic changes in progress such as a higher frequency of use among women and people in their late teens and twenties, the data also suggests that some regularized past participles are used more among Puerto Ricans while others are more common among Dominicans.

The Ara Pacis: Contested Meaning of a Historical Monument, Past, Present, and Future

Alexandra Amsden, Art History

Sponsor: Dr. Carol Krinsky, Art History

Originally erected by Emperor Augustus as an altar to Roman peace, the Ara Pacis is now housed in a modern museum that has evoked great controversy among Italy's rival politicians. I examine the ways in which these supportive or opposing politicians contest the memory and meaning of the monument, and use it to promote their political and cultural positions. I have combined a study of the three key periods in the history of the Ara Pacis with a study of the political figures who molded this monument over time. They include Augustus, the first Roman emperor; Benito Mussolini, the Fascist dictator who thought of himself as a successor to emperors; and contemporary politicians including the center-left former Mayors of Rome, Francesco Rutelli and Walter Veltroni, the current center-right Prime Minister, Silvio Berlusconi, and Mayor of Rome, Gianni Alemanno. Through an analysis of journal and newspaper articles, books, and interviews from each period, I have come to understand the policies of each political figure and his influence on the monument. The current controversies reflect an internal struggle within a country torn between the desire to move toward a progressive future and the desire to hold onto a traditional past.

From Abram to Ibrahim: A Comparative Study of the Narrative Voices and Structures in the Qur'an and the Book of Genesis

Mohammad Barkeshli, Economics

Sponsor: Dr. Gabriela Basterra, Spanish and Portuguese, Comparative Literature

My research focuses on the voices that narrate the two sacred texts, the Qur'an and the Book of Genesis. I compare their respective tones, modes, character development, dialogue and narrative discourse. By reading these texts from a contemporary perspective—which I define as that of the “modern subject”—I attempt to liberate the reader from the overwhelming scope of context that has given these books, or collections, a life of their own. Both texts claim divine authorship and thus through analyzing the narrative voices—the many unrecognizable “I”s that speak within the narrations—on a purely literary basis, we can explore the similarities and the differences apparent in the various discourses. In this study I further address the question of whether or not the “divine Voice” really belongs to the discursive world—the world of direct dialogue between personages—by exploring the relationship between the Voice of the divine to that of the narrator and of the “author” in the texts.

Yiannis Ritsos' Transformation of Sophocles' Ajax Experienced through Performance

*Christos Birkitt, Hellenic Studies**

Sponsor: Dr. Liana Theodoratou, Hellenic Studies

My thesis explores the reconfiguration of Sophocles' Ajax within the modern Greek poet Yiannis Ritsos' poem “Ajax.” Specifically, I analyze how Ritsos redefines Ajax's tragedy by examining his rewriting of the aesthetics and ethics of suicide. In addition, since there have been several theatrical adaptations of Ritsos' poetry, I examine the transference of his text into performance. The title of the Ritsos' volume of poetry that contains his “Ajax,” *The Fourth Dimension*, is a direct reference to time. In Ritsos, time is not perceived as linear but instead as a palimpsestic continuum in which our fragmented voices and those of the ancients are interwoven. When Sophocles' Ajax is reworked and contemporized by Ritsos, for example, the tragic legacy of Ajax is linked to modernity in a way that suggests how the past survives in the present and, indeed, how it helps shape this present. Ancient and contemporary tragedy are thereby related in a way that asks us to think about the relations among the past, the present, and the future. A performance of Ritsos therefore carries the legacy, wisdom, and tragedy of the ancient world—as it is depicted or staged in Homer and Sophocles—into our modern one. As a result, I hope to suggest, we are offered a lens that opens onto an understanding of modern society that, emerging in relation to both ancient and modern voices, is achieved through the rewriting and performance of the classics.

A Castle Cut from Paper: Intertextuality and Hyperreality in Sir Gawain and the Green Knight

Patrick Blagrove, English and American Literature

Sponsor: Dr. Martha Rust, English and American Literature

There are multiple references to fictional representations of chivalry and courtly romance within the text of *Sir Gawain and the Green Knight*. Characters in the poem several times seem to confuse their reality with tales and adventure stories, either consciously equating actual events with imaginary stories or allowing their ideas to be so shaped by romances and rumors that they confuse fact and fiction. The explicit references to romance conventions and the comparison of events in the poem with earlier fictions and the oral tradition of tales by characters complicates the representation of their reality and the concept of chivalry. While creating a more realistic depiction of the real world on one hand, the characters' consciousness of romance conventions and familiarity with the genre more importantly hints on the other hand

that, since they are inescapably characters working within that genre, they are performing roles based on fictions, and that therefore chivalry as represented is based on fiction. They could be said to be operating therefore in a world reminiscent of Jean Baudrillard's concept of hyper-reality and simulacra, struggling to represent things that do not represent any actual things in themselves.

It's a Rich Man's World: The Currency of Female Beauty and Virtue in the Tornabuoni Chapel in Santa Maria Novella, Florence

*Jessica Carei, Medieval and Renaissance Studies**

Sponsor: Dr. Virginia Cox, Italian

Giovanni Tornabuoni commissioned Domenico Ghirlandaio to redecorate the cappella maggiore in Florence's Santa Maria Novella to reassert familial ownership of the chapel, their high profile at Santa Maria Novella, and social prestige of the family. Part of this plan involved utilizing the portraits of the Tornabuoni women throughout the design scheme. But why portraits of women? What could the inclusion of Lucrezia Tornabuoni, Giovanna degli Albizzi, and Lodovica Tornabuoni contribute to Giovanni's campaign? Through my research, I have concluded that Giovanni exploited their virtue for the family's gain. Because Giovanni wished to reinforce the Tornabuoni's spiritual worthiness in the eyes of the Dominican Order and Florentine community who worshipped there, Giovanni needed to publicly assert the family's private virtue, a commodity women possessed and cultivated in Early Modern Florence through the creation of idealized portraiture within a religious context. Memorializing and commemorating these women in their civic contexts would foster a perception of increased virtue among the entire Tornabuoni clan in the eyes of the Florentine public. Thus, although Quattrocento Florence is typically seen as a rich man's world, women, rich in virtue, were vital to familial success.

Realism in Contemporary Literature: Reality, Hyperreality, Las Vegas

*Courtney Chatellier, English and American Literature**

Sponsor: Dr. Elaine Freedgood, English and American Literature

Theories of post-modernity and hyper-reality complicate the project of realist representation in contemporary literature. Writers seeking to produce a realist literature of postmodernity must confront (or redefine the terms of) such challenges to the ontological status of the real. In the fiction of Thomas Pynchon, Don DeLillo, and Lydia Davis, television and the culture that adheres to television are among the most important subjects of rep-

resentation that allow for an exploration of the shades of difference between reality and simulation. The city of Las Vegas, similarly, presents a counterpoint to traditional, strict definitions of realism. I investigate the problematic of realism in contemporary representation and attempt to expose the ways in which these authors represent that problematic as an integral part of the reality they are writing. I perform this investigation through the lens of traveling in Las Vegas over several days, an experience which focuses my own observations about how we conceptualize, represent and inhabit contemporary reality.

The Pontianak and Other Female Asian Ghosts

*Charmaine Chua, International Relations**

Sponsor: Dr. Judith Miller, French

The Pontianak, sometimes affectionately referred to as the Vampire of the East, originated from Malay culture, but is omnipresent in Asia, especially in Singapore and Malaysia. According to urban legend, the Pontianak is thought to be the cause of spontaneous abortions and is capable of transforming herself into a beautiful woman to seduce and kill men. Her continued presence in South East Asian societies suggests that her role serves to preserve Malay culture occulted by the triple colonization of the British, Chinese immigration, and Japanese occupation in South East Asia. I trace the history of the Pontianak by looking at the myths, urban legends, inconsistencies in definition, and skeptical debunking that attempt to come to grips with this infamous ghost. Through the discussion of sociological and psychological aspects of this phenomenon, such as the use of the Freudian Uncanny, I postulate several reasons as to why the Pontianak has come to her widespread fame. Specifically, I attribute her influence to factors of gender and the socio-historical background of the societies where she originates. The Pontianak is just one example of many other female Asian ghosts, such as the highly popularized Sadako in the Japanese film, *The Ring*. As the female ghost makes her return through the big screen, it is of interest to us to examine why she continues to haunt our societies.

The Politics of Forgetting: Defining the Legacy of the First Red Scare and the Changing Face of a Nation, 1917–1920

Felipe Cole, History

Sponsor: Dr. Stefanos Geroulanos, History

In contemporary political discussions, the period of American history known as the Red Scare refers to the Second Red Scare (1949–1958). Distinct from its successor in its events, legacy, and memory, the First Red Scare (1917–1920) involved terrorist bombings, labor

strikes, and mass protests on a large scale. The radical upheavals of the First Red Scare, coupled with what many in the United States considered the inevitability of a world revolution emanating from the 1917 Bolshevik revolution in Russia, fomented mass hysteria across the country. Despite the gravity of the events that took place, the legacy of the First Red Scare, aside from its role in the formation of its successor, remains relatively unexplored. My research seeks to explain the legacy of the First Red Scare as an episode in American history, which was willfully purged from the national memory in order to accommodate new interpretations of the American nation and the reformulation of the role of “other” in American politics and public life. By analyzing period social histories, journalistic sources, first person accounts, anti-radical legislation, and internal communications of the government and political organizations, I examine the real legacy of the First Red Scare and what its absence from the public consciousness has precipitated.

Evita and Evita: The Contemporary Transformation of the Myth of Eva Perón

*Elizabeth Corbett, Latin American Studies**

Sponsor: Dr. Gabriel Giorgi, Spanish and Portuguese

Eva Perón, Spiritual Leader of the Argentine nation, wife of Juan Domingo Perón, and one of Argentina’s most controversial figures, died at age 33 only to enter into immortality, legend, and myth. The myth of Evita in contemporary times (defined as the 1990s and 2000s) has come to be identified by the juxtaposition of the international/global representations and local/national interpretations: Evita and Evita. This contemporary period not only signals the complete transformation of Evita into an international icon, but also reveals the emergence of responsive and concurrent interpretations within a local perspective. In what ways has the contemporary myth of Eva Perón manifested itself and how and where, if ever, do these interpretations cross paths? I specifically examine the most important and relevant examples, “Evita” (1996) directed by Alan Parker, starring Madonna; the paintings of Argentine visual artist, Daniel Santoro; and the Argentine “response” to Parker’s film, “Eva Perón” (1996), to shed light on the myth of Evita today.

“Temple Boys”: Etruscan and Cypriot Parallels

*Sophie Crawford-Brown, Classics, Fine Arts**

Sponsor: Dr. Larissa Bonfante, Classics

There are about 300 known examples of Cypriot “temple-boys” dating between the fifth and fourth centuries B.C. These small sculptures typically depict a young boy between the age of two and five with a string of

amulets across the chest, and often with the tunic pulled up to expose the genitals. They are known primarily from sanctuaries and are thought to relate to coming-of-age rituals. In Etruria, there are three distinct types of votive offerings related to young children. One group, the *bambini in fasce*, show an infant in swaddling bands, while the second type depicts a woman nursing an infant. The final group, of which only about fifty survive, is largely unpublished. While studying these pieces in Italy on a grant from the Dean’s Undergraduate Research Fund, I found that they bore a striking resemblance to the Cypriot “temple-boys.” They too show young children in a similar seated position, and often with a bird in one hand (also common in the Cypriot types). What accounts for this unexpected parallel? While it is true that trade is recorded in the Mediterranean going back to the Bronze Age, the specificity of this type and its limited geographic and chronological range may provide a unique insight into the relationship between Cypriot and Etruscan religious and daily life.

Baseball as a “Redemptive Interpretation to the Meaning of Existence” in Literature

Alexander Edelman, Politics

Sponsor: Mr. James Traub, Journalism

In his 1992 essay “Lonely Man of Faith,” Rabbi Joseph Soloveitchik remarks on the challenge of the titular character: any man endowed with utter conviction experiences a profound sense of loss at the inability to intertwine himself with the god he worships, as well as a unique loneliness that comes from existence in a secular society. According to Soloveitchik, a lonely man of faith would constantly live in some sort of precarious balance between the secular world and the world of his faith. A number of authors have envisioned the game of baseball as the place where the real world and the mythic collide and intertwine. In works like Malamud’s “The Natural,” Coover’s “Universal Baseball Association,” and the writings of W. P. Kinsella, baseball is presented as a plane where cosmic struggles are played out, and where a quest for what Soloveitchik calls a “redemptive interpretation to the meaning of existence” takes place. I explore baseball as religious experience, religious quest and personalized myth, taking into account the ideas of writers like Soloveitchik, Eliade, and Heschel to explain the pull of a game which, as poet Donald Hall wrote, “sets off the meaning of life.”

The Metaphysics of Will: An Alternate Approach to the Free Will Problem

*Rodrigo Ferreira Flores, Philosophy**

Sponsor: Dr. John Richardson, Philosophy

Many believe that “free will” is what infuses the choices that we make with meaning and a certain sense of freedom. Yet, when we look around at the world, it seems that everything that happens is determined by previous causes. What if every single one of our actions was the necessary consequent of certain facts about the past in conjunction with the laws of nature? Would this mean that we have no “free will”? This question has troubled philosophers for a long time; reaching an answer, however, seems to be as far away as it has ever been. Why do we continue to struggle with this philosophical quandary? Is the existence of “free will” really incompatible with the existence of Determinism? Nineteenth century philosopher Arthur Schopenhauer vehemently denied this and I believe he had good reasons to. My research employs Schopenhauer’s metaphysics as the foundation for a successful Compatibilist account of the free will problem.

Natalia Goncharova’s “Mystical Images of War”: A Synthetic Russian Identity as Seen through an Avant-Garde Lubok

Anna Gargarian, Art History

Sponsor: Dr. Pepe Karmel, Art History

My research aims to establish Natalia Goncharova’s 1914 lithograph series “War: Mystical Images of War” as an important Modern work of the early twentieth century. In doing so, I have researched the historical image culture of Russia, while placing it within a larger global context. I have explored the history of printmaking in Europe and the East, while focusing on Russian folkloric imagery and its later incorporation into Christian Orthodox society. Due to the political message of her images, I have also researched the relationship between war and image dissemination in pre- and post-Soviet Russia. I have related these histories to Goncharova’s temporal context by exploring the late nineteenth century folk-revival movements, and her active participation in the Russian Futurist movement. Through formal analysis of Goncharova’s images, I have traced her stylistic influences back to a Folkloric, Pagan, and Byzantine past, while noting her avant-garde innovations. I conclude that Futurism’s combination of literary and visual artistic media was exceptionally successful in Russia because of the history of *lubki*, Russian popular prints. Goncharova’s “Mystical Images of War” are not only a continuation of *lubki* tradition, but stand out as modern works reflecting an international trend towards apocalyptic and folk-revival themes in art of the avant-garde at the start of the First World War.

The Production of Irish Cultural Nationalism in Argentina: The Bulfin Family

*Rebecca Geraghty, History**

Sponsor: Dr. Eileen Reilly, Irish and Irish-American Studies

Within Irish historiography, Irish-Argentine Eamonn Bulfin is recognized for his role in the physical-force nationalist movements in Ireland at the start of the twentieth century. Traditional accounts, however, truncate his activism by exploring only his political participation in Ireland during the 1908–1916 period. Eamonn Bulfin did not contribute to the political cause because he was following directions from some inner biological connection to Ireland. Instead, he made these contributions because he perceived himself to be Irish. This perception was not innate, but had instead been produced by conscious social efforts on behalf of his family. In fact, Eamonn Bulfin’s well-known activism within Ireland was continuous with his and his family’s lesser-known cultural nationalist activities in Argentina. As journalists, Bulfin’s uncle and father used their visibility in *The Southern Cross* and *Fianna* newspapers to develop and nurture a sense of collective Irish identity amidst a group of people living over six thousand miles away from Ireland. Through the newspapers and their founding of the Gaelic League of Buenos Aires, the Bulfins were cultivators, producers, and reproducers of Irish cultural nationalism from the geographical base of Argentina. By neglecting this preface of Eamonn Bulfin’s cultural nationalist development in Argentina, the existing scholarly accounts confine his nationalism to a nationally-bounded paradigm. This study contextualizes his sense of Irishness within its Argentine context to reveal the important developments in Irish nationalism taking place in Latin America.

Arthur Griffith and Patrick MacManus: International Links between Irish and Argentine Revolutionaries

Rebecca Geraghty, History

Sponsor: Dr. Eileen Reilly, Irish and Irish-American Studies

On June 13, 1912, Irish revolutionary Arthur Griffith wrote to Patrick MacManus in Argentina requesting financial aid for the Sinn Fein newspaper. Griffith was a prominent leader of the Sinn Fein nationalist movement that advocated for Irish independence from the British Empire. This newspaper was both the forum through which Griffith articulated his views, and a vital lifeline for the Irish independence movement. In an acute hour of need, Griffith appealed to an Irish-Argentine for support. MacManus had immigrated to Argentina from Ireland in the 1880s. He had achieved great prosperity

and carried the banner of Irish culture to South America. MacManus' connections to one of the foremost architects of the independent Irish state reveal the centrality of the Irish-Argentine community's role in this revolutionary struggle. This transnational connection between Griffith and MacManus exposes an Irish-Argentine community that actively contributed to Irish freedom, and widens the traditional interpretive lens applied to Ireland in the early twentieth century.

New York Theater in a Post-9/11 World

Maya Glasser, Individualized Major, Gallatin School of Individualized Study
Sponsor: Dr. Martin Daughtry, Music

If theatre serves to bring people together, should sensitive material be censored to protect audiences in chaotic times? How much of an impact does art have, and when are its messages needed the most? Perhaps most importantly, whose job is it to decide what audiences can and cannot handle, and what they need? While the media focused on more mainstream music events in late 2001, Broadway continued to be an important local and national force, and a typical, yet significant musical entity in the new post-9/11 world. In order to investigate the impact of 9/11 on New York theatre, I spoke with a number of theatre professionals, including actors, producers, and critics, and read numerous theater-related articles between 2001 and 2008. My research raises further questions about the role of theater in relation to a national tragedy, theater's impact on society, and whether theatrical productions should ever be censored in light of political turmoil.

Corridos of the Texas-Mexican Border: Geographical Difference, Transnational Violence, and Community

*Kathleen Griesbach, Latin American Studies and English and American Literature**
Sponsor: Dr. Sibylle Fischer, Spanish and Portuguese

I investigate social and political conflict in US-Mexican border communities as reflected in several groups of *corridos*, narrative Mexican folk ballads. The central problems I explore through analysis of the *corrido* revolve around the paradox of the border commonly discussed in Latino studies: its existence as a stark political divide but also as a living space. Through the *corrido*, I explore how and to what extent the geography of the border engenders violence and political strife. Through the lens of history, film, media coverage and critical theory I contextualize my findings from the Arhoolie Foundation, an archive of Texas-Mexican vernacular recordings in

California where I conducted research through a DURF grant. I explore the tension between the border as a place of violence and one of community, and the *corrido* as historical artifact (news report), cinematic legend, and cultural critique. I focus on the *corrido* traditions of two border regions.

Bromantic Comedies: The Genre Breaking Works of Judd Apatow

Samuel Griffel, Cinema Studies
Sponsor: Mr. Derek Kane Meddock, Cinema Studies

In tracing the history of the romantic comedy genre within the larger context of traditional cinema, much has been made over the perception that romantic comedies ignore societal transformations while purporting an idealized version of romance. More recently the trend has shifted away from traditional views, such as marriage being seen as a happy ending or the presentation of a harmed or weakened female protagonist, towards a more "confluent love" that minimizes the idealized and focuses on an acceptance of the pragmatic. Nonetheless, the romantic comedy and the sexually explicit comedy have rarely intersected. By exploring the works of Judd Apatow, specifically the films *40 Year Old Virgin*, *Knocked Up*, and *Forgetting Sarah Marshall*, a balance is struck between the romantic and the sexual. These films share a reversal from the traditional romantic comedy, presenting a weak male as a spectacle. Sexual promiscuity and vulgarity are also at the forefront of these post feminist films. Additionally, the most significant relationships shared are "bromantic" (a close relationship between the male character and his male buddies), in order to highlight the problems in traditional romantic relationships.

Picasso to Deconstruction: Parallels in Art and Language

Grace Huang, Individualized Major, Gallatin School of Individualized Study
Sponsor: Dr. Friedrich Ulfers, German

In 1907, the artists Pablo Picasso and Georges Braque began developing the Cubist art style. Both interested in shedding classical representations of form, space, and mass, they created artwork based on taking apart and analyzing objects. Their work, especially Picasso's, developed into a study of visual representation and the realization that representational art is an abstraction of reality. Interestingly, half a century later the philosopher Jacques Derrida developed the postmodern theory of deconstruction, asserting that language is an abstraction of reality, that it is inherently metaphoric. He argued that the use of language ignores the difference between

reality and representation between the actual object and the corresponding word. As a result he revealed the contradictions and problems in previous philosophy texts. Studying and comparing Picasso and Derrida's work in their respective fields, I realized that both questioned conventions of how we see reality. Independently, they each worked towards the same understanding of what is real by exposing the flaw in classical logic of assuming that a representation can effectively express something in reality. That this postmodern way of thinking manifests in multiple fields of study implies a more widespread change in the way we perceive reality.

Progressivism and the Cold War: The Ideological Origins of American Foreign Policy

Andrew Kagan, History

Sponsor: Dr. James Peck, East Asian Studies

My research examines the different methods used during three foreign interventions in Asia that America undertook during the Cold War to stop the spread of communism and why these methods had such different results. Specifically, I look at why they were managed in different ways due to the changes in American political ideology as it manifested as a result of two differing conceptions of the liberal concept of progressivism. Through historical research using political science methods, I find that the policies enacted by the U.S. occupation in post-World War II Japan were an extension of Roosevelt's radical New Deal progressivism, in which policies were enacted in a sweeping, top-down fashion. The Vietnam War was run like Johnson's Great Society: by technocrats and a mid-level bureaucracy. Finally, Reagan's involvement in Afghanistan was a reflection of his vision at home: the idea that freedom and capitalism could be achieved through massive deregulation and giving people large amounts of money to achieve their goals. Reagan's rejection of progressivism serves as an interesting counterpoint. I explore how these differing implementations of progressivism through foreign policy had radically different results. I also reflect on the implications raised for the Obama administration.

Productive Development Policies in Ecuador

*Mina Kim, Economics**

Sponsor: Dr. David Ludden, History

For the past fifty years, Latin America has lagged behind developed countries in terms of productivity growth. This productivity lag is clearly evidenced in the case of Ecuador. The Ecuadorian economy has demonstrated low performance growth when compared to its Latin American and Caribbean counterparts since the 1980s.

The juxtaposition of Ecuador's high export concentration, low total factor productivity, and low manufacturing and industrial performance evolves into an imperative analysis of the country's productive development policies that are meant not only to mitigate these issues, but also foster economic growth. More specifically, the bedrock of the research is to understand how and why these policies are failing. The policies are looked at from two different levels: horizontal (e.g. financing for development) and vertical (e.g. the tourism sector). The examination of key policy facets—design, implementation, coordination, and evaluation—reveals that the failure and inefficiencies lie within the institutional and legal frameworks.

Contesting City Spaces: Public Art in Bogotá

*Paula Kupfer, Journalism and Latin American Studies**

Sponsor: Dr. Sibylle Fischer, Spanish and Portuguese

The existence of public art in a city constitutes an index of civility, and in the case of Bogotá, the capital of Colombia, it is evidence of a rupture with the past, a change in the status quo. While the notion of public art in a "city under siege" and notorious for its violence and insecurity might seem paradoxical, the past decade has proven otherwise. Starting in the 1980s, but most notably since the late 1990s, art has been used as a means to solve urban crises and to deal with the scars of a violent past. Through a combination of art-informed public policy, large-scale public artworks, graffiti, and more vernacular street imagery, the face of the city is changing significantly. Using multidisciplinary research methods, including personal interviews with figures ranging from the city's ex-mayor to graffiti artists, photographic documentation of artwork in Bogotá, consultation of magazine and newspapers, as well as scholarly book sources, this project aims to shed light on the current state of public art in Bogotá.

Rock 'n' Roll and Radios: The Photography of Malick Sidibé, 1960 to Today

*Perrin Lathrop, Art History**

Sponsor: Dr. Shelley Rice, Art History

Photographer Malick Sidibé's photographs characterize the dynamism and hope enveloping the youth in post-independence Mali. Capital city Bamako's network of youth clubs devoured the French and American cultural and commercial products flowing into the economy following Mali's independence from France in 1960. Sidibé's camera captured the youths' quest to define their own sense of African-ness within a modern world through appropriation of fashion, music, and commercial goods found on the pages of French magazines and gracing rock

and roll album covers. In the 1990s, Western interest in African photography took hold, causing Sidibé's shift from commercial portraitist in 1960s Mali to international contemporary artist today. This shift in individual status results in a changing meaning in his works as they are transplanted from a culturally specific context to the white gallery wall. I investigate this shift through the study of the political and cultural history of Mali, contemporary magazine imagery, and theory on contemporary African art, as well as through interviews with gallery owners, photo historians and museum curators close to Sidibé. From this exploration, I argue that the re-invention, re-presentation, and re-viewing of Malick Sidibé's photography today effects new routes of exchange between Africa and the rest of the world that foster the emergence of an equalized global visual dialogue.

An Island within an Island: The Chuetas of Mallorca—A Study of Group Identity

*David J. Lebowitz, Spanish**

Sponsor: Dr. Kenneth Krabbenhoft, Spanish and Portuguese

Minority group identity often follows a fairly standard trajectory: formation, evolution, and sometimes, loss. The island of Mallorca is home to the Chuetas, a group of Catholics whose ancestors were Jews who converted under duress during the Spanish inquisition. While the Chuetas were stigmatized as “ugly,” “Jewish,” and “greedy” for more than 500 years, the advent of tourism and globalization beginning in the 1950s has substantially weakened these social prejudices. In the contemporary age, the Chuetas lost most of the cohesion that in the past bound them as an autonomous community. This study explores the ramifications of society's ostracizing a minority group and questions how dependent group identity is upon cultural bigotry that isolates said group. Research was based on twenty personal interviews of Chuetas and non-Chuetas in Palma de Mallorca in January 2009 to discover what weight, if any, the Chueta label is presently afforded there. Findings point neither to a conspicuous Chueta population in Palma nor to any importance attached to this label, which is, at this point, anachronistic at best. The findings suggest that a society's abandonment of its discrimination of a certain tight-knit group will invariably engender the dilution of that group's strong sense of identity and cohesion.

Manners and Empire: An Examination of the Relationship between Public Concern with Morality and Imperial Sentiments in Mid-Eighteenth Century Britain

Jennifer Lubejko, History

Sponsor: Dr. John Shovlin, History

Over the course of the eighteenth century, the expanding commercial classes of Britain challenged the power of the landed classes, who were the traditional rulers of society. During this time of change, increased trepidation about the threat that France posed to the well-being of Britain's transatlantic economy led to the Anglo-French conflict known as the Seven Years War (1756–1763). As evidenced by public discussions from this era, commentators often associated this sense of insecurity with unease about the state of manners, a contemporary term for morality, in Britain's commercial and lower classes. I investigate how this association of declining manners with insecurity influenced the development of public imperial sentiments. I use a variety of mid-eighteenth-century publications that discuss manners and their connection to both the British transatlantic economy and the North American colonies and colonists. This primary evidence reveals that public discussions often affirmed the landed classes as the traditional rulers of Britain by associating increased commerce with national insecurity. By extension, these affirmations enabled a conservative notion of empire, one that advocated defense against France and restricted commercial expansion, to circulate in British political culture during the era of the Seven Years War.

The New School of Philosophy: Unfolding the Theories of Delia Bacon

Brianna McGurran, English and American Literature

Sponsor: Dr. Juliet Fleming, English and American Literature

Published in 1857, Delia Bacon's *The Philosophy of the Plays of Shakespeare Unfolded* proposes that the plays attributed to Shakespeare were actually the product of a secret society of learned English courtiers who hoped to arouse anti-monarchical sentiment among audiences. Bacon claims that the plays employ the technique of induction popularized by Francis Bacon (no relation) in order to present audiences with empirical instances of human nature, which the public was then encouraged to translate into a more general cognizance of the desirability of democratic republicanism as a political system. Bacon's proposition—that this coterie of playwrights decided to promote their political doctrine on the stage

before a live audience able to ponder and respond to the action immediately—casts her as the earliest public sphere theorist to suggest that experimental science was integral to the creation of critical public debate in seventeenth century England. *Philosophy* both predates social theorist Jürgen Habermas' argument in his seminal *The Structural Transformation of the Public Sphere* and provides readers with a novel way of evaluating the plays' pertinence in our own time. To date, scholars have either roundly ignored Bacon's contributions to Shakespeare criticism or have emphasized the eccentricity of her life and work at the expense of a sustained engagement with her text. I rehabilitate *The Philosophy of the Plays of Shakespeare Unfolded* by arguing that Bacon was a forerunner of modern political and literary theory and that her work admirably tackles one of the most profound questions in criticism: the ability of literature to affect the progress of history.

Stuart Davis and Joaquin Torres Garcia at the Whitney Studio Club

*Jared Osborne, Art History**

Sponsor: Dr. Miriam Basilio, Art History and Museum Studies

In 1921 the Whitney Studio Club on West 4th Street in New York City's Greenwich Village held an exhibition featuring Joaquin Torres Garcia and Stuart Davis. This underresearched exhibition serves as the primary source of evidence for the previously overlooked relationship between the two artists. Specifically, Davis' dynamic and free-wheeling urban landscapes of the late 1920s and early 1930s are rooted in Torres Garcia's energetic and vibrant urban landscapes from the 1921 show; Torres Garcia's mature Universal Constructivism works are influenced by Davis' highly abstracted and geometric works from the 1921 show. In order to demonstrate this relationship, I researched and analyzed each artist's oeuvre through reading catalogues and viewing their works at the Metropolitan Museum of Art, MoMA, MALBA (Buenos Aires), and the Joaquin Torres Garcia Foundation (Montevideo). Additionally, I consulted primary and secondary literature such as Torres Garcia's papers at the Getty (Los Angeles) and Davis' diary from 1920 to 1922 at the Morgan Library (New York) to support and expand upon the links between the two. A thorough examination of the exhibition does not overthrow the traditional art historical narrative attributed to each artist. Rather, the show works within the narrative and enriches it by revealing an ignored dialogue between the two artists.

A Morphological Analysis of Female Figurines from the Site of Grimaldi

Samantha Porter, Anthropology

Sponsor: Dr. Randall White, Anthropology

Gravettian female statuettes, commonly known as "Venus Figurines," have been a fixture in both academic archaeology and popular culture since their discovery in the late 19th century. Many interpretive frameworks for these extremely diverse objects have been put forward, and while there exists an abundance of literature focusing on qualitative observations of similarities/differences among the figurines, there is a general lack of more empirical, measurement based analysis. With this in mind, I conducted a systematic study of 14 figurines from the Gravettian/ Epigravettian site of Grimaldi in Italy which had yet to be scrutinized in such a fashion. I quantitatively described their form, taking measurements of distinct morphological elements (the head, breasts, belly, etc.) and plotting them against each other, revealing several patterns relating to body proportion. I then applied the resulting data to an interrogation of current interpretive frameworks for female figurines. I concluded that the conception of the figurines from Grimaldi was to be different from those at other sites. In sum, not all Gravettian female figurines express the same value and we should not try to interpret them as if they did.

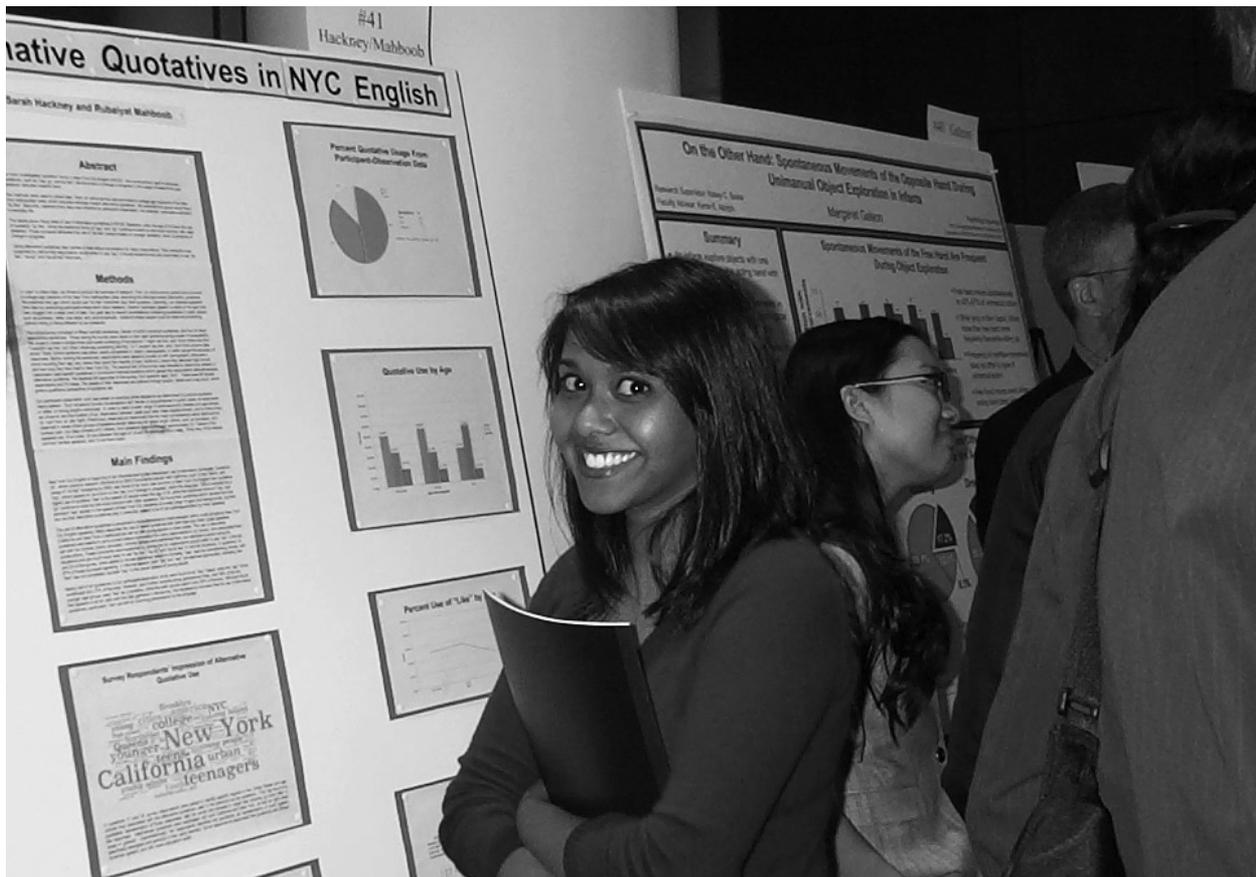
Barry Harris and his Jazz Workshop: "A University of One"

*Maurice Restrepo, Music and Sociology**

Sponsor: Dr. Martin Daughtry, Music, and Dr.

Maureen Mahon, Music

At 79 years old, pianist Barry Harris is a significant figure in jazz as a performer and, more importantly, as an educator. During his career Mr. Harris has performed with legends such as Cannonball Adderley and Dexter Gordon, cementing his place in jazz history. As a pedagogue he has been instrumental in creating a theoretical language used to teach the improvisational approach associated with the be-bop style of Charlie Parker and Bud Powell. While jazz education has shifted from a largely informal pedagogical tradition into a formalized system taught at universities, Mr. Harris is one of the few teachers who has resisted the institutionalization of the music, teaching largely outside of music schools and only occasionally appearing as a guest lecturer at universities in Europe and North America. This research presents an ethnography of Mr. Harris' current pedagogical arena: his weekly workshops, conducted continuously in New York City for the past few decades. In addition to highlighting the main



points of his theoretical approach to jazz education, my work seeks to define Mr. Harris’ educational efforts as a grass-roots approach that aims to preserve and proliferate knowledge of the musical language of 1940s be-bop. He believed that this approach is lacking in current educational practices in jazz.

Muslim Immigration and the Construction of Stereotypes in Contemporary Spain

*Ishita Singh, Journalism and Spanish**
Sponsor: Dr. Jo Labanyi, Spanish and Portuguese

As Muslims move to Spain in increasing numbers, Spaniards have been forced to confront their understanding of these new immigrants. Spaniards have created stereotypes in their cultural representations of these immigrants in order to simplify and perhaps better understand the complex relationships that Spain has had with Islam throughout its history. I examined multiple Spanish films, novels, and plays that deal with Muslim immigration, as well as stories and memoirs produced by Muslim immigrants in Spain. I also visited various Islamic cultural centers in Madrid and talked to immigrants there about Spanish perceptions of Muslim immigrants. I conclude

that stereotypes of Muslims allow for the creation of stereotypes of Spaniards, who become defined as what Muslims are not. There is a tendency to construct Muslims as “backward” in such a way that the Spaniards with whom they interact become constructed as “modern.” I look at stereotyping as a two-way process—a way of dealing with anxieties not only about Muslims, but also about what Spaniards represent in the world today.

The Jewish Community of Madrid: Language Death and Revival

*Rachel Smith, Anthropology and Linguistics**
Sponsor: Dr. Robert Chazan, Hebrew and Judaic Studies

Djudeo-Espanyol, the language of Sephardic Jews, is currently endangered by the rapid decline of fluent speakers. Spread across Europe, the Ottoman Empire, and North Africa following the Jewish expulsion from Spain in 1492, the scattered Sephardic communities formed several dialects combining linguistic features of Djudeo-Espanyol with the local language. Those who settled in Morocco developed the dialect of Haketia, mixing Djudeo-Espanyol with elements of Arabic. I investigate the contemporary state of Haketia in Madrid to understand how and why the

dialect was still used by the Jewish community. No native speakers under the age of 80 remain. Both in Madrid and abroad, however, the language persists as a salient marker of ethnic identity for the Moroccan Jews who find themselves scattered across the diaspora, reinforcing their link with Spain. The use of Haketia in the restricted domains of food, music, and religion designate this dialect as the embodiment of tradition. As Haketia only survives in this realm, it has transformed from a dialect of low-prestige for older speakers to a high-prestige marker for youth. As young people begin to take a more active interest in the survival of their ancestral tongue, they give hope for a more expansive revival.

Towering over Censorship and Maintaining a Message

Eric Sutch, Tisch School of the Arts

Sponsor: Dr. Martin Daughtry, Music

Less than a month after the September 11 attacks, the musical group Leftover Crack staged a performance blocks from the grounds of the World Trade Center that included a paper mache reenactment of the destruction that took place on 9/11. As a result of this scheme, the band immediately came under attack and shortly thereafter, a growing police presence began to appear at their performances, shutting the concerts down for minor offenses that are prevalent yet overlooked at other concerts. Promoters remain fearful of booking this otherwise extremely popular band that sells out thousand-capacity venues regularly. I examine this situation from a variety of perspectives including the band, police, venue/show promoters, and other musicians helped or harmed by their reactions to the events of September 11, 2001.

Traditional Chinese Medicine

*Xiao Jing Wang, East Asian Studies**

Sponsor: Dr. Joanna Waley Cohen, History

Traditional Chinese Medicine (TCM) is becoming increasingly difficult to maintain as a medicinal form for a variety of reasons. Until now, however, TCM has been able to not only survive, but thrive because of its ability to adapt to and incorporate trends in popular belief and practices brought about by historical, societal, and cultural changes. In order to survive what many see as competition from Western Medicine, TCM needs to continue this trend: instead of viewing Western Medicine as a threat to its existence, TCM and TCM practitioners need to incorporate these latest advancements not only to preserve the practice of this ancient art, but also to create a new form of holistic healing that will bring

greater benefit to patients. This trend has already begun to occur in China, and in the US the melding of the two forms has formed the beginning of a new form of TCM. This research presents the theory and practice of dietetics and herbal medicine in modern China and examines how historical, societal, and cultural changes have shaped and changed TCM from its beginnings in the Zhou dynasty. In order for TCM to thrive in the modern world, practitioners need to build on the principles developed throughout history, use scientific advancements to provide a stronger basis for the practice of TCM, and expand the principles of dietetics to align with today's global diet.

Visionary Synthesis: The Iconographic Sources of Hildegard of Bingen's Visual Theology

Alexis Wang, Art History†

Sponsor: Dr. Kathryn Ann Smith, Art History

In 1165, Hildegard of Bingen (1098–1179) oversaw the illumination of one of the most inventive theological and visionary works of the Middle Ages: the Rupertsberg Scivias. Various interpretations as an Apocalypse, a prophetic call for reform, and most often, as the devotional work of “a figure of the purest female character, all fantasy, full of feeling,” the Rupertsberg Scivias comprises a unique synthesis of text and image, skillfully woven together to comprise one individual's interpretation of salvation history. That the Rupertsberg Scivias was conceived by a female virtuoso and executed under her direction within a female monastic community, further provides insight into the agency of medieval female piety. This study situates the illumination program of the Rupertsberg Scivias within twelfth-century spiritual and intellectual context. Using the records of Hildegard's public preaching tours and correspondence, I determine the monasteries with which Hildegard had intellectual exchanges, and consequently the texts and images at these monasteries to which she may have had access. By showing that the illuminations in the Rupertsberg Scivias employ iconography derived from scientific and theological sources, I demonstrate that Hildegard of Bingen was an active participant in a cultural milieu that is thought to have excluded women. Far from being the work of an isolated, unlearned mystic, the Rupertsberg Scivias stands as a testament to the intellectual and spiritual achievements of female monasticism in twelfth-century Germany.

REPresentations: Soviet and Post-Soviet Political Art

*Ksenia Yachmetz, Art History and Russian**

Sponsor: Dr. Pepe Karmel, Art History

In 2006, the Ukrainian art collective Revolutionary Experimental Space (R.E.P.) began their project *Patriotism*. In form, *Patriotism* is a universal language of graphic symbols varying in size and orientation. Designed by the artists themselves, the symbols are stenciled onto the walls and facades of galleries and museums. Juxtaposed with one another, they create micro- and macro-narratives, which literally deconstruct local and global problems. These monumental pictographs address issues such as political corruption, human trafficking, and immigration regulation. Provided with a dictionary, the spectator is responsible for reading and decoding the narratives. In this way, *Patriotism* is more than art; it is a participatory event. I argue that *Patriotism* is both an effective and aesthetic example of political art. I make my claim on the basis that there exist two kinds of political art—one propagandistic and the other critical. By tracing the genealogy of *Patriotism* through examples of political art made before, during, and after the Soviet Union, I situate the project within a greater art historical discourse. Comparing and contrasting both the form and content of these works, I show how art can expose the effects of a politically and socially oppressive regime through irony and subversive imitation.

The Ethereal Threshold

Christine Yackee, Theater and English and American Literature

Sponsor: Dr. Martha Rust, English

Medieval romances span two worlds: the world of the story, which takes place in a realistic realm, and the fairy realm, in which beings have supernatural abilities: knights are green, damsels disregard social constructions and time patterns shift. These two worlds never completely separate as traveling comprises a major element in the stories. One of the major methods of travel from the real world to the fairy realm involves passing through or by a body of water. An examination of this symbolic passageway between realms shows the fairy world as a sort of limitless haven for worthy real world characters. Water flows between the worlds, becoming a connecting medium symbolic of the new beginnings and sense of utopia that the fairy world holds and into which it guides the knights. These watery thresholds also reveal the fairy realm as the instigating site of knightly quests. In this way water crossing suggests that quests are less about knightly valor than is usually presumed, as knights depend on the fairy realm for guidance and safe passage. This symbolism occurs in many medieval romances, including Chrétien de Troyes' *The Knight of the Cart* or *Lancelot*.

CREATIVE WRITING

“Gravity: a Love Story”

Patrick Blagrove, English and American Literature

Patrick was awarded the Tory Dent Research Scholarship to explore “the connection between the science of physics and the art of poetry” and produce an original manuscript, currently titled “Redshift.” The following is one of his poems:

GRAVITY: A LOVE STORY

*As mud sinks deeper down somewhere cavernous,
toward Earth's core, stones a hemisphere away
settle in ranks for reinforcement: tenderness
in the tectonics, tension in the clay;
you're walking away and it is with all
its desperate magnitude that Earth tries
to bring you back. It seems almost frail:
taut plains lay prostrate and beg; pining
bridges cry gravel; a mountain hangs its head;
and soil, now you leave it ignored
again is crushed, lapses into vast, dead
canyons, toward what's burning in the core.
Everything is pulled inward: the effect
of each resounding footstep: Come back.*

“Aqui en la penitencia”

Gregory Solano, Comparative Literature

Gregory was awarded the Tory Dent Research Scholarship to attend Semana Santa (Holy Week) in Seville, Spain, and produce original poetry and a short story about his time there. His manuscript is currently titled “Aqui en la penitencia” (“In Penance” or “Here in the Confessional”). The following is one of his poems:

OVER THE ROAR

*The occasional roar of the train
shook the bricks of the back porch
in the afternoon when she wore her
garden hat, navigating a yard thick with itself.
Everything lived around her.
She reached out with her thin
pigment-drained hands and touched the
face of the purple bougainvillea
and explained quietly.
Camilo and Abuelo loaded them into the pickup,
one by one, by one, by one
Abuela Fina wearing a jacket in spring
a kiss for Camilo,
a kiss for the bougainvillea.
Dirt stained khakis and the brown, bruised
callused hands of
her diabetic husband at work.
a kiss for Camilo,
a kiss for the bougainvillea.
Snow-like hands, effervescent veins in the twilight
when she turned to go they explained quietly
over the roar of the engine, over the roar.*

EXPOSITORY WRITING

The following ten abstracts represent work done in connection with an advanced course offered by the Expository Writing Program entitled “Writing and Speaking in the Disciplines.” Students worked on topics of their own choosing from different disciplinary areas and were mentored in their writing by the course instructor, Dr. Andrea McKenzie. The following are the papers from the course that were selected to be presented at the CAS Undergraduate Research Conference on Friday, April 17, 2009.

Perceptions of American Health Care: Through the Eyes of Former Bhutanese Refugees from Nepal

Serra Akyar, Biochemistry

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Bhutanese refugees from Nepal’s camps are currently the largest group of refugees resettling in America. The medical care the refugees receive correlates to their wellness and health status, two aspects that affect their assessment of the quality of life in America. I interviewed former Bhutanese refugee adolescents from Nepal’s camps to compare their perspectives of medical treatment in Nepal’s camps and American medical facilities. I found that adolescents perceived health care in Nepal as generally lacking in quality. They perceived doctors as careless and sometimes corrupt. In contrast, they found the quality of care in New York City hospital clinics excellent. They found that language and cultural barriers affect the way their families understand medical treatments. For example, doctors sometimes did not explain why procedures were performed, and procedures that seem commonplace to Americans confused them. Partnerships between hospitals and resettlement agencies might help resolve these problems. Resettlement agencies could supply medical interpreters and experts on refugee resettlement to educate doctors about refugee culture and medical understanding.

How the US Transitions Its Military Personnel to Civilian Life: Applying for Benefits from the Department of Veterans Affairs

Timothy Chapman, Sociology

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Military veterans transitioning to civilian life must apply to the Department of Veterans Affairs (VA) for ongoing medical and life benefits. Through this research I aimed to determine the problems with the current system and to explore possible solutions. I compared veterans’ online blogs about their situations with interviews I

conducted with VA officials. I found the amount and complexity of the paperwork involved with the application process to be a major problem. The distance to treatment centers also affects the type and quality of medical care given to veterans. I found that veterans with Post Traumatic Stress Disorder are not being effectively diagnosed or treated, and community veterans’ groups that support returned veterans are underused and could be more effectively deployed. Finally, I found a small, but readily identifiable dichotomy between some veterans’ accounts of the transition process and official VA accounts. I recommend that veterans receive more training about civilian services before leaving active duty. A more comprehensive diagnosis and follow-up program for veterans suspected of mental health issues should be implemented. Also, forming an umbrella organization for community resources would help veterans find these organizations.

Facebook vs. Face-to-Face: How Social Networking Impacts Young Adults in Developing Professional Relationships

Sandy Lee, Silver School of Social Work

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Mark Zuckerberg, Facebook’s founder, says that “the culture of the internet has changed dramatically over the past five years.” In 2008, Facebook ranked first among social networking sites, with 115,000,000 unique visitors monthly and over 200,000,000 active users since 2009. Anyone, including prospective employers, can access a user’s profile unless it is privatized. One study found that 44% of young adults posted personal information on Facebook. Another study found that 18% of surveyed employers found information about prospective employees on social networking sites. How does social networking on Facebook impact young adults in developing professional relationships? I analyzed published data to determine the effects of Facebook networking for young adults. I found that employers now emphasize

social skills and hire for the organization, not just for the job. Unlike the traditional resume, Facebook reveals the candidate's developed social skills to the organization through activities such as wall posts and pictures. Facebook users searching for employment should express themselves with moderate profile filtering and avoid posting potentially offensive pictures and comments. Users should also make sure their online and offline "selves" match. Future research should survey and interview Facebook users and employers about the factors that influence employers' hiring decisions.

The Effect of the Current Economic Crisis on Korean International Students at NYU

Sang Soo Lee, Economics

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

The international student population at colleges and universities in the United States contributes more than \$15.5 billion to the US economy annually. To obtain knowledge about how the current economic crisis is affecting Korean international students, I interviewed a representative from New York University's International Students Advisory Office and the president of the Korean International Students Organization (KISO). Korean international students are leaving the US because they cannot afford tuition or cannot find jobs here. A similar outflow happened during the 1997 Asian economic crisis. Due to the exchange rate, Korean international students choose to take time off, doing internships, taking language courses, or serving in the military, hoping that the economy will recover. Korean students who stay at NYU are making more careful choices regarding food and housing, such as living in dorms with roommates rather than living in single dorms or apartments, and eating in or cooking more often. The reduced job market also causes students to choose majors that might help them find jobs more easily. I recommend that to keep international students contributing to the US economy, the US relax restrictions on international students' part-time work and consider a scholarship program for them.

Combating Antibiotic Resistance

Rachel Lin, Biology

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

According to the US Centers for Disease Control and Prevention (CDC), two million people acquire bacterial infections in hospitals each year. Mortality numbers increased from 13,300 in 1992 to 90,000 in 2006. Seventy

percent of the bacteria behind these infections showed resistance to antibiotics, thus increasing the mortality rate. The European Union (EU) has implemented prescription regulations, educational campaigns, and infection control to combat antibiotic resistance. Are these methods appropriate for the US? I examined case studies of resistant bacteria in the EU and compared rates of antibiotic resistance and consumption. Reducing antibiotic consumption did not necessarily decrease resistance rates. Factors such as ease of travel, patient proximity, and failure to detect infection earlier propagated resistance. Educational campaigns most effectively reduced consumption if they were sustained, used mass media, and emphasized primary care providers' participation. In hospitals, hand hygiene and screening methods reduced resistance rates and were shown to be cost-effective in specific hospitals in the US. Gradients in antibiotic consumption and resistance exist across the EU, making the resistance efforts' effectiveness difficult to measure. Research is needed on whether similar consumption gradients exist in the US. To implement infection control methods in hospitals, more evidence of their feasibility in the US is needed. Recommendations of health agencies such as the CDC are needed to ensure hospitals follow resistance guidelines.

The Effect of Microfinance on Women

Jeeyoung Park, Silver School of Social Work

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Microfinance Institutions (MFI) are banks that offer small loans to groups of impoverished clients so that individuals can start businesses and initiate a steady income flow. MFIs target women because they make up the majority of the impoverished population and, through their life roles, are more likely to affect children's well-being. MFIs assess themselves as banks, and so measuring their social impact and ability to transform poverty is often overlooked. This study measured the economic and social empowerment of women by MFIs in Ethiopia, Eritrea, Bangladesh, and India. Accompanying loans with education, amenities such as health care, and strategies to change perceptions of women does empower women economically. Offering education to younger generations and addressing social institutions that oppress women, such as dowries, early marriages, and polygamy, also works to eradicate long-term poverty and establish empowerment. MFIs must be sensitive to women's and communities' local perceptions and practices. Traditions such as India's caste system and chaotic events such as war can entrench or overturn women's roles and accompanying

oppressive practices. Currently, MFIs most effectively empower women in post-war situations where oppressive views of women were obliterated because men were absent and women necessarily took over responsibility for the household.

American Hotels in Dubai: The Customer-Provider Encounter

Sarah Rivera, Undeclared Major

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Many American hotel chains, such as Marriott and Hilton, have locations in the Middle East and plan to expand. To guarantee customer satisfaction, service providers must be acutely aware of the needs and wants of their customers. To do so, they need to understand the social mores, political influences and religious and cultural climate of the environment in which the business stands. This study examines differences between American and Middle Eastern cultures through the lens of customer service. I analyzed hotel websites, investigated customer service practices and traditions in Middle Eastern culture, and interviewed Middle Eastern students about their customer service preferences. My interview subjects reported preferring attentiveness, politeness, and speedy service in a customer service encounter. When in a sales interaction, they strongly dislike aggressive behaviors; they are not, however, turned off aggressive behavior in any other customer service context. These results imply that when American hotel chains expand to the Middle East, they must be considerate of cultural and religious differences to accurately provide for the needs and wants of their customers.

How Do Minors Cope with the Conditions of Adult Prisons?

Monica Santos, Silver School of Social Work

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

In 2006, 2.2 million juveniles were arrested in the United States. The high juvenile crime rate led to changes in the way that juvenile offenders were treated. Many states passed legislation that made transferring juveniles to adult courts easier. For example, California's Proposition 21 changed juvenile and adult criminal laws so that more juvenile offenders could be tried in adult courts. The legislation also increased the number of crimes for which juveniles would be automatically transferred to adult courts for trial. I studied the conditions juveniles face in juvenile facilities versus adult prisons to see if

the current juvenile crime prevention strategy works, and how juveniles cope with conditions in adult prisons. I found that minors incarcerated in adult prisons learned how to survive instead of how to integrate into the outside community. In addition, because juveniles in adult prisons do not have access to the rehabilitative programs found in juvenile facilities, they cannot improve their living and coping skills. As a result, once minors are released from adult prisons, they have a higher rate of prison reentry than minors held in juvenile facilities.

Performance-Enhancing Substance Abuse and Prevention in Adolescents

Victor Su, Biochemistry

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Performance-enhancing substances (PES) such as anabolic steroids were originally created for medical treatment. They have since been a major problem in sports culture due to substance abuse. This problem exists not only at the professional level but also in adolescents. This research attempts to identify why adolescents use steroids and how to devise effective prevention methods. Previous research shows that adolescents choose to take steroids for competitive reasons, for body building and shaping, and due to peer pressure. This research study identifies three other possible reasons: 1) adolescents look to professional athletes as role models; 2) adolescents lack long-term planning ability and do not perceive long-term risks; and 3) current studies and prevention methods focus only on athletes and leave out non-athletes. Through my research, I propose corresponding solutions: 1) educate professionals about their impact on adolescents and adolescent steroid use; 2) educate adolescents about long-term planning; and 3) create a separate program, or expand current programs, to include non-athletes in research surrounding prevention of PES abuse.

Connections Between the Biological Effects of Nicotine and the Search for Better Treatment of Parkinson's Disease

Leonardo Vittini, Undeclared Major

Sponsor: Dr. Andrea McKenzie, Expository Writing Program

Epidemiological studies show that smoking is associated with lower incidences of Parkinson's disease (PD). Cigarette smoke contains numerous chemicals; here, I pay particular attention to nicotine. Nicotine has been shown to stimulate the central nervous system and improve cognition, two of the areas directly affected by

PD. However, nicotine is also a carcinogen, an antagonist of normal cell function; it is also, most importantly, addictive. Is nicotine feasible as a treatment for PD? Sershen et al. (1987) showed nicotine to be neuroprotective in mice with experimentally induced PD. Subsequent experiments by Costa et al. (2001) and Quik et al. (2006) showed similar results. Specifically, Quik et al (2006) showed that nicotine increases nACh receptors around the striatum. Previous results have shown the existence of at least 11 different nACh receptors (Quik 2000).

Quik et al. (2007) showed that PD specifically targets 3 of these 11 receptors. Identifying such specific targets may open the door for the implementation of treatment to counteract PD's effects. Currently, nicotine's negative biological effects outweigh its potential neuroprotective effects. Nicotine treatment is not feasible. Despite this, its promise as a research tool cannot be overstated. Future research should focus on finding a non-nicotine substance that stimulates nACh receptors.





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

An Ethical Realist Critique of the Cold War National Security Council

Alexander Arnold, History

Sponsor: Dr. Stephen Holmes, Politics

My research aims to understand how the intellectual framework of the Cold War National Security Council (NSC), which Professor Jim Peck has defined as “Visionary Globalism,” was responsible for the tragedies the NSC helped to bring about. I first garnered a definition of the NSC intellectual framework from relevant NSC documents and historical commentary of the era. I then examined how this framework affected the NSC's actions in the Cold War, focusing on the massacres of the Vietnam War, the aid the US gave to the coups that ousted Sukarno of Indonesia and Allende of Chile, and the NSC's intense opposition to Prime Minister Nehru of India. Through this process, I expected to find that, to a point, the tragedies for which the NSC was responsible were the inevitable outcomes of acting as a superpower in a harsh world of infinite complexity. Yet, contrary to the NSC's claims, much destruction could have been avoided had the NSC intellectual framework been critically analyzed and adapted to the reality of the ever-changing world of the Cold War.

Psychological Distance in Electoral Decision Making

Alexander Beznos, Psychology

Sponsor: Dr. Yaacov Trope, Psychology

Oftentimes, certain candidates are deemed “unfit” for candidacy by the media and yet still end up winning elections and nominations. This study applies the Construal Level Theory and investigates how psychological distance may lead to unexpected voting outcomes and the fluctuation of presidential polls over time. We hypothesized that the shift in construal level as a result of psychological distance caused voters to be more influenced by candidates' peripheral aspects when Election Day was psychologically close than when it was distant. Central candidate aspects were expected to have more influence when an election was still far off, but in the near future they would be about as influential as peripheral aspects. We manipulated psychological distance by administering the survey over four time-points to respondents who were recruited from online political blogs. Results from regression analyses of peripheral and central aspects did not support our hypothesis and showed that in the near, central aspects were a stronger predictor of overall candidate liking than in the distant. Overall, central aspects were a much stronger predictor of candidate liking than

peripheral aspects. These results suggest that people make well-informed choices when faced with an important decision like voting for a president.

Coptic in Cairo: Women’s Rights in the Egyptian Christian Minority

*Catherine Bilkey, Journalism and Middle Eastern Studies**

Sponsor: Yvonne Latty, Journalism

My investigation of the rights of Coptic Christian women in Cairo focused on whether or not the insular nature of this Egyptian minority community, which in the past has been a key part of its survival, has been ultimately detrimental to its status within a greater Egyptian nation. In order to conduct this research, I spent ten days in Cairo filming interviews and gathering footage typical of Cairo and its surroundings in order to depict clearly the lives of my interviewees. While the interviews suggest an insular Christian culture in Egypt, in many ways the separateness of the Coptic community has benefited its female members. Egyptian women, in general, suffer severe sexual harassment on a daily basis. Gender segregation in Egypt has led to sexual oppression, especially in very conservative Muslim communities. In contrast, the Coptic Christian tradition of not always equal, but permitted male-female friendships have led to a perceived lack of sexual harassment within the community, as well as a protective net for Christian women. The cultural restraints against marrying outside the religion and the pressure for Coptic women to marry young even though males may marry quite old, however, remain barriers to true freedom.

Language as an Expression of Identity for Youth in the French *Banlieue*

Lauren Birnie, French

Sponsor: Dr. John Moran, French

Through the riots of the Fall of 2005, much of the world was first introduced to the tension that exists between the primarily second- and third-generation immigrant youth of the *banlieues* and mainstream French culture. This tension has escalated, however, from the relationship between their first-generation immigrant parents and mainstream French culture since World War II, a period during which France saw a dramatic increase in immigration as a response to increased need for labor. Through my research, I examined how this tension is expressed through the language that the *banlieue* youth use in order to create their own sense of identity that is separate from both their parent culture and mainstream French culture and to have control over the representation of this identity. Moreover, I looked at both personal and artistic appropriation of this language by the main-

stream French culture and the potential consequences of such appropriation. My findings suggest that, because mainstream culture does not share the same experiences as *banlieue* youth culture, slang appropriation is bound to be a misrepresentation of this subculture group and therefore undermines and alters the original significance and meaning that this language represents while robbing the *banlieue* youth of control over their own identity.

Differential Treatment of Workplace Infractions on the Basis of Gender

Caitlin Bowman, Psychology

Sponsor: Dr. Madeline Heilman, Psychology

Despite improvements in recent decades, there is still a gender gap in the modern workforce with women occupying a smaller percentage of upper management positions than men. This study sought to explore how the relationship between gender stereotypes and workplace infractions might contribute to this gender gap. We hypothesized that, in a male gender-typed position, female targets would be devaluated for infractions that represented violations of female stereotypes and that male targets would be devaluated for infractions that represented violations of male stereotypes. We used a performance evaluation paradigm in which 35 female and 14 male participants read reports about different employee infractions and rated the employees on multiple scales, including scales of overall performance, types of punishment, and adjectival scales. Results showed that participants rated female and male targets differentially in terms of likeability, but only devaluated female targets for one of the female gender-typed infractions. These results suggest that women who commit infractions are perceived as merely fulfilling the expectation that they will be unsuccessful in a male gender-typed role, which makes them non-threatening and therefore not worth penalizing. These findings suggest that the success of the target may be a mediating factor in evaluating workplace infractions.

Fantasies and Attention to Relevant Health Information

*Agnieszka Bulanda, Chemistry and Psychology**

Sponsor: Dr. Gabriele Oettingen, Psychology

Previous research has found that engaging in positive fantasies about a desired future predicts less successful goal attainment. The present study extends this to look at how positive fantasies about desired behaviors affect attention to relevant information about the negative consequences of those behaviors. Female participants were randomly assigned to engage in positive fantasies

about wearing high-heeled shoes, to generate positive fantasies and then to question their fantasies, or to complete a control positive-imagery exercise. Participants in the positive fantasy condition for whom the behavior was relevant subsequently spent less time on a website page describing the negative consequences of wearing high-heeled shoes. Further, this effect generalized such that these participants also spent less time on pages containing information about negative health consequences of wearing other fashion attire. Finally, participants who engaged in positive fantasies exhibited the largest decrease in systolic blood pressure (SBP) from before to after the fantasy exercise, suggesting physiological contentment. Findings suggest that positive fantasies about a relevant behavior make people less interested in seeking out information about the possible negative health consequences of that behavior.

“Anything Goes”: Negotiating the Boundaries of Neo-Burlesque in New York City

Carolyne Burgess, Anthropology and French
Sponsor: Dr. Rayna Rapp, Anthropology

Neo-burlesque is a genre of performance that has its roots in a performance tradition known as burlesque. Since its re-emergence in 1993, the neo-burlesque stage in New York City has been an active site for the parody and subversion of American societal norms. I analyze the perception of neo-burlesque as a space of uncensored expression, as a space in which “anything goes.” Primarily, I seek to define the divergent relationship of the incorruptible ideal of burlesque, that which recognizes no boundaries or structure, and holds nothing in high enough esteem to spare it from satirical abuse, with the fallible incarnation of burlesque as neo-burlesque, a genre with distinct outer limits that work to include or exclude voices based on genders, sexualities, socio-economic statuses, races, and ethnicities. In light of this disparity, I analyze the social structures in place that prohibit or constrain the realization of the burlesque ideal.

Social Concerns and Surgical Decision Making: The Cultural Evolution of Beauty and Venus the Global Goddess

Michael Busiashvili, English and American Literature;
Jessica Kim, Undeclared Major; and Young Kim,
Undeclared Major
Sponsors: Ms. Shaghayegh Harbi, Liberal Studies, and
Dr. Stephen Warren, NYU Medical Center

Cultural standards of feminine beauty have evolved. Yet, have perceptions of what is beautiful varied with time and culture? Independent of time and culture, with

respect to surgical decision making, Venus, the Global Goddess, remains the universal symbol of artistic beauty. Within the Korean culture, “the double eye-lid” (쌍꺼풀) surgery is a commonly performed, completely aesthetic procedure, with the desire of recreating the Greco-Roman ideal of classical beauty. Furthermore, the plastic surgeon serves as the gatekeeper towards the global evolution of a uniform feminine identity. In fact, on a broader societal level, cultural standards of appearance have been prone to remove or alter any perception of that which is deviant or different. By completing a retrospective medical chart review study, we examined the distribution and demographic characteristics of completely aesthetic surgical procedures performed on female patients. In addition, we analyzed scholarly journals, academic literature, historical outlines, and artistic representations of beauty. Our findings demonstrate that the perception of beauty has been centered on an unwavering theme: the manifestation of Greco-Roman female beauty with the plastic surgeon as the ultimate gatekeeper.

Leaving Las Vegas: Sac and Fox Casinos in Oklahoma Indian Country

Lily Carey, Anthropology
Sponsor: Dr. Aisha Khan, Anthropology

From riverboats to the strip, from low-lit backrooms to bright casino floors, from high stakes bingo to high stakes gambling addictions, the life and history of American gaming is vast. In recent years, Sac and Fox Nation of Oklahoma joined the ranks of other Native American nations that are controversially giving a new life to the American casino. After 200 years of being marginalized and underrepresented, Native Americans developed gaming on tribal lands as both a necessary source of tribal income and as a way to assert tribal sovereignty separate from federal and state authorities. My research looks at the controversy of ownership over Sac and Fox gaming. Nation members dispute where gaming monies are spent within the tribe, where they are lost to outside structures, and what steps to take, as a nation, to prevent future loss. While asserting their unique place in the American gaming industry, Sac and Fox grapple with controversies of ownership. My research finds that in so doing, they redefine the bounds of Native American identity, shedding new light on the relationship between tribal sovereignty and defining what it is to be Native American.

Trait Independence in Eocene Primate Dental Evolution

*Katherine Carter, Anthropology**

Sponsor: Dr. Shara Bailey, Anthropology

Eocene primate radiations contained many parallel developments of dental features including the addition of a hypocone to the upper molars and the loss of a paraconid on the lower molars. The latter development is unusual given ontogenetic restraints on the paraconid. Although earlier studies have examined one of these phenomena, they are rarely viewed together as a process. Many cladistic studies treat the presence or absence of these cusps as discrete and independent traits. The objectives of this study were to examine between-teeth trait independence and to identify metric traits of use in situations where high levels of parallelism is suspected. Occlusal photographs of upper M1s and M2s and lower M2s across a wide sampling of adapiform and omomyid primates were measured using unit-standardized coordinates centered on cusp base triangles. The resulting metrics were analyzed using a combination of multivariate multiple regression and pairwise contrasts. This represents a novel way of analyzing data that takes into account trait independence as well as occlusal and developmental constraints. Results indicate high variability in the position of the protocone, with the cusp incurring a mediolingual shift in many species with a hypocone. Loss of a paraconid did not significantly alter lower cusp positions. Metric combinations of coordinate data showed little or no phylogenetic signal. Together, this indicates that selection acted strongly on the independent development of a hypocone, so much so that it most likely led to the parallel loss of a paraconid throughout primates.

Gestures and the Language Development of Young Children

David Cheng, Psychology

Sponsor: Dr. Alan L. Mendelsohn, NYU Medical Center

This study aims to determine if the frequency of child gestures at 14 months or the frequency of maternal gestures is correlated with child language development at 14 months and 24 months. At 14 months, mother-child interactions were recorded and coded for the frequency of gestures. At 14 and 24 months, child language expressive and receptive development were measured by the Preschool Language Scale-4 (PLS-4). Participants consisted of 125 mother-child dyads from a larger study. Since gesturing may be a way of practicing communication skills before verbal language development, we predicted that the frequency of child gestures would be positively correlated with language development at 14 and 24

months. Since maternal gestures could model proper communication skills, we predicted that the frequency of maternal gestures would be positively correlated with child language development at 14 and 24 months. Data confirmed that the frequency of child gestures was positively correlated with language expressive and receptive development at 14 months ($r=0.199$, $p<0.5$; $r=0.204$, $p<0.5$ respectively), but not at 24 months. The frequency of maternal gestures was only correlated with child language expressive development at 14 months ($r=-0.217$, $p<0.5$). Frequent gesturing by children is associated with better language expressive and receptive development.

Determining the Home Range of a Mantled Howler Monkey (*Alouatta palliata*) Group of Isla de Ometepe, Nicaragua

*Kenneth Chiou, Anthropology**

Sponsor: Dr. Anthony Di Fiore, Anthropology

In behavioral ecology, estimates of home range (HR), the area animals inhabit over time, are useful for evaluating foraging ecology, grouping behavior, and demography. These assessments can be critical for implementing effective conservation strategies. HR is normally evaluated using large datasets from long-term field studies. In a pilot study, I developed a strategy for assessing HR of mantled howler monkeys (*Alouatta palliata*) on the volcanic island of Ometepe, Nicaragua, over a one month period. HR was ascertained using long follows with geographic location recorded at each tree an individual occupied using a handheld GPS unit. Overall, 236 data points were collected representing 20 hours of sampling. Two nonstatistical methods of inferring HR, grid-cell and minimum convex polygon, yielded values of 1.0 and 2.0 hectares respectively, which compare unfavorably with mean estimates for HR obtained from the literature (5–29 hectares) but more favorably with data collected over similar timeframes. As such, short-term studies cannot substitute for long-term studies when accurate HR values are needed. It is suggested, however, that long follows have a strong potential for gleaning insights into other aspects of ranging behavior and should be incorporated into long-term studies as a valuable tool.

Implementation Intentions: Benefiting Accessible Exercise Activity

Hope Citron, Psychology

Sponsor: Dr. Peter Gollwitzer, Psychology

Although there is a vast amount of past research documenting the efficacy of forming implementation intentions, “if-then” plans, for ultimate goal attainment, this research has yet to discover what types of behavior

one chooses in order to achieve said goal. The present study addressed whether, in forming an implementation intention, a participant would perform the most accessible exercise behavior, identified in a pilot study as running. In a diary form, three week, online comparative questionnaire, we found that participants who formed implementation intentions were significantly more likely to exercise more. Participants who formed implementation intentions also ran more than any other condition (goal or control) when controlling for importance of their exercise goal. Additionally, we found that participants who exercised more over the first week formed better implementation intentions, exercised more over the last week, and therefore had better goal attainment. The present study contributes to implementation intention research the ideas of the accessibility of behavior and the possible mediator of experience on forming valid plans.

Accuracy through Bias: The Effect of Shared Reality Motivation on Theorizing on the Mind of Similar Others

Julia Conant, Psychology

Sponsor: Dr. John Jost, Psychology

Accuracy in theorizing on the mind of others is crucial for successful social interaction insofar as it aids us in anticipating others' actions and regulating our own behavior accordingly. Despite a myriad of studies demonstrating the biasing effects of motivation on judgment and decision-making, relatively little attention has been paid to the potential impact of motivation on theory of mind. We propose that the motivation to achieve shared reality leads to increased accuracy in mental state inferences as well as to increased attitudinal alignment (social tuning) with similar others. First, we manipulated participants' perceived similarity to a speaker in a video. After measuring their motivation to achieve a shared reality with the person, we then asked them to infer the speaker's mental states at several points in the video and to indicate their agreement with his attitudes. Participants' inferences were compared to the mental states the speaker reported actually having had. Although a direct link between similarity and the dependent variables was not observed, results indicated that participants who were led to believe that the speaker was similar to the self were more motivated to achieve a shared reality with him; that shared reality motivation increased accuracy in theorizing on the person's mind as well as the degree to which participants tuned toward his attitudes. This research not only adds to the literature on theory of mind, but also sheds light on how accuracy can be enhanced through bias.

The Acoustics of Arabic Pharyngeal and Glottal Fricatives and their Effects on Non-Native Discrimination

*Angela Fink, Linguistics**

Sponsor: Dr. Lisa Davidson, Linguistics

The purpose of this study is to explore how listeners perceive foreign speech sounds and whether or not they accurately discriminate between similar, yet distinct sounds. Recent work hypothesizes that when individuals listen to a foreign language, they categorize the sounds they hear according to the sounds found in their own native tongues. This implies that two sounds that are not distinct in a speaker's native language will be categorized as variants of one familiar sound, thus preventing the speaker from discriminating between them. During the production component of our study, we examined the acoustics of similar but unique sounds as produced by native Arabic speakers, in order to identify what traits might help non-natives discriminate between them. We paid close attention to cues such as vowel formants, consonant identity and manner, and gender and speaker variation. In the perceptual portion of the study, we assessed native English speakers' ability to distinguish the two sounds, and to determine whether their accuracy improves as a result of long-term Arabic exposure. Such research may offer insight into the processes of speech production and perception, thus enabling educators to better assist students in second language acquisition.

Dolly Dissonance: Anxieties Surrounding Dolls in NYC and the PRC

*Elizabeth Fox, Metropolitan Studies and Journalism**

Sponsor: Dr. Michael Ralph, Social and Cultural Analysis

Dolls generate productive insights because this genre of commodity requires the smallest conceptual leap to reification, where an object appears to be imbued with life. As such, dolls are a quintessential locus of confusion between person and product. I analyze the suggestion that Bill Brown makes in an article entitled, "Reification, Reanimation, and the American Uncanny," that Americans experience a unique anxiety surrounding the incomplete distinction between people and things due to the history of slavery in this country, where people were literally made into objects. My research centers on whether anxiety surrounding dolls is uniquely American, or transnational in nature. I utilized ethnographic methods and surveys to compare female college students' perceptions of doll anxiety at NYU and Shanghai's East China Normal University. In both countries, students acknowledged anxieties regarding dolls and expressed this anxiety in identical terms (fear

of “soulless eyes” and dolls that come alive at night to cause harm), despite the fact that dolls have historically played different roles in American and Chinese culture. I also found a correlation between 1979’s One-Child Policy, and increased desire for dolls, purchased to “substitute for sibling relationships.” My research is a jumping-off point to question why both countries understand the Other through the metaphor of dolls, evidenced by the American trope of “China dolls”; meanwhile, the Mandarin word for doll literally translates to “Western Baby.” Might the rejection of dolls as something “not inherently Chinese,” a truth belied by the historical record, bear some relation to the memory of imperial violence China has experienced at the hands of Western nations?

In-Groups vs. Out-Groups: The Effects on Advice-Giving

Gloria Francis, Psychology

Sponsor: Dr. Yaacov Trope, Psychology

Construal-level theory (CLT) posits that one’s psychological distance from an entity determines what construals, or interpretations of the environment, one uses to process that entity. Increased psychological distance causes higher-level (more abstract) construal use, whereas decreased psychological distance causes lower-level (more specific) construal use. Though considerable CLT research demonstrates how people employ construals during perception, it is unclear how construals translate one’s perceptions into actions. We test the idea that higher-level construals are weighted more heavily when people advise out-group versus in-group members because out-groups are more psychologically distant from the self. We assigned participants to an intergroup or intragroup condition and had them advise someone on one significant and one minor romantic relationship problem, which require high-level and low-level construal usage, respectively. We measured how long participants addressed each problem. Although participants in the intragroup condition spent a larger percentage of time addressing the low-level problem, this did not reach significance. Follow-up studies using a more salient social distance manipulation are discussed.

Obesity and Internalizing Problems

Renee Fultz, Psychology

Sponsor: Dr. Demy Kamboukos, NYU Child Study Center

In the US, 34% of children are obese or overweight, and this rate is higher for ethnic minorities (Ogden et al., 2008). Studies have shown a link between childhood

obesity and psychopathology, including externalizing problems, which appears to be more pronounced in younger children (Stradmaier et al., 2000). There is also evidence of a gender difference: overweight girls tend to exhibit more externalizing problems than boys (Datar, 2004). There is a paucity of research on the relationship between psychopathology and overweight in early childhood and ethnic minorities. Therefore, this study investigated the relationship between overweight (BMI $\geq 85\%$) and externalizing problems in preschoolers from urban, disadvantaged neighborhoods. Two hypotheses were proposed: overweight children would exhibit higher externalizing problems compared to non-overweight children; and there would be a gender difference: overweight girls would exhibit more externalizing problems than non-overweight girls, but there would be no difference for boys. The study produced two major findings: overweight boys were significantly less defiant than non-overweight boys. Overweight girls were significantly more defiant than non-overweight girls. These results are consistent with the literature, although more research is needed to study the reasons behind these findings.

An Innovation-Slash-Phenomenon

*Alexandra Furukawa, French and Linguistics**

Sponsor: Dr. Gregory Guy, Linguistics

The ever-changing slang of casual speech is widely appreciated by its users for its evolving nature. The evolution of such slang varies, and in today’s technological age, the language of technological mediums is fast becoming a popular channel for changes to language, particularly in the domain of slang. Lately, the word “slash” in casual English speech is acquiring a slang meaning quite different from the traditional “to cut.” I collected instances of “slash” produced in speech and writing (/, slash), when used to mean not the verb “to cut,” but rather something more like a conjunction meaning “and also.” The latter usage, apparently originating from commonly written or typed casual phrases like “and/or” and “singer/song-writer,” has recently infiltrated casual speech. Surveying 129 participants, I collected data about the acceptability of “slash” in specific linguistic contexts and its usage rate among different demographics. The results show women and young people, often the biggest proponents of change, propelling the new meaning of “slash” to accepted status, supporting its legitimacy as a change in progress. Clearly, the proliferation of technology today is facilitating not only the spread of new ideas but the spread of change in the old tool of expressing them: language.

Can Five-Month-Old Infants Anticipate the Sources of Different Vocalizations?

*Larissa Gabelman, Psychology**

Sponsor: Dr. Athena Vouloumanos, Psychology

Previous experiments have shown that by five months of age, infants can match speech sounds and rhesus monkey sounds to the animals that produced them (Vouloumanos, Druhen, & Hauser, under review). In this experiment, we used a violation-of-expectation paradigm in which infants were first presented with either speech or a monkey call, and then shown a human or a monkey face. We found that when the infants heard speech, they did not look longer when it was followed by a monkey face, but upon hearing a monkey vocalization, looked longer when it was followed by a human face. This is evidence that by five months, infants recognize that monkey vocalizations cannot be produced by a human source, but may not have sufficient experience with monkey faces to recognize the vocalizations that they can or cannot produce. This is further discussed in terms of how infants become sensitive to and acquire language.

Head-Mounted Eye Tracking in Natural Tasks: Visual Guidance of Locomotion

Larissa Gabelman, Psychology

Sponsor: Dr. Karen Adolph, Psychology

Visual information about the location and dimensions of obstacles is critical for navigating through a complex environment. Previous researchers claimed that walkers require foveal fixation of obstacles to navigate adaptively (e.g., Patla & Vickers, 1997). Participants in previous experiments, however, walked repeatedly along a straight path with a single obstacle. In the real world, walkers chart their own paths through complex environments cluttered with obstacles. We recently demonstrated that children do not require obstacle fixations during spontaneous navigation through a cluttered environment: Over 40% of the time, children do not fixate obstacles in advance; instead, they guide locomotion from the periphery (Franchak, Adolph, Gabelman, & Babcock, 2009). In the current study, adults wore a wireless, head-mounted eye tracker while walking through a cluttered environment to search for randomly placed targets. Preliminary results indicate that adults, like children, do not need to fixate obstacles to step up, down, and over obstacles. Peripheral vision is sufficient for rapid and adaptive obstacle navigation. Given that participants selected their own paths, rates of travel, and frequency of obstacle encounters, it is likely that findings from this laboratory analogue generalize to real-world locomotion.

Conversations with Parrots: The Effect of the Vocalizing Source on Speech Perception in Infants and Adults

*Hanna Gelfand, Linguistics**

Sponsor: Dr. Athena Vouloumanos, Psychology

To what extent does the vocalizing source affect speech perception? Human adults are capable of perceiving a sound as speech when it is generated by a variety of different sources including humans, computers, and parrots. Are infants sensitive to the source of a potential speech sound? We presented nine-month old infants with a set of speech and non-speech sounds produced by either a human or a parrot, in tandem with a visual display: a human face or a checkerboard pattern. Infants controlled the presentation of sounds by looking toward or away from a computer screen. We examined whether infants had a preference for human speech over parrot speech and non-speech sounds produced by humans and parrots by measuring infant looking time for each sound type. Infants looked longer during the presentation of human speech compared to all other sounds, but this difference did not reach statistical significance. Additionally, infants looked longer during the presentation of parrot speech paired with a human face than when paired with a checkerboard pattern and this difference was statistically significant. Infants' sensitivity to the speech signal may be source dependent on either acoustic or non-acoustic characteristics of a human generating source indicating that speech perception in infancy is affected by both acoustic information and visual speech cues.

The Presence and Absence of Ears in Ancient Egyptian Art: An Issue of Gender Roles?

*Elizabeth Greenfield, Anthropology and Linguistics, and German**

Sponsor: Dr. Ann Macy Roth, Hebrew and Judaic Studies and Art History

The fifth pharaoh during the 18th dynasty of ancient Egypt was Hatshepsut, the first female pharaoh not acting on behalf of another. Hatshepsut's reign was successful, marked by internal peace, outward exploration, and extensive building. After her death, her successor and stepson, Thutmose III, had almost all images of her destroyed or defaced. Previous to his reign, in accordance with the tradition of Egyptian portrayals of being as people are, men and women were both depicted as having ears of a set proportion; however, during and following the reign of Thutmose, as the images of his female predecessor were being erased, so were the ears of women in general, while their male counterparts' ears were being enlarged.

This project explores what this altered appearance means as a representation of gender roles within ancient Egypt.

How the Virtual Gemeinde Affects the Actual: The German Jewish Community and the Use of Internet Social Networking

*Elizabeth Greenfield, Anthropology and Linguistics, and German**

Sponsor: Dr. Paul North, German

Historically, a critical element in the maintenance of community has been the geographic proximity of members of that community to each other. This is particularly relevant in the case of minority groups. Proximity enabled consistent communication and contact within the community, as well as the maintenance of community ritual and tradition. Through the events of the 20th century, however, the German Jewish community (*Gemeinde*) has undergone many changes affecting the geographic proximity of the group. In today's virtual age of online communities and e-communication, the ability to create proximity in the absence thereof has, in some regards, changed the surface appearance of the *Gemeinde*. Through the use of Internet social networking, certain sectors of the Jewish community have become accessible to the larger community. Despite the many changes to the community, new Internet-based methods of community building and maintenance have enabled community traditions to be maintained.

Uncovering the Link between Self-Regulatory Strategy and Planning

*Sisi Guo, Psychology**

Sponsor: Dr. Gabriele Oettingen, Psychology

Fantasy realization theory differentiates four strategies for goal setting: mental contrasting, indulging, dwelling, and reverse contrasting. Of the four, the strategy of mentally contrasting a desired future with the negative reality that stands in the way has been shown to be most effective; it leads people to make commitments based on their expectations of success. The aim of the present study was to determine whether mental contrasting could also lead people to plan in a similar expectancy-dependent manner. Results confirmed the predicted pattern for planning when it was assessed as the cognitive and behavioral strategy for problem solving. More concretely, results showed mental contrasting participants were more strongly committed to making and executing their plans when their expectations were high and less committed than when expectations were low. Such expectancy-dependent planning suggests that

mental contrasting could elicit effective planning by encouraging people to plan for only problems that have a high probability of success.

Acceptability of Alternative Quotatives in New York City English

Sarah Hackney, Linguistics, and Rubaiyat Mahboob, Linguistics

Sponsor: Dr. Gregory Guy, Linguistics

Our work investigates “quotative” forms—the constructions used to introduce quotations, such as “say,” “go,” and “be like”—in New York City English (NYCE). We document a change in progress in the usage of these forms and speakers’ attitudes towards them. We used two methods to collect data. First, we promoted an online survey to college-age residents of the New York metropolitan area, which recorded attitudes toward alternative quotatives. We predicted this group would favor “be like.” Secondly, we collected apparent time data by participant-observation: we collected examples overheard in everyday life. The results show rising rates of use of alternative quotatives in NYCE. Speakers under the age of 35 favor the use of quotative “be like,” while the traditional forms of “say” and “go” continue to exist but are more common with older speakers. Those surveyed attributed the use of “be like” predominately to younger speakers, which is evidence of change in progress. Using alternative quotatives also carries a lower-status connotation for many respondents. This connection was supported by claims that respondents would prefer to use “say” in formal situations and are more likely to use “be like,” “be all,” and “be all like” informally.

Falling or Squeezing: Infants’ Sensitivity to Consequences while Walking through Openings

Bridget Hartzler, Psychology

Sponsor: Dr. Karen Adolph, Psychology

How do infants decide if actions are safe or risky? This study examined whether infants take the consequences of errors into account: Do they judge their capabilities more conservatively in situations they deem more dangerous? I observed 17-month-old infants as they walked over a raised platform toward doorways varying in width. In the falling condition, the consequence of errors (trying to fit through a too-small opening) was falling off the platform. In the entrapment condition, the consequence of errors was getting wedged in the doorway. In both conditions, infants explored possibilities for action by looking, touching, and testing different positions. They made more errors, however, in the entrapment condition,

trying repeatedly to shove their heads, limbs, and bodies through impossibly small doorways. My results suggest that infants take different consequences of errors—falling versus entrapment—into account.

The Effects of Attractiveness and Success on Social Penalties for Women

Emily Hayden, Psychology

Sponsor: Dr. Madeline Heilman, Psychology

Women who are successful in traditionally male-gender typed roles fall victim to harsh social penalties for transgressing their traditional gender roles. This research attempted to neutralize these social penalties by enhancing gender specific attributes via physical attractiveness. This study aimed to demonstrate that when information about professional success is directly stated, less attractive women would fall victim to social penalties whereas attractive and less attractive men would not. As well, this study aimed to demonstrate that when information about professional success is not directly stated, attractive women would be rated as less competent than attractive and less attractive men. Ninety-three male and female college undergraduates reviewed four employee descriptions, each accompanied by a portrait photograph from a fictitious national consulting firm, and rated the employees on their competence, achievement orientation, likeability, and interpersonal hostility. Results partially supported the hypothesis that less attractive female stimuli would be rated as more interpersonally hostile than the male stimuli. Additionally, attractive female stimuli's interpersonal hostility ratings were not significantly different from the male stimuli. Results indicate that physical attractiveness does work to negate social penalties. The effect attractiveness has on interpersonal evaluations demonstrates the continuing presence of gender stereotypes in professional environments.

The Effects of Communication Style on Perceptions of Women's Competence in Male Gender-Typed Academic Domains: A Lack-of-Fit Explanation

Elise Hickel, Psychology

Sponsor: Dr. Madeline Heilman, Psychology

Consistent with the Lack-of-Fit model (Heilman 1983), we tested the hypothesis that women's tendency to communicate in a more tentative style (e.g. using more hedges) engenders negative evaluations when pursuing a male-typed academic domain, like physics; men who communicate tentatively, on the other hand, were hypothesized not to be subject to such biased evaluations when pursuing a female-typed academic domain, like

nursing. A study was conducted in which participants were asked to rate profiles of fictional students (male or female) applying for courses in either physics or nursing. The fictional students purportedly provided an academic transcript and voice mail message (communicated in either a tentative or not tentative style) for a college advisor. Participants rated these students on both male and female stereotyped attributes, performance expectations in courses of varying difficulty, and finally provided course recommendations. Results partially supported the hypothesis. Female students communicating tentatively while applying for a physics course incurred lower ratings on adjectives corresponding to critical reasoning ability as compared to their male counterparts; male students communicating tentatively while applying for a nursing course also incurred lower ratings on these adjectives as compared to their female counterparts.

The Influence of Disgust on Third Party Punishment Decisions

Christine Hosey, Psychology and Economics

Sponsor: Dr. Elizabeth Phelps, Psychology

A broad range of factors can influence the decision-making process including emotional state, environment, and expectations. In this study we asked how individuals respond when they observe "unfair" decisions. Fairness is a social norm that prescribes equity and often guides moral and social decisions. Without an explicit enforcement mechanism, however, people do not always abide by these norms. We investigated the role that perceived moral character plays in punishment decisions during an economic game. Participants read newspaper articles about people who were portrayed as either moral or immoral. Participants then observed the protagonists of the articles play an economic game, during which the protagonists assumed the roles of decision-maker and decision-recipient. Upon viewing a decision, participants had the option to punish the decision-maker. Participants punished decision-makers more severely when decision-makers were perceived as immoral and decision-recipients were perceived as moral. These findings indicate that people do not base punishment on others' actions alone. Rather, they allow their perceptions of moral character to sway the degree of punishment. These findings have implications for the formations of prejudice, as they demonstrate how outside information colors our decisions.

Ameliorating the Negative Effect of System Justification on Environmental Attitudes and Behaviors

Su-Anne Huang, Psychology

Sponsor: Dr. John T. Jost, Psychology

Many people deny environmental problems and resist changing their behaviors to help the environment, despite overwhelming evidence of environmental destruction and global warming. Research demonstrates a strong relationship between system justification—a motivation to justify the status quo—and the denial of environmental problems. The current study examined whether it is possible to alleviate the effects of system justification in order to encourage pro-environmental attitudes and intentions. We proposed that framing pro-environmental change as a means to affirm and advance the system, instead of threatening it, would enable people to acknowledge and respond to environmental problems. We ran a one-way between-subjects ANOVA for the dependent variables of environmental attitudes and behavioral intentions. We then conducted a regression to measure the effects of an interaction between level of system justification and the presence or absence of a system affirmation. Results illustrated that reframing environmental problems as an opportunity to affirm the system gives rise to more pro-environmental behavioral intentions. Additionally, those low in system justification were more willing to help the environment when there was a system affirmation compared to none, and less willing when there was no system affirmation. Those high in system justification were not affected.

The Children’s Organizational Skills Scale: Specifying Impairments in Day-to-Day Executive Functioning

Christina Hunkins, Psychology

Sponsor: Dr. Richard Gallagher, NYU Medical Center

Approximately 7.8% of American children are diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), a disorder characterized by symptoms of hyperactivity/impulsivity and inattention. While medications can effectively manage core ADHD symptoms, many children still experience poor scholastic performance due to organization, time management, and planning problems associated with ADHD. No previous measure isolated and assessed problems with these behaviors. The Children’s Organizational Skills Scale (COSS) seeks to identify impairments in organization, time management, and planning behaviors. This study tested the concurrent, convergent, and discriminant validity of the COSS. COSS scores of children with ADHD are significantly higher

than those of children with other psychiatric diagnoses, indicating that children with ADHD are significantly more impaired in organization, time management, and planning behaviors. While the parent version of the measure does not show strong convergent validity with established measures of ADHD, both the parent and teacher forms of the COSS show strong discriminant and concurrent validity with these measures. Scores of children with a primarily hyperactive/impulsive subtype of ADHD (ADHD-HI) and children with a primarily inattentive subtype of ADHD (ADHD-I) were also compared, with no significant differences found.

Walking and Talking: Mothers’ Views of Developmental Transitions in Infancy

Lisa Hurwitz, Psychology

Sponsor: Dr. Karen Adolph, Psychology

I examined mothers’ perceptions about changes that follow infants’ transitions to independent locomotion and language. Sixty mothers of 11- to 13-month-old infants participated in a semi-structured interview. First, mothers reported on their infants’ abilities, that is, whether infants are crawlers, walkers, and talkers. Then, they reported changes in infants’ activities and routines after the onset of these skills. Based on transcripts of the interviews, I coded the number and type of behaviors parents listed for each condition. Previous research showed that the onset of walking is associated with increases in infants’ social behaviors. Thus, mothers of walking infants were expected to note larger and more dramatic changes in infant behaviors than mothers of crawling infants. This study is the first to examine how the transition to talking affects behavioral changes. Possibly mothers will report more behavioral changes with the onset of walking than they do with the onset of crawling or even talking. Preliminary data suggest that mothers of walking infants report more changes in social behaviors whereas mothers of crawling infants report more changes in gross motor behaviors.

Self-Esteem Threat Affects Spontaneous Trait Inferences of Stereotypic Behaviors

Naticia Hutchins, Psychology

Sponsor: Dr. Jim Uleman, Psychology

How are we influenced when forming inferences about others? We investigated whether threatening participants’ self-esteem affected how they perceived members of their own group (in-group) and members of a different group (out-group). Specifically, we threatened participants’ self-esteem by giving them false feedback and subsequently measured the degree to which they formed spontaneous trait inferences (STI) from stereotyp-

ic behaviors of in-group and out-group members, using a false-recognition paradigm. Surprisingly, participants formed significantly fewer STI from stereotypic behaviors of out-group members when under self-esteem threat than when not under threat. This contradicts previous research suggesting that after threat, participants engage in increased stereotyping of out-group members in order to enhance self-esteem. The current study, however, tested female participants exclusively, a socially disadvantaged group compared to males, which may account for the difference. We discuss these findings in light of research on implicit out-group favoritism and suggest implications and future directions.

Price Volatility and the Efficient Energy Portfolio for the United States

Katarzyna Janczura, Economics

Sponsor: Dr. M. Ishaq Nadiri, Economics

The current energy portfolio of the United States is exposed to significant risk, which depends on the price volatility of the energy sources. This research focuses on the composition of energy portfolios for the United States energy sector and possible solutions to optimize this investment. The study utilizes the modern portfolio theory mean-variance approach, a risk-return analysis, to compose the efficient frontier of portfolios in which the risk is minimized for a given return. The performance of each energy portfolio, consisting of oil, coal, natural gas, nuclear energy, and renewable energy, is measured using the Sharpe Ratio and compared to the existing portfolio. The study provides further evidence that the current energy portfolio of the United States is not efficient. In addition, the study shows how including the cost of pollution, measured by the intensity of carbon emissions, changes the energy source allocation within the portfolio by including less carbon-intensive substances.

Education and Income Inequality: Education as a Predictor of Income Distribution

Hannah Jolley, Economics

Sponsor: Dr. Raquel Fernandez, Economics

My research aims to determine the relationship between educational attainment and income inequality. The first stage of analysis relates an individual's expected income to his or her level of education and the quality of that education, measured by government revenues per student and student-teacher ratio. A strong positive relationship was found between income and level of education in census regions within the U.S. from 2000 to 2005. Educational quality was also statistically significant in some years and regions, but not consistently so. Once

this relationship between general levels of income and educational quality and quantity has been established, I investigate how the *distribution* of these educational resources, as indicated by variance in level of education, government revenues, and student-teacher ratio affects the variance in income within a region. The results of this second stage of analysis were less definitive: while variables were statistically significant in some years and regions, there was not enough consistent evidence to confirm that the variance in income can be related to the variance in individuals' quantity and quality of education. Alternate econometric models or data sources are being explored that may be able to yield more consistent results.

Green Homes for Urban Development

Yasmina Khan, Art History, and Urban Design and Architecture Studies

Sponsor: Dr. James D. Morgan, Art History

Achieving maximum use out of minimum space will produce energy efficient, affordable housing for those in need. To prove this hypothesis, I examined historical and contemporary examples of constrained spaces, like the Bowery Flophouses and the Tokyo Capsule Hotels. A spatial analysis of both types of lodging houses provides insight into how to construct a home using the minimum materials required, and simultaneously providing inexpensive housing. While original flophouse users—single, male immigrants—have diminished in number, there are other users along the Bowery whose lodging needs are being ignored in the neighborhood's gentrification process. The displaced student, the vagrant, the musician, and the writer are a few of the new users in the Bowery in need of temporary, cheap lodging. Through this analysis I conclude that there is a need for a new flophouse. By utilizing the concept of maximum use out of minimum space, I propose a multi-unit structure that will fulfill the need for inexpensive housing along the Bowery. The research on the Bowery Flophouses has confirmed that an analysis of historical, cheap lodging houses can provide insight into how to construct affordable housing today.

Materialization of Radical Democracy in a Modern Nation

Hannah Kim, Economics

Sponsor: Dr. George Shulman, Gallatin School of Individualized Study

In their 1985 book *Hegemony and Socialist Strategy*, Ernesto Laclau and Chantal Mouffe predict a change in political history from Marxism to what they define as radical democracy. By focusing on the articulation of pluralistic conflicts arising from diverse interests within

a capitalist society, radical democracy parts with Marxist materialism, which emphasizes class struggle. Laclau and Mouffe present a more realistic approach to interpreting modern political and social conflicts. My main interest is to apply the theory of radical democracy in a modern nation. Focusing on the case of South Korea, I discuss how well radical democracy explains political behavior surrounding the 2008 U.S. beef import protests. It is evident that South Korea, a modern democracy in constitution, still has a political tendency to regress toward Marxist class-struggle centered debates after a decade of left-wing government regimes. Using the protests as a common political front, however, various socio-political groups gathered to express their own agendas, showing that radical democracy is viable. I demonstrate how South Korea's political identity and democratic maturity are in transition from a leftist to a rightist regime, making the nation an interesting subject of observation in the application of radical democracy.

Hand Over Fist: Infants' Exploration of Multiple Objects

Meghana Komati, Psychology

Sponsor: Dr. Karen Adolph, Psychology

This study examined infants' spontaneous exploration of multiple objects, specifically infants' actions when they hold an object in each hand. We conducted a naturalistic, longitudinal study with 26 infants at 11 and 13 months of age. Infants were videotaped for one hour at each age in their homes during a normal, daily routine. First, I identified each episode of simultaneous object play in the 52 hours of videotape. Then I coded bouts of multiple object exploration when infants held two or more objects, at least one in each hand, and scored the type of object play as relational or non-relational play. In relational play, infants brought the objects into contact with each other by banging them together, rubbing one against the other, fitting the objects together, or inserting one object into another. In non-relational play, infants held, shook, or mouthed objects, but did not relate the objects to each other. Preliminary data analyses indicate that relational object play such as banging and fitting increased from 11 to 13 months and non-relational play such as mouthing decreased over time. Infants first explore object properties separately and later learn to relate object properties to each other.

The Electoral College and Regime Legitimacy

Leona Krasner, Politics

Sponsor: Dr. Eric Dickson, Politics

Does the existence of the Electoral College affect perceptions of legitimacy about the national government? It was hypothesized that the more one knew about the Electoral College, the less favorably one would perceive the legitimacy of the national government. Level of knowledge of the Electoral College was measured via a questionnaire that assessed procedural, how-it-works aspects of the Electoral College, and outcome, what-it-affects aspects of the Electoral College. Perceptions of legitimacy were measured through a set of Likert-type questions that probed thoughts and feelings about concepts underlying legitimacy. Results partially confirmed our hypothesis. The presence of additional information about the Electoral College decreased perceptions of the legitimacy of the Electoral College. In light of this research, perhaps the Electoral College, as an institution, should be re-assessed to determine whether it is truly beneficial to the citizens of this country.

Self-Initiated Regulatory Strategies of Goal Setting and Levels of Depression

*Giulia Landi, Psychology**

Sponsor: Dr. Gabriele Oettingen, Psychology

Mentally contrasting a positive future with negative reality leads people to commit to goals when expectations of success are high, and refrain from goal commitments when expectations of success are low. To the contrary, indulging in the positive future or dwelling on negative reality makes people commit to goals regardless of expectations of success (Oettingen, Pak, & Schnetter, 2001). Prior research has found these effects in experimentally induced mental contrasting (Oettingen et. al, 2001). In line with Oettingen, Barry, Mayer, & Maglio (2008), we found the same pattern for self-initiated mental contrasting. Interestingly, though, our research shows that this typical pattern is only evinced for non-depressed students. Depressed students who self-initiated mental contrasting committed to goals in a way that is detrimental to goal attainment: they committed to goals when expectations of success were low and refrained from goal commitments when expectations of success were high. The results have implications for the psychology of goal pursuit as well as for treating symptoms of depression.

The Effects of Induced Stress on Memory

Kristin Lee, Psychology

Sponsor: Dr. Elizabeth Phelps, Psychology

Memory varies based on emotionally arousing properties of stimuli and may be modulated by stressful experiences. Research indicates a possible specific interaction between stress and emotion where stress applied after encoding may exacerbate the influences of emotional arousal during encoding, resulting in improved recall. The combined impacts of stress and emotion on memory are not yet defined. This study examined memory for emotionally arousing items combined with a post-learning stressor by presenting 44 participants with a learning task of emotional and neutral stimuli. We compared recall performance between a group that endured a post-learning stressor and a non-stressed control group. Recall analysis yielded no significant differences between groups, but indicated an unexpected interaction between gender and stress. This study's findings both extend and complicate the understanding of memory and its processes by emphasizing the need to incorporate a wider range of uninvestigated factors involved in memory formation.

Adolescent Daily Routines in Relation to Grades, Self-Esteem, Depression, and Deviance at the Transition to Middle School

Brittany LeMonda, Psychology

Sponsor: Dr. Diane L. Hughes, Psychology

The transition to middle school is a time when children have increased opportunities for self-directed activity, and how children negotiate their growing independence during this time has implications for their long term adjustment. There is growing evidence that unsupervised, after-school time during early adolescence predicts antisocial and delinquent behaviors and lower grades. Nonetheless, most studies of children's daily routines focus only on after-school activities, which present limited information on a young child's day. Most studies, moreover, begin in the high school years and are based on homogeneous samples. This study fills these gaps by investigating the daily routines (a full weekday and full weekend day) of 11–12 year old children (N=118) and mothers (N=95) from diverse ethnic backgrounds. We aimed to: (1) describe the daily academic routines of adolescents; (2) describe maternal behaviors around supervision and monitoring of adolescents; (3) describe behavioral and psychological aspects of adolescent-mother relationship quality (e.g., family time; mothers' spontaneous mention of positive feelings toward adolescent); and (4) examine prediction from

adolescent academic routines, maternal supervision and monitoring, and adolescent-mother relationship quality to adolescent self-reported grades, self esteem, depression, and deviance. Findings indicated that adolescents' and mothers' mention of daily routines around academics (homework, reading), maternal supervision and monitoring, and adolescent-mother relationship quality predicted all adolescent outcomes in expected directions. Findings are discussed with respect to the methodological benefits to examining adolescent daily routines as a window onto how adolescents are adjusting to the transition to middle school.

Solidifying the Asian-American Presence: Re-envisioning "E Pluribus Unum"

Joseph Lin, Social and Cultural Analysis

Sponsor: Dr. John Kuo Wei Tchen, Asian/Pacific/American Institute, NYU

This project presents the site of Flushing, New York, as a lens through which to reassess the ideas of civic engagement and immigrant populations which were proposed in political scientist Robert Putnam's 2006 lecture, "*E Pluribus Unum: Diversity and Community in the Twenty-first Century.*" Putnam suggests that ethnically diverse neighborhoods "hunker down," much like the way that turtles temporarily stretch out their necks, only to retreat back into their shells. This case study of Flushing explores the tensions there during Councilwoman Julia Harrison's campaign for English words to be placed alongside Chinese and Korean signs in downtown Flushing. By following the unfolding events of the former Councilwoman's campaign, I build on Putnam's analysis to emphasize the role of local politicians in confronting ethnically-diverse citizens, as well as hindering and promoting civic engagement of their constituents. I explore the ways in which local politicians and media create "amnesia" among the ethnic whites, demarcating difference between them and the Asian-American community. In offering Flushing as a nuanced, localized case study of Putnam's cross-country analysis, I seek to introduce a model for solidifying permanent presence of the Asian-American communities in the United States.

Coordinated Entry in Behavioral Economics and Ecology: Tacit Coordination Without Reinforcement Learning

Seth Madlon-Kay, Economics

Sponsor: Dr. Andrew Schotter, Economics

Experiments in ecology and behavioral economics have shown that both animals and people seem to tacitly coordinate equilibrium behavior at the group level in

games where players choose options with payoffs that decrease as more players choose them. In ecology those options are usually patches of resources, and in economics they are usually markets with profits that decrease with competition. Researchers in both fields have concluded that the apparent coordination seen in such games is the result of players following simple reinforcement learning strategies. The current research tests this theory in an experiment where players must coordinate without communication to achieve the optimal outcome, but relying on reinforcement learning alone would result in coordination failure. The results show that groups of people can display tacit entry coordination just as successfully, even when reinforcement learning is not applicable, possibly by using expectation-based strategies.

Is It Sheep or Goat? The Use of Morphological Traits to Differentiate Mandibles and Mandibular Teeth of *Ovis* and *Capra*

Kerri-Ann Matthews, Anthropology

Sponsor: Dr. Pamela Crabtree, Anthropology

New diagnostic criteria based on morphological distinctions in the mandible, permanent premolars (P3–P4) and molars (M1–M3), of adult mandibles of sheep (*Ovis aries*) and goat (*Capra hircus*) have been used as a method to successfully assess taxonomy of *Ovis* and *Capra* on a large and diverse sample of modern reference material. Halstead, Collins, and Isaakidou conducted a blind study on adult and juvenile mandibles of sheep and goats from several modern collections and concluded that in conjunction with previously published work on deciduous premolars (dp3-dp4), very lightly worn M1-M2 and P3-P4, the new criteria enable complete and fragmentary mandibles of all ages to be positively identified as from sheep or goats with high accuracy. To test the accuracy of their criteria, 30 sheep and goat mandibles from the Godin collection were scored blind in accordance with their diagnostic criteria. Results are predicted to oppose the new criteria and demonstrate that the criteria do not aid in assessing a positive identification of sheep or goats from archaeological mandibles of unknown species.

Osteobiography of Child Skeleton “Va” from Al Widay I, Sudan

Sophia Mavroudas, Anthropology

Sponsor: Dr. Susan C. Anton, Anthropology

I present an osteobiographic analysis of a subadult skeleton found in association with an adult skeleton in grave “Va” at the site of al-Widay I, Sudan. Al-Widay I is a cemetery site from the Kush Kingdom in Nubia dating from 2000–1500 B.C. The cemetery was excavated

by the University of Chicago’s Oriental Institute. The excavation was part of an effort to explore Sudanese archaeology before the anticipated flooding by the newly built Hamdab dam. I use various methods to determine the age of the skeleton including dental eruption patterns, long bone lengths, degree of epiphyseal development and closure, and the length of the mandibular ramus. Sex is determined by mandible morphology and by measurements of the ilia. Stature is reconstructed using diaphyseal measurements of the femur and tibia. The combined methods to age the skeleton provide a range of twelve to eighteen months. The examination of the mandible and measurements of the ilia indicate female. The measurements of the femur and tibia provide a stature estimate of 24 inches. The complete osteobiography of the “Va” child’s skeleton will contribute to the final analysis of the al-Widay I cemetery site and be an important addition to understanding the overall demographic and mortality patterns of the Kush Kingdom.

The Role of Interoception in Emotional Experiences

*Erica Meltzer, Neural Science and Psychology**

Sponsor: Dr. Elizabeth Phelps, Psychology

Interoception is our sense of the physiological condition of the body. The James-Lange theory of emotion postulates that conscious emotional experience results from the perception of physiological change. This study investigated whether interoceptive ability mediates the relationship between physiological arousal responses and the subjective intensity of an emotional experience. To evaluate interoceptive ability, participants performed a heartbeat detection task, judging whether a tone was synchronous with their heartbeat or not. Participants also viewed and provided intensity ratings for images, while we recorded their skin conductance responses (SCR). For neutral images, greater interoceptive ability predicted an increased positive correlation between the magnitude of SCR to the stimuli and their intensity ratings. Thus, in individuals with an acute interoceptive sense, physiological changes may contribute to the subjective intensity of neutral emotional stimuli.

The Ethnic Politics of Bilingual Public Education in Mauritania

Dorna Moini, French and Economics

Sponsor: Dr. Claudie Bernard, French

Mauritania is a country ethnically divided, plagued by a past and present of slavery and discrimination. Since gaining independence from France in 1960, the Arabo-Berber race has dominated the Negro-African population. These ethnic tensions have spawned a lin-

guistic battle between French and Arabic. Despite a 95% Muslim population, the Arabic language has become a symbol of repression upon the black community. After years of rule under Ould Taya, a president tantamount to a dictator, Mauritania is finally making its transition from dictatorship to democracy. In 1999, after a series of educational reforms, the Ministry of Education officially ended its regime of “arabisation” in public schools. What ensued was an evolution spurred by the use of the French language. The country elected its first black president of the National Assembly and in 2007 officially criminalized slavery, dubbing it a crime against humanity. Meanwhile, obstacles remain and the Arabo-Berber class in power continues to manipulate the social hierarchy. By applying social theories of nationalism and revolution to an original case study, I analyze the genesis of humanitarian progress, with French education as a trajectory to political empowerment and peace for the Negro-African population.

Commitment in Maltreatment-Related PTSD Patients

Kelsey Moore, Psychology

Sponsor: Dr. Marylene Cloitre, NYU Medical Center

Post-Traumatic Stress Disorder (PTSD) is a disorder following a traumatic event that can cause social and emotional deficits. Often, these deficits can develop into significant functional impairments. Accordingly, it is hypothesized that people with PTSD may have difficulty sustaining long-term commitments, like maintaining a job or relationship. In a sample of 60 individuals with sexual trauma-related PTSD, we found that people with higher scores on the Clinically-Administered PTSD Scale (CAPS) are more likely to be single. Of the single subjects, 61.9% drop out of treatment as compared to 58.8% of non-single subjects ($p = .057$). Approximately 32.4% more employed people completed treatment than unemployed people. For the three clusters of PTSD symptoms (avoidance, re-experiencing, and hyperarousal) the frequency of avoidance is significantly correlated with marital status. Non-single subjects have a lower frequency of avoidant symptoms than single subjects. As a measure of total functioning, we created a variable that accounted for both current commitment to a relationship and employment status. Single, unemployed subjects had an average frequency of avoidance score at 15.70 ($SD = 02.87$). Non-single, employed subjects had a significantly lower average frequency of avoidance score at 13.67 ($SD = 04.68$). These findings suggest that people with high avoidance scores have difficulty maintaining long-term commitments, and are less likely to stay in treatment.

To Make a Bead: A Case for Gendered Craft Specialization in the Early Upper Paleolithic

Joelle Nivens, Anthropology

Sponsor: Dr. Randall White, Anthropology

The Upper Paleolithic is marked by the first major dispersal of anatomically modern *Homo sapiens* (AMH) into Europe. The first of the archaeological cultures associated with this migration is known as the Aurignacian (40-28kya). The earliest phase of the Aurignacian in Western Europe is referred to as the Early Aurignacian dating to around 35-32kya. These Early Aurignacian assemblages are particularly interesting for the presence of both Neanderthals and AMH in the region during the period. The Aurignacian is also characterized by the first appearance of body ornaments in Europe. As such, this period is central to the debate surrounding the replacement of Neanderthal populations by AMH. Yet undue emphasis is often placed on the semantics of “modern” versus “archaic” behavior and generalizations rather than specifics of the archaeological record. With this in mind, this research focuses just on the collection of basket shaped beads unique to Southwest France. I seek to develop a more detailed understanding of the conditions—social and technological—of the beads’ production by first outlining a more comprehensive operational chain. Secondly, the possible channels for knowledge transmission are explored. Finally, I investigate the implications these findings may have on our understanding of Aurignacian social organization.

How We Measure Economic Progress

John Okoye, Economics

Sponsor: Dr. Edward Wolff, Economics

Advanced nations measure economic success and well-being using standards that very often give fleeting and even false impressions of the overall economic climate and tend to mask both disparities of growth and standards of living. The purpose of this research is twofold: to define in detail the inadequacy of the economic methods that many advanced nations use to measure growth and prosperity, and to arrive at a more holistic and detailed approach to assessing a country’s economic well-being that takes disparities into account while giving a more accurate, broader description of a nation’s economic growth. To answer these inquiries I first studied the conditions that surrounded the Great Depression and its central causes. I then examined economic statistics of the past 60 years such as the debt-to-GDP ratio, the average annual wage, the GDP per capita, the illiteracy rate, and the household debt-to-income ratio. It was in examining these statistics that I realized that in the past 35 years,

the share of the nation's income and wealth controlled by the top 10% of Americans has increased tremendously, while the wages of the country as a whole have remained stagnant in real terms despite an 85% increase in worker productivity. I concluded that in order for an economy to thrive consistently, the needs of consumers must be addressed so that demand remains strong. This entails increasing access to healthcare, technology and education as well as increasing the number of small businesses. It means ensuring that workers are properly compensated for their productivity and are able to compete in the global economy. The best way to strengthen our economy is by addressing the greater needs of the community as a whole rather than merely the needs of the most prosperous.

Ballcourts of the Maya Lowlands

*Kathleen Paul, Anthropology**

Sponsor: Dr. Pamela Crabtree, Anthropology

The ballgame is an essential activity in Maya culture and is practiced within a specific structure in each site: the ballcourt. This study aims at understanding these courts within the functional, architectural context of a distinct set of urban centers. During the summer of 2008, I conducted primary, photographic, and literature-based investigation of ballcourts at various sites throughout Belize and Guatemala. The study aimed to obtain qualitative and visual data in order to place these courts in a spatial context in relation to the size and orientation of surrounding structures; this information offers an understanding of specific social structure or patterning within the urban planning of Maya Lowland sites. Results suggest no significant temporal variation in ballcourt construction. There does, however, appear to be a trend from open to semi-enclosed courts as one moves west from Belizean coast centers toward inland Guatemalan centers. Most sites containing multiple ballcourts contain a specific court for formal, ritual activity while peripheral courts may be incorporated into adjacent, functional structures. This supports hypotheses that the ballgame often functioned on two separate levels: as a ritualistic public event and as a casual recreational activity.

Rethinking Cattle: A Comprehensive Archaeological Analysis of North and East Africa

Sarah Pilliard, Anthropology

Sponsor: Dr. Pamela Crabtree, Anthropology

The origin of African pastoralism is contentious and its spread is not well understood. The indigenous domestication of cattle in North Africa has led to a variety of herding systems: transhumant pastoralists, sedentary pastoralists, and agropastoral farmers. All three

have varying economic ties to each other and to hunter-gatherer groups as well as involving a variety of other plant and animal species for subsistence. This analysis will establish an archaeological chronology of the origins and spread of cattle in North and East Africa. Animal genetics, human genetics, and ethnography will be evaluated to complement the archaeological foundation. This research will elucidate how both the environment and culture influenced the origins and spread of cattle leading to the diversity of African cattle and subsistence systems. By rethinking the cultural significance of cattle, I will provide a basis for better understanding the motives of early humans to domesticate cattle or adopt cattle herding.

Mood and Fantasy

*Samuel Portnow, Psychology**

Sponsor: Dr. Gabriele Oettingen, Psychology

This study investigated the longitudinal relation between positive fantasies and depression. Positive fantasies are known to predict low success in academia, and low success in academia is known to predict an increase in depression. Thus, we hypothesized that low success in academia would mediate the relation between positive fantasies and an increase in depression over time. In order to investigate our hypothesis, we assessed positive fantasies and depression of students in NYU's "Introduction to Psychology" course during the third week of class and again four weeks later. The second assessment also came one week after students received their grades from their first midterm. Although the mediation of low success was not significant, it was in the predicted direction. Positive fantasies alone, however, did predict an increase in depression over time.

Exploring the Daily Routines of Ethnically Diverse Infants in Relation to Mothers' Mental Health

Hannah Prussin, Psychology

Sponsor: Dr. Catherine Tamis-LeMonda, Applied Psychology, Steinhardt School for Culture, Education, and Human Development

My research explored the daily routines of 200 low-income African American, Dominican, and Mexican 24-month olds living in New York City. Through the coding of infants' daily routines, I found support for the hypothesis that low-income infants spend the most amount of time engaged in caregiving and unstructured activities rather than didactic activities that enhance learning and social development. These findings underscore the importance of early intervention programs for infants at risk for delays caused by a lack of engagement in learning activities. I also predicted that the two Latino

groups would have the lowest levels of learning activities due to their lowest relative poverty and parental education levels, but in fact African Americans had the lowest levels of learning activities. These findings suggest that the two Latino groups may share immigrant values about the importance of learning activities. I also investigated these daily routines in relation to maternal depression. I found no relation between maternal depression and infants' daily routines, refuting my hypothesis that depressed mothers would engage more in caregiving and unstructured activities than in learning activities. Future research on infants' daily routines may benefit from the exploration of more qualitative components of parenting.

High and Low Bridges: Perceiving Possibilities for Action in Infant Locomotion

*Jennifer Quon, Neural Science**

Sponsor: Dr. Karen E. Adolph, Psychology

Learning to walk involves perceiving when the ground situation is safe or risky and adjusting movements accordingly. This study examined how infants decide whether walking is possible or impossible and whether they can find alternative means to navigate a challenging situation. Fourteen-month-old infants were encouraged to cross wide and narrow bridges (2 to 60 cm) over both a deep (71-cm) and shallow (17-cm) precipice. Preliminary data from 11 infants show that attempts to walk varied by bridge width: Infants attempted to walk over wide bridges within their abilities and avoided walking over narrow bridges beyond their abilities. Although previous work showed that adults are more reticent to cross a deep precipice compared to a shallow one, infants were equally likely to walk in the deep and shallow conditions. On challenging bridges, infants slowed down, took smaller, slower steps, and turned sideways. On impossibly narrow bridges, infants found a variety of alternative means for navigating the precipice (backing, stepping, sitting, or crawling into the gap, and crawling onto the bridge). Results suggest that infants gear locomotion to the environment but may not yet consider the consequences of falling from high versus low surfaces.

Comparative Effectiveness of ACE Inhibitors for African Americans

*Jennifer Quon, Neural Science**

Sponsor: Dr. Nirav R. Shah, NYU Medical Center

Angiotensin Converting Enzyme (ACE) inhibitors are among the most prescribed medications for hypertension today. Inconclusive data from subgroup and *post hoc* analyses of clinical trials suggest that these drugs may disproportionately harm African American patients. In

a retrospective cohort study of hypertensive patients, I will examine the potential racial/ethnic differences in the clinical effectiveness, safety, and adverse effects of ACE inhibitors. I will use clinical data from Bellevue Hospital's Electronic Health Record (EHR) system. Preliminary results show that African Americans experience less clinical benefit and greater harm from ACE inhibitors compared to whites. This comparative effectiveness study will contribute to the reduction of health disparities by addressing a vulnerable and hard-to-reach population, and will create new knowledge relevant for patients, providers, and policy-makers alike.

Why Did ** Knock Down the Towers: Rap and Censorship in the Post-9/11 World**

Elaine Ramirez, Journalism and Economics

Sponsor: Dr. Martin Daughtry, Music

When Jadakiss rapped, "Why did Bush knock down the towers?" in 2004, the music video showed a man watching him on a television, struggling with a remote to turn his message off. MTV did turn the message off by censoring out the word "Bush." In the years following the terrorist attacks of September 11, 2001, Jadakiss and other musicians faced censorship, some incidents as overt as this and others more subtle. Along with an investigation of reactions to that day's events in the actions and words of rap and hip hop artists, I present cases of censorship of hip hop and rap in mainstream media and the emergence of certain independent labels led by artists resistant to conglomerate media pressure. I researched news articles, academic papers, internet forums, rap lyrics, album cover art, and music videos to provide an in-depth look at the rap industry's commentary to the politics of 9/11 and the political results that rippled thereafter.

Looking beneath the Surface: An Experimental Approach to Variation in Upper Paleolithic Female Figurines

*Sarah Ranlett, Anthropology**

Sponsor: Dr. Randall White, Anthropology

Beginning in the Gravettian Period of prehistory (28-22 kya), depictions of women became a major theme in Paleolithic representation. Figurines from this period, commonly referred to as "Venus Figurines," are enigmatic figures, well known in the study of both art and archaeology. The Venus of Willendorf is the most familiar of these figurines and is often taken to be representative of the nearly 200 known statuettes. Yet the extant corpus of statuettes is much more diverse than much of the available literature suggests. These statuettes embody many different morphologies and stages of production, are

carved in a number of raw materials, and are found in a variety of archaeological contexts across Eurasia. In order to experimentally investigate this variation, reconstruction of the production process in different raw materials was executed. It was found that raw material choice may not only predicate facets of this variation, but is also a significant component of variation in and of itself, affecting not just the final form but also the experience of sculpting, an experience that was likely meaningful to the prehistoric authors of these figurines.

Government Policy and Public Attitudes toward Russian Émigrés in France, 1919–1939

*Yelizaveta Raykhlina, History and Russian**

Sponsor: Dr. Edward Berenson, History

The exodus of White Russians that followed the October Revolution and the 1918–1921 Civil War has been closely studied by historians as a means of understanding the dilemma of emigration and the uneasy status of the refugee. The particular case of Russian émigrés living in France in the 1920s and 1930s provides a fascinating study of how Europe’s first truly large-scale political refugee population was treated and tolerated, particularly when compared to more traditional, wage-seeking immigrants from countries like Italy and Poland. I conclude that the differing economic climates of the two interwar decades dictated government policy and heavily influenced public perception. In the 1920s the French economy was booming and was in desperate need of foreign labor. Thus, the government held an open immigration policy and welcomed the Russian refugees, while the public took a momentary interest in Russian “exoticism” and “mystery.” Jobs in the liberal professions were difficult to obtain, so many Russian men joined the French proletariat in the factories and mines across France. With the worldwide depression of the 1930s, however, the French government cut back on work permits and sent back thousands of foreign workers. Since the Russian émigrés were political refugees, however, they stayed in France and eked out a living in very real poverty. Public opinion at this time hardened and Russian émigrés came to be viewed with suspicion. In the face of the impending Nazi threat, many refugees emigrated once again, while others, particularly the young generation, fully assimilated into French society. Although WWII signaled the end of the Russian community in France, the two interwar decades proved to be a relatively accommodating period that, despite its opposing fads and crackdowns, allowed the refugees to establish communities, find employment, reconnect with culture, and maintain their political integrity.

Posture, Play, and Parenting: Effects on Infants’ Development of Object Exploration Skills

Sarah Sanclemente, Steinhardt School of Culture, Education, and Human Development

Sponsor: Dr. Karen Adolph, Psychology

This study examined whether infants’ propensity for exploring objects in different positions is affected by how often they play in various positions, their experiences playing with certain materials, and activities outside the home. We observed 29 4.5- to 7.5-month-old infants in the laboratory as they explored 12 toys made of different materials while lying on their backs and bellies, and sitting up. Infants with more home experience playing on their backs and bellies showed more manual exploration in those postures in the lab. And infants who never played with certain materials (e.g., wooden toys) explored toys made of those materials more often than infants with prior experience. Home sitting experience predicted higher levels of coordinated visual-manual exploration in every position; correlations were especially high while sitting up. In current analyses, we are testing the effects of activities outside the home. The findings indicate that daily experiences playing with objects are linked with individual differences in the development of infants’ object exploration skills.

The Effects of Compensation to Increase Live Donor Kidney Supply

Anne Sebastian, Economics

Sponsor: Dr. Guillaume Frechette, Economics

The current supply of kidney donations continues to fall short of the increasing demand, creating a widening gap between the supply and demand of kidneys. Financial incentives provide an alternative to the current system to increase the supply of live kidney donations. Specifically, implementing a market price can provide a financial incentive that elicits greater kidney donation from live kidney donors. This price can be estimated using the hedonic wage-risk model, where the price is dependent on the risk that the donor takes. In this case, risk is measured by the value of the donor’s statistical life, which varies upon income level. Additionally, types of potential payment mechanisms that organize kidney sales are discussed. Implementation, however, of a market price for kidneys into the current Medicare payment system creates differing implications for various income levels, which affect the quantities of kidneys supplied and demanded. Application of a kidney market results in social consequences and raises ethical questions that have not yet been resolved.

Cultural Identity and the Question of Lebanese Nationalism

*Sara Smith, Anthropology and Middle Eastern Studies**
Sponsor: Dr. Aisha Khan, Anthropology

The Cedar Revolution, a wave of nationalistic sentiment that swept Lebanon after the 2005 assassination of former Prime Minister Rafiq Hariri, attempted to expel Syrian occupation and create a secular, patriotic Lebanese government. This national fervor, however, quickly dissipated after the Hezbollah-Israeli War of 2006 when the 2007 presidential elections resulted in seven months of political stalemate. Nationalism, a sentiment of pride and honor for one's nation, is an inherently plural cultural construct in Lebanon that is claimed and asserted differently depending on social, political, and economic context. I analyze the plurality of perceived Lebanese cultural identities, how they are constructed in relation to a national "Lebanese" identity, and the mechanisms through which representations of the Lebanese nation are perpetuated in popular culture. Through an anthropological analysis, this research will explore how cultural identity is deeply rooted in Lebanese understandings of territory and kinship, which are defined by religious sect. I seek to examine what it means to be Lebanese, while simultaneously identifying with one of the country's many socio-religious communities. Furthermore, is a cohesive and secular nationalist movement, like the Cedar Revolution, plausible in a country where religious sectarianism defines fragmented cultural identities?

Social Interactions Imprinted in Domestic Space: Collapse or Regeneration of Etruscan Society?

Sarah Spano, Anthropology†*
Sponsor: Dr. Rita Wright, Anthropology

The collapse of the Etruscan Civilization and subsequent rise of the Roman Republic cannot be fully understood without tracing crucial threads of social interactions, which are usually lost to more formal discussions of political and territorial advances. For the first time in this context, I use anthropological models specifically adapted to the archaeological realm to examine the floor plans of household structures from seventh century B.C.E. Etruria and first century B.C.E. Rome. The methods include an examination into the accessibility of space within structures, in particular analyzing courtyard development, access to private spaces, and the ability to enter and exit Etruscan versus Roman households. Through this analysis of spatial structure from limited archaeological remains, I demonstrate that the ability of females to flourish within classical households depends on the ability to move freely throughout domestic spaces. In this case neither

a transformation nor regeneration ensues from Etruscan collapse: vital components of social life in the household fail to surface in the newly founded Roman Society. It is the link between household structure and articulation of space, collapse and regeneration models, and women that I explore through this research.

Women's Empowerment and Microfinance in Bangladesh

Alexis Sumsion, Gallatin School for Individualized Study
Sponsor: Ms. Lauren Kaminsky, Gallatin School of Individualized Study

The highly publicized field of microfinance creates significant improvement in the financial status of its participants. Small loans to impoverished women around the world give them more opportunity to start businesses and create better lives for themselves and their families, but what does it do for them socially? I gained access to ASA Microfinance company's clientele and conducted field-level research using interviews and polls of 20 to 30 women in the Comilla and Mymensingh districts of Bangladesh. The goal was to study what effect microfinance had on women's empowerment in this developing country. Based on global media and the local company's focus on women in microfinance, I expected to see a majority of women financially and socially empowered and equal. The results of the interviews showed something different: only ten to 20% of women used the loan money for their own businesses; most gave it to their husbands and retained their diminished positions. Most became only slightly empowered. Microfinance enable women to have some leverage, but cultural and religious constraints that hold the status quo in place cripple its potentially revolutionary effects.

Pink Frilly Dresses (PFD) and Gender Identity: Future Implications

Sarah Teitelbaum, Psychology
Sponsor: Dr. Diane Ruble, Psychology

Pink frilly dresses (PFD) is a recently identified phenomenon that describes young girls who are adamant and unyielding when it comes to wearing "girly" clothing. PFD has been shown to occur mainly in pre-school aged girls, though it can also occur in older girls. Prior research has shown that rigid adherence to gender constructs is often socially detrimental, so I hypothesized that children who experienced PFD outside the normal age range will experience poorer adjustment when they are older. Thirty-nine young girls and their parents were interviewed at two separate times approximately five years apart and assessed for PFD at Time 1 and adjustment at both Time

1 and 2. PFD (T1) was shown to predict lower appearance self-worth in the kindergarten cohort (T2) as well as lower peer self-worth in both cohorts. While future research is necessary, these findings can help to make sense of young girls' and adolescents' issues of self-worth related to their appearance.

Do Core Values Serve a Fundamental Modulatory Function in Transference?

Cameron Toman, Psychology

Sponsor: Dr. Susan Andersen, Psychology

Social-cognitive psychology research has demonstrated the chronic accessibility and sustained application of significant other mental representations onto target new people who resemble the significant other, known as transference. The present study ventured to interrupt the sustained application of these mental representations by providing incongruent information (between the target significant other and the *actual* significant other). We utilized the idiographic/nomothetic paradigm, which allows participants to provide information about a significant other that is then used in a later manipulation session to induce transference (without participant's *conscious* awareness). The analysis demonstrated the activation of a self-regulatory compensatory process resulting from a threat to the working self-concept in transference. The present study is the first of its kind to demonstrate the effects of incongruent information in transference and provides insight not only into the boundary conditions of the transference process but also interpersonal information perception.

Action Feedback on Perceptual Judgments

*Dina van der Zalm, Psychology**

Sponsor: Dr. Karen E. Adolph, Psychology

Possibilities for action affordances depend on the relationship between the body and the environment. Perception of affordances guides action, but does action also affect perception? We investigated the effect of action performance on perceptual judgments by evaluating the accuracy of people's judgments about their ability to fit through doorways of varying widths. Participants made their judgments either before or after 20 trials of walking through the doorways. We predicted that participants who walked through doorways before making judgments would more accurately perceive their ability to fit. Indeed, participants in the action-first group benefited from action feedback and made more accurate subsequent judgments than those who judged doorways before walking through them. Apparently, action feedback facilitated more accurate perceptual judgments by

drawing participants' attention to their body dimensions. Judgments in the action-first group were strongly related to height, weight, and torso size, whereas judgments in the perception-first group were not. Increased accuracy of the action-first group indicates that action performance can improve perception of affordances.

Baby Hauler: Infants Carrying Objects

Alyssa Zuckerman, Psychology

Sponsor: Dr. Karen Adolph, Psychology

This study is the first to document infants' ability to carry objects while crawling or walking. Fifty 13-month-olds were videotaped for one hour in their homes; 26 infants were experienced crawlers and 24 were novice walkers. Based on frame-by-frame coding of videotapes, I assessed how frequently infants carried objects, how much time they spent carrying, the number of crawling/walking steps while carrying, their strategies for holding objects while transporting them from place to place, and whether carrying resulted in negative consequences (falls or stumbles). In addition, I examined whether locomotor experience and crawling/walking skill affect infants' ability to carry objects. Contrary to common wisdom, preliminary data indicate that crawling infants can carry objects, albeit infrequently ($M = 5.1$ bouts/hour), by holding them in their mouths, tucked under their arms, pushing them against the floor, and scooting while clutching the objects. Crawlers also cruised while carrying objects. Novice walkers frequently carry objects ($M = 42.7$ bouts per hour), using primarily one strategy—holding objects in their hands. Both crawlers and walkers stumble and fall, but walkers' falls are more frequent. Thus, walkers choose to carry objects because their hands are free, despite the added burden of keeping balance while carrying.

Effects of Oil Refinery Outages and How Impacts Vary According to Region

Catherine Zung, Economics

Sponsor: Daniel Xu, Economics

The purpose of this research is to determine how unexpected shocks to the U.S. oil refining industry affect supply decisions and consumer demand. Recently, refineries operate in increasingly tight markets due to high utilization rates and persistent growth in demand. As such, disruptions to production can create large market imbalances. I compare the effects of outages in California against those in the Gulf Coast caused by Hurricanes Katrina and Rita. California refineries operate in a very isolated market due to higher fuel standards which ultimately cause them to be the main suppliers

of fuel consumed in that state. In contrast, states along the East and Gulf Coasts consume similar types of fuel. This allows refineries to make up for local production losses with supplements from other areas. I estimate that consumers in the West Coast have a response to changes in price that is almost four times as great as the response along the Gulf. Moreover, imports and inventory levels play much larger roles in the determination of price in the West Coast. With the results, I am able to infer effects from tax policy changes.

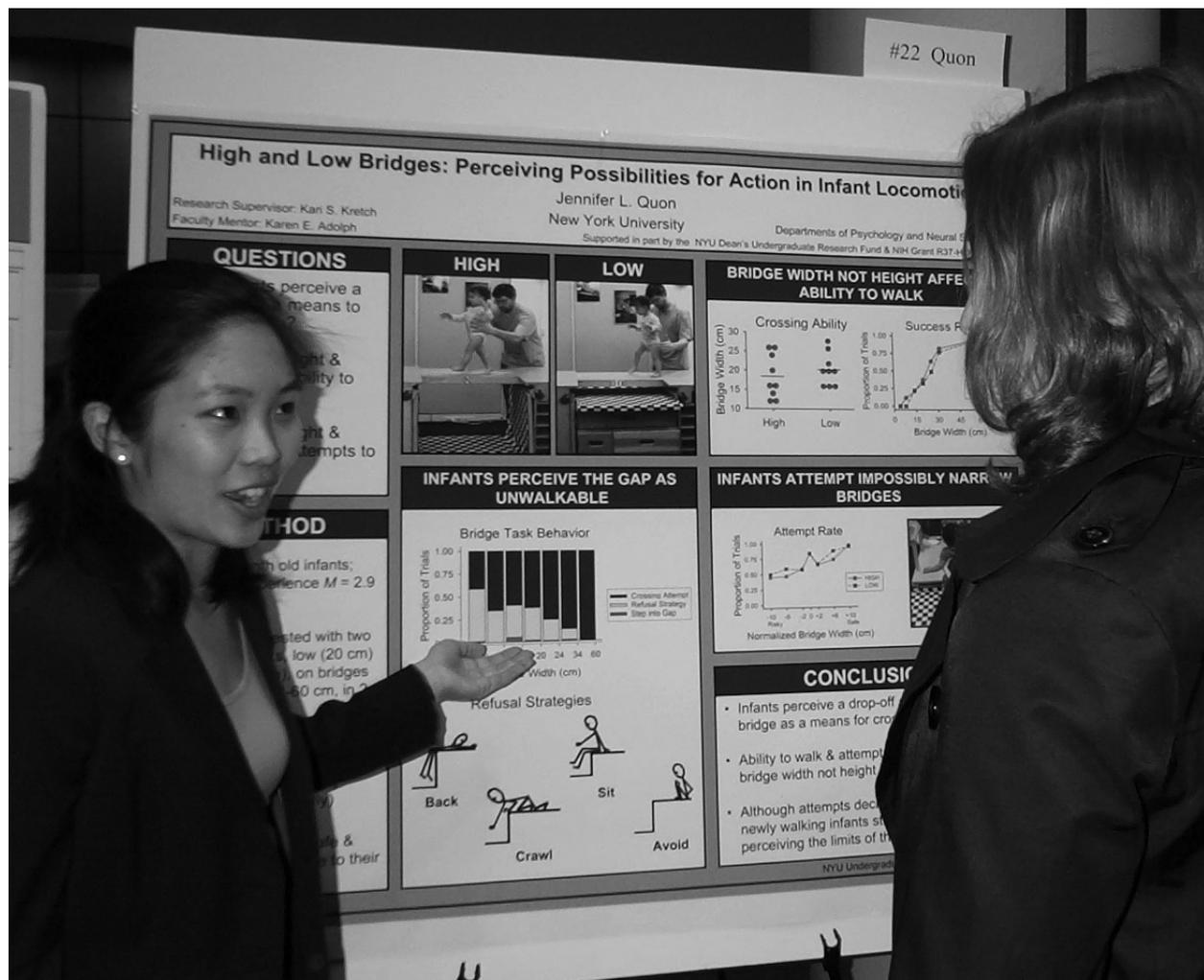
Organizational Skills: A Comparative Study of Children Diagnosed with ADHD Versus Anxiety Disorders

Naomi Zwillenberg, Psychology

Sponsor: Dr. Richard Gallagher, NYU Medical Center

Concerns about organization, time management, and planning (OTMP) deficits are common among children with Attention Deficit Hyperactive Disorder (ADHD).

It is unclear, however, whether OTMP problems are specific to ADHD or a reflection of executive function disturbance associated with general psychiatric disturbance. Anxiety disorders (ANX) affect a selective subset of executive functioning (Watkins, 2005). This study examines whether ADHD children have more organizational deficiencies than ANX children and whether ANX children have different organizational profiles than ADHD children. The diagnostic groups were compared using the Children’s Organizational Skills Scale (COSS), and rating scales of behaviors that reflect psychiatric diagnoses. The COSS distinguished between the groups, suggesting that children with ANX and ADHD have different organizational profiles. Level of impairment on the COSS was correlated with deficits in attention, but not anxiety. Results indicate that organizational deficiencies are greater in children with ADHD, but problems are also present in ANX children.



COLLEGIATE SEMINARS

Offered only to freshmen in the College of Arts and Science, Collegiate Seminars are taught exclusively by distinguished senior Arts and Science faculty whose excellence as scholars and teachers has been recognized by their appointment as Collegiate Professors. These faculty not only teach these courses but also serve as the students' mentors throughout their entire undergraduate careers at NYU. Like other seminars, these small classes are meant to introduce students to important subjects and to challenge them intellectually through rigorous standards of analysis and oral and written argumentation. To that end, they stress demanding readings and writing assignments that introduce students to an essential research skill—such as a literature review, quantitative reasoning, critical use of primary sources, the identification of a research problem, critical analysis of texts, or confrontations with works of art. In applying and registering for one of these seminars, students are expected to commit themselves to doing honors-level academic work and to participating actively in co-curricular and mentoring activities beyond the semester-long course. The following papers were presented at the CAS Undergraduate Research Conference on Friday, April 17, 2009 and grew out of two Collegiate Seminars: “The Cultural Nature of Language” taught by Dr. Bambi Schieffelin in the Department of Anthropology and “Pharmaceutical Drugs, Ethics, and Culture” taught by Dr. David Scicchitano in the Department of Biology.

The Cultural Nature of Language

The Linguistic Lives of LolCats

Ruth Brillman, Anthropology and Linguistics
Sponsor: Dr. Bambi Schieffelin, Anthropology

Communication is an essential element of every culture, and that communication is often facilitated through a culture's language. The online LolCat culture—an internet site known for its humorous pictures of cats with amusing captions—is no different. Members of the LolCat community communicate with LolSpeak—an online register with an intricate social history. LolSpeak is a highly self-referential register, replete with highly customizable, easily recognizable phrasal templates (dubbed “snowclones”), which allow for the generation of new humor and expression by referring back to older LolCat and Internet memes. Understanding the memes that snowclones reference, and utilizing snowclones to make new cultural references that connect language to culture are two key tenets of proper LolSpeak. Indeed, an understanding of these cultural components is perhaps more important than a strictly linguistic understanding of LolSpeak grammar and orthography. This is because LolSpeak is a highly social register; it is not used randomly, but very intentionally, to represent, reference, or otherwise establish membership in the LolCat community. The intentional use of a register other than LolSpeak can accomplish the opposite. Many LolSpeak users see comments posted in 1337, another Internet register, as a direct insult and denial of LolCat culture.

Memetics in New Media: An Analysis of Post-LOLcat Communities

Ryan Gander, Undeclared Major
Sponsor: Dr. Bambi Schieffelin, Anthropology

Internet communities provide phenomenal subjects for study, not only because of their accessibility, but because they allow us a glimpse of how new technologies enable community formation. Though many of these virtual communities are relatively small, they nevertheless possess social and linguistic norms found in other human societies, allowing us to gain deeper insight into how we create and comprehend identity and belonging. Through LOLcats and the subcultures it has spawned, I analyzed how social and linguistic communities originate and evolve using the concept of “memes.” My research focused primarily on the different styles and deliveries of humor between communities which originated from the larger original LOLcat meme (ICanHasCheezeburger.com). While the various subcultures most certainly adopted certain features from their parent community, I discovered that these offspring of LOLcats were unique, each containing norms distinct from the others and from the larger LOLcat community, though there was a great deal of reuse, remixing, and recombining that lead to identifiable or community specific forms of humor. In this way, we can see that the evolution of social communities is not only about transmitting conventions of humor, but more importantly, about transforming them within recognizable parameters.

The Religious Lives of Lolcats

Celia Garay, Undeclared Major

Sponsor: Dr. Bambi Schieffelin, Anthropology

Religious themes are used in conjunction with Lolcat images—cats juxtaposed with captions. Examining its mainstream site, ICanHasCheezburger.com (IHC) and dozens of other websites, religion was used in three distinct ways. In IHC, users draw on religious themes for humor, exploiting ceiling cat (God) and basement cat (Satan). Through comments, the users regulate appropriate use (good taste) to maintain a standard of community. These users also created the Lolcat Bible Translation Project using the IHC Bible characters. A second group of websites created by religious groups, while humorous, mixes Lolcat images with religious iconography for proselytizing to users who might be drawn to these internet images (e.g., lolsaints.com). The third set of websites also mixes religious material with lolcat images, but mocks religion (e.g., loltheists.com). Thus, different communities of internet users found that Lolcat images could be used for their own purposes.

The Economic and Commercial Consequences of Lolcats

Sophia House, Politics

Sponsor: Dr. Bambi Schieffelin, Anthropology

Since 2003 “Lolcats,” or funny images of cats with captions, have taken the Internet by storm, floating through various forums and finally finding a home at ICanHasCheezburger.com (IHC.com). Purchased by Pet Holdings, Inc., the site has become a lucrative business venture. Examining sources, including the *Wall Street Journal* and FoxNews, as well as online blogs, I analyzed the site’s unique success as a “new media” business model. IHC.com exemplifies both the possibilities and the complications of this new model. Relying on user-generated content, it goes a step further in creating a marketable product. Unlike other websites, it creates a “total package” experience for users including social networking features. The site’s owners and users enjoy an unprecedented symbiotic relationship, and this plus website-as-product are the crux of IHC.com’s economic success. I also examined complications of their model: the anonymity of the Internet creates copyright problems; the site’s sustainability is unknown; and, most importantly for others, the IHC.com model has been impossible to replicate.

The Origin of the Lolcats: I Has It

Karen Kuhn, Anthropology and Linguistics

Sponsor: Dr. Bambi Schieffelin, Anthropology

Like any community, web-based or otherwise, the Lolcat community has a rich history and an origin myth. My research traced the history of the Lolcat meme to a captioned photograph of a costumed cat on a 1905 postcard. I found that, since its release, these captioned anthropomorphic pictures of animals represented as speaking, have continued to gain popularity. This trend has peaked with the blog, ICanHasCheezburger.com. This blog has evolved into an economic and cultural phenomenon with merchandise and ubiquitous cultural references. Analyzing both images and captions from ICanHasCheezburger.com, I found that captions central to the generation of humor developed different patterns of meaning in the community. Many times, the humor of these recurring captions is exclusive to the community, and often self-referential, creating an in-group solidarity that is maintained. I discovered that the Lolcat community is protective and regulatory of their captions and their language—Lolspeak—and that the captions themselves have begun to signify the identity of the phenomenon even when detached from the cat images that originally accompanied them, as evidenced in mainstream advertising such as McDonald’s as well as in slogans handwritten on buildings.

Pharmaceutical Drugs, Ethics, and Culture

Intellectual Property Rights and the Role of Governments in the Pharmaceutical Industry

Mirza Ahmed, Biology

Sponsor: Dr. David Scicchitano, Biology

The need for affordable access to medication in public health emergencies has led to the provision of compulsory licensing, which is used by governments to combat anti-competitive marketing practices. There are, however, few, if any, specific guidelines regulating compulsory licensing of pharmaceutical products, and governments have significant leeway in deciding when to deploy it, leading to abuse of their authority. In December 2006, Thailand issued compulsory licenses on Merck’s antiretroviral Stocrin (Efavirenz), even though the action was not prompted by a national health emergency. To compete with this low-cost, generic, Merck reduced its price from \$516 to \$237 per patient per year. Merck’s actions prompted Brazil to demand lower prices for Efavirenz to treat its 700,000-strong HIV-positive

population. The compulsory licensing events in Thailand and Brazil precipitated further actual or threatened compulsory licensing events around the globe. The imbalance of power between the governments and the companies require redress in order to protect the intellectual property rights of investors and provide inventors with an incentive to develop new drugs. Thus, I highly recommend the creation of an international body to revise the text of the Trade Related Aspects of Intellectual Property (TRIPS) Agreement and the Doha Declaration, which focus on issues related to compulsory licensing, as well as pharmaceutical companies' pricing policies.

Ethical Reviews of Clinical Trials

Chelsea Cooper, Undeclared Major

Sponsor: Dr. David A Scicchitano, Biology

United States pharmaceutical companies export clinical trials to developing nations where they can be done less expensively on large, genetically diverse populations. The United States mandates that an ethics review committee, often called an Institutional Review Board (IRB), evaluates the proposed studies. Unethical trials occur in developing nations, however, and these provide evidence that the structure and effectiveness of ethics reviews must be improved. For clinical trials exported to developing nations, the principal issue is whether the ethics review should be completed in the United States or in the nation where the experimental trials will occur. In the United States, members of the IRBs often have more review experience, but they do not understand the cultural norms and community needs of the developing nations. In contrast, IRB members located at the foreign site are culturally aware, but often both their independence and their neutrality are compromised due to their inextricable relationship with the pharmaceutical industry, creating conflicts of interest. In order to ensure the most comprehensive protection of human rights, I recommend the completion of dual ethics reviews, completed in both the United States and overseas. Furthermore, a database of prior ethical review results and recommendations should be created in order to minimize the ambiguity of the review process by enabling IRBs to access pre-existing ethical precedents.

How Can Researchers Adapt Their Own Ethical Standards to the Local Cultural Norms of Underdeveloped Countries?

Sean Cross, Undeclared Major

Sponsor: Dr. David Scicchitano, Biology

The surge of clinical trials conducted in underdeveloped countries has created the need to guard the rights of the often uneducated individuals taking part in these trials. The Declaration of Helsinki lays out an international framework for conducting these trials ethically, but these ideas are based in the developed world's beliefs of medical ethics. When a trial is being carried out in a resource-poor setting, researchers can be presented with cultures and customs not familiar to them. A balance between the culture of where the pharmaceutical industry is located, and where the trials are taking place should be established. The best available proven care should be provided to subjects in every trial, regardless of whether or not that treatment would normally be available to that local population. It is also important to consider local interpretations of informed consent. Some populations require the head of the family to give consent for an entire village, but the rights of every individual in a study must be considered. This means ensuring that there is understanding between each subject and the researchers. Every study must pay special attention to ensure that the highest ethical standard is held for each individual research situation.

The Ethics of Financial Compensation of Research Participants

Thomas Mawson, Undeclared Major

Sponsor: Dr. David Scicchitano, Biology

The ethical debate on financial compensation for research participants is often based on an assumption that financial compensation unduly induces participation. But studies suggest that research subjects are motivated by a variety of factors, rarely just financial compensation. These include: (1) a desire to help other patients; (2) scientific interest; (3) a need or desire for financial compensation. Regardless of health and income levels, research subjects do not feel exploited by offers of financial compensation and have a positive view of research. Based upon an analysis of existing data, it is clear that financial compensation can often be a strong inducement; it is difficult, however, to judge when or if the inducement is an undue influence for participation. While patients rarely feel that offers of compensation significantly affect their judgment, there remains the possibility that they do not realize that they are being unduly influenced. The small amount of empirical data on this

issue precludes drastic action like prohibiting financial compensation, but journals should report any financial compensation offered in published studies. Significantly more research is necessary to fully understand the role of financial compensation in the decision-making process of research participants.

Pediatric Research: The Efficacy and Ethics of Federal and International Legislation

Dmitriy Nevelev, Undeclared Major

Sponsor: Dr. David Scicchitano, Biology

As a result of the pediatric drug dosing controversy, many nations have enacted legislation that promotes clinical research in children and enforces regulations to prevent abuse in these trials. Such legislation, as seen in the United States and the European Union, has received heavy criticism regarding efficacy and ethics when studying drugs in a population under 18 years of age. How can legislation best balance conflicting objectives between ethics and scientific advancement? Analyzing the results and provisions of the Food and Drug Administration Modernization Act, the Best Pharmaceuticals for Children Act, the Pediatric Research Equity Act, the Paediatric Medicines Regulation, and additional professional reviews provides an answer to this question. Although there are issues with legislation, it is necessary to enforce drug-testing standards for children and promote testing. The legislation is an evolving process that requires international attention. To improve the quality of medicine and ethical standards of pediatric testing there should be (1) more oversight committees created to

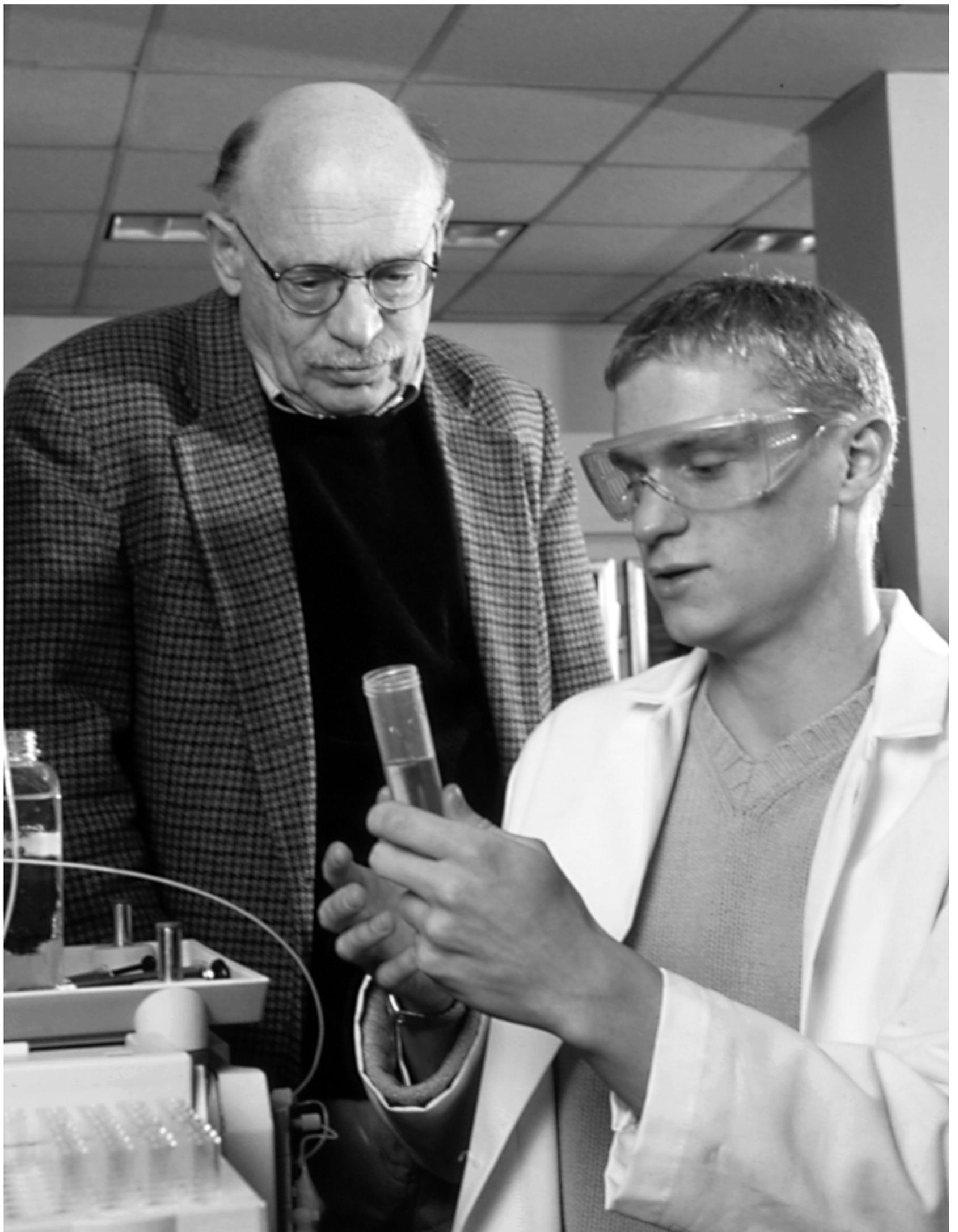
monitor recruitment, parental consent, and participation willingness throughout the trials; (2) enforced labels that distinguish drugs that have not yet been tested; and (3) a public, annually updated list of drugs that have not yet been determined to be effective in children.

The Credibility of Continued Medical Education

Hyejin (Jenny) Yang, Undeclared Major

Sponsor: Dr. David Scicchitano, Biology

Continued Medical Education (CME) for physicians is designed to keep them aware of recent medical advances and is required to maintain their medical licenses. Portions of CME are funded by the pharmaceutical industry. This can pose a conflict of interest between the physician and the pharmaceutical industry if the commercial support from drug companies directs the program into a marketing scheme for their product. This leads to a question: How do pharmaceutical-supported CME programs influence physician behavior that affects their patients? The purpose of CME is to further educate physicians; if, however, the commercial support from drug companies directs the program into a marketing scheme for their product, CME is influencing the prescription behavior of physicians everywhere, which ultimately affects the patient. The analysis of the data leads to the conclusion that the \$1.2 billion that the pharmaceutical industry spent to support CME in 2007 altered the behavior of participating physicians of CME. The current power of the Accrediting Council of Continued Medical Education is not enough to resolve this conflict of interest; thus, the organization needs to be strengthened with enough government support to enforce regulations.



Given finite resources, should we fund more research into the cause—and possibly, cure—of cancer, or build a space station? Can weather be predicted much more accurately than it is now? Is your water supply safe to drink? Is the human population changing the world climate? We all tend to take it for granted that science and technology increasingly play a role in our livelihood, our recreation, and our economic and even our physical survival. As in the humanities, many problems in applied science are so complex that they require collaborative research by scientists with diverse backgrounds and training. The purpose of education in our “postmodern” world is to allow one to navigate with insight and comfort in an increasingly math- and science-driven environment, to distinguish what is sense from what is nonsense, and to form a basis for sound decision-making.

—Neville Kallenbach, *Professor of Chemistry*

NATURAL SCIENCES

Resetting the Clock in *Caenorhabditis elegans* Male Tail Tip Mutants

Samuel Ahn, Biology

Sponsor: Dr. David Fitch, Biology

The model organism *Caenorhabditis elegans*, in response to environmental stress such as lack of food and overcrowding, may enter an alternative larval stage of development called dauer. Upon exit from dauer due to more favorable living conditions, *C. elegans* resumes development into adulthood. Mutations of heterochronic genes, ones that influence the timing of tail tip morphogenesis in adult males, cause mutant tail tip phenotypes called Lep. However, heterochronic mutants that have passed through dauer sometimes revert back to the wild type phenotype. Currently, there are two hypotheses I hope to test: 1) it is the length of time in which *C. elegans* has been in dauer that causes this reversion to the wild type phenotype, or 2) it is *C. elegans*' having entered dauer at all. I have gathered data for the mutant rescue of two week old dauer worms (hypothesis 1), and I am working to quantify the mutant rescue of one day old dauer worms (hypothesis 2).

Macaques' Observation of Social Status Relationships between Unknown Pairs of Monkeys

Yi Han Ang, Neural Science

Sponsor: Dr. Wendy Suzuki, Neural Science

Similar to humans, most non-human primates are known to live in social networks. Understanding how primates learn the hierarchical relationships amongst their members can inform our knowledge about cognitive processes or neuronal networks used for the formation of social memory in humans. Can macaques learn to identify a dominant monkey after watching short video clips showing the interactions between two unknown macaques of different social status? In this experiment, we presented a female Rhesus macaque with video clips, using a touch monitor, that spanned five different behavior categories of interactions involving displacement, food priority, or threatening behavior. She was able to correctly distinguish between the dominant and submissive monkey across the test clips within three of the five categories. In addition, she spent a larger percentage of time touching the dominant than the submissive monkey across the test clips within four of the five categories. Our findings showed that a Rhesus macaque was able to

learn to distinguish between two unknown macaques of different social status from watching the training clips and to apply it to new scenarios in the test clips. Due to the use of only one subject, however, we cannot generalize the findings to all macaques.

Medical Benefits Found in Laparoscopy versus Open Colectomy

Amanda Bailey, Mathematics

Sponsor: Dr. Robert Shirinov, New York Hospital Queens

For almost a year, I have been assisting Dr. Ruiz and Dr. Shirinov in their clinical research at New York Hospital Queens. The main objective of this research is to prove that laparoscopic surgery is more favorable for elderly patients than open colectomy, and to reveal which operative procedure is better for treating these elderly patients who are suffering from diverticulosis and diverticulitis. About 1/3 of people who are older than 45 years and 2/3 of all persons older than 85 years have been diagnosed with these, resulting in approximately 200,000 hospitalizations in the U.S. per year. The laparoscopic technique requires making small incisions on the abdomen with the use of a laparoscope, allowing surgeons to see their operating field through small openings. Open colectomy, which is more invasive, involves removing all or parts of a patient's colon through a large incision in the abdominal wall. My main responsibility in this research was to collect data from patients' surgical charts and organize information, such as age, gender, and length of stay in the hospital, into spreadsheets.

Based upon the collected data, laparoscopic surgery appears to be more beneficial in treating diverticular disease. Patients recovered faster with a shorter hospital stay than those who underwent open colectomy. Not only was the estimated blood loss lower, but the time it took patients' bowel movements to function normally after undergoing laparoscopy was more rapid, leading to fewer postoperative complications. Furthermore, both the amount of time it took patients to return to consuming solid foods and the mortality rate in laparoscopy was much lower than in open colectomy.

In conclusion, surgeons can use the results that my mentors and I have obtained to see that laparoscopy is more favorable than open colectomy in treating elderly patients with diverticular disease. Discovering which operative approach is safer and more helpful to patients is important in these times of increasing constraints on hospital occupancy rates and access to nursing services in many regions of the country. Moreover, effectively proving that one technique is more beneficial than another may result in making laparoscopy the standard operating procedure, possibly applying it to younger patients who are also being diagnosed with the disease.

Characterization of Zelda Protein in *Drosophila melanogaster*

*Rachael Barry, Biology**

Sponsor: Dr. Christine Rushlow, Biology

In early animal embryos, control of development is first due to gene products deposited in the embryo by the mother. Later, the embryo's own zygotic gene products take over the process. This change of control is called the maternal to zygotic transition. In *Drosophila melanogaster*, the Zinc-finger Early *Drosophila* Activator (*Zelda*) plays a significant role in controlling the maternal to zygotic transition. Without it, embryos do not progress past thirteen mitotic divisions and fail to form a cellular blastoderm. The zinc-finger DNA binding domain of *Zelda* implicates its function as a transcription factor that activates expression of zygotic genes. Using antibody staining to determine *Zelda* protein localization throughout the first thirteen nuclear divisions, I observed this protein to increase in concentration in the syncytial nuclei prior to the activation of the zygotic genome at the eighth nuclear division. A protein necessary for degradative pathways in the maternal to zygotic transition, *Smaug*, appears to have no affect on *Zelda* expression during this time.

The Effects of Metoclopramide on Gastric Motility as Measured by Short-Term Bioimpedance

*Kathleen Capaccione, Biology**

Sponsor: Dr. M. Raquel Huerta-Franco, Universidad de Guanajuato, Mexico

Gastric motility assessment is an important medical diagnostic technique for many disorders affecting movement through the gastro-intestinal (GI) system. Optimal evaluation of gastric motility involves a balance of accuracy, reproducibility, and patient comfort. Short-term bioelectrical impedance successfully balances these characteristics by measuring the peristaltic waves of the stomach via electrodes placed on the skin. Huerta-Franco et al. have previously shown that bioimpedance evaluation produces results consistent with other assessment techniques in normal systems with main peak activity around 3 cycles per minute (cpm). This led us to inquire if it could accurately assess systems under stress. We tested healthy volunteers using short term bioimpedance to measure gastric motility in the fasting state and after administering metoclopramide, a drug which speeds gastric emptying. We analyzed the Fast Fourier Transform (FFT) spectra and compared the signal among the fasting and medicated conditions. The median of the area under the curve of the frequency range in the region between 2 to 8 cpm decreased from the fasting to the medicated state. The use of the relative area under

the curve yielded results consistent with other gastric motility evaluation techniques. Thus, it appears that this technique can accurately assess gastric motility rates, but more studies are needed to verify this trend. Because of its comparative cost-effectiveness, I hope that short term bio-electrical impedance will make gastric motility assessment possible in underprivileged areas.

Memory-Enhancing Effects of Amygdala Isoproterenol on Fear Conditioning

*Ellen Caparosa, Neural Science**

Sponsor: Dr. Joseph LeDoux, Neural Science and Psychology

Recent work has demonstrated that the blockade of noradrenergic receptors in the lateral amygdala (LA), a region of the brain critical for fear learning, disrupts fear memory acquisition and reconsolidation. This experiment evaluates whether or not direct stimulation of beta-adrenergic receptors with isoproterenol, a beta-adrenergic agonist, can enhance the strength of fear conditioning under conditions that normally support only weak fear learning. In Pavlovian auditory fear conditioning, an aversive unconditioned stimulus (US; e.g. footshock) is paired with an initially neutral auditory conditioned stimulus (CS; e.g. a tone); this pairing endows the CS with the capacity to elicit conditioned fear responses. To test the effects of LA beta-adrenergic stimulation on fear conditioning, we exposed rats to a mild fear conditioning protocol and given pre-conditioning infusions of isoproterenol or vehicle. Results showed that pre-conditioning isoproterenol infusions enhanced fear memory acquisition. These results support the hypothesis that fear memory formation is enhanced under conditions of high levels of beta-adrenergic receptor stimulation in the amygdala. Evaluation of the ways in which abnormal noradrenergic function can cause overly strong or weak fear memories provides insight to the potential role of norepinephrine systems in anxiety disorders, with specific relevance to post-traumatic stress disorder.

Survey Design and Questionnaire Development

*Meghan Carey, Chemistry and Chemical Engineering**

Sponsor: Dr. Ralph Katz, NYU College of Dentistry

The goals of my research training were to acquire necessary skills in questionnaire design, survey development, and statistical analysis in order to effectively pursue future research. In addition to readings and tutorials with my faculty mentors, my training included skill building in the use of SPSS statistical analysis software, and completing the tutorial and certification exam as required by the University Committee on Activities Involving Human

Subjects. I am ultimately interested in expanding previous lines of inquiry established by my faculty mentors which focused on health disparities. Specifically, I will, in the future, explore a range of issues on the willingness of African-American adolescents to volunteer as research subjects in biomedical research studies and as participants in HIV screening tests. My preparatory readings focused on questionnaire methodology as well as on the exploration of influences on health decision making at the intersection of race and youth. Overall, my research training project requires my acquiring knowledge and related skills on key topics including, but not limited to: 1) understanding the legal requirements in approaching human subjects; 2) preserving human welfare; 3) assessing the most effective methodological approach by which to achieve sufficient response from the targeted participant pool; and, 4) designing and developing questionnaires.

Regulation of Lozenge Expression in the *Drosophila melanogaster* Genital Disc

*Moinuddin Chowdhury, Biology**

Sponsor: Dr. Mark L. Siegal, Biology

To identify differentially expressed genes driving development of sexually dimorphic genitalia in *Drosophila*, our lab carried out microarray screens on genital imaginal discs. This disc develops into the internal and external genital structures of the adult fly. The microarray results showed that *lozenge*, which encodes a transcription factor, is a highly expressed gene throughout development of the female genital disc. Male discs show no corresponding expression. *Lozenge* has various functions, including roles in eye development and blood crystal cell formation. *Lozenge* is also required for the development of spermathecae and parovaria, female internal genital organs involved with sperm storage and viability.

I hypothesize that the female-specific expression of *lozenge* (*lz*) is subject to regulation by the sex-determination pathway, as well as by position-specifying morphogenetic pathways. I have carried out genetic crosses to generate homozygous loss-of-function mutations for *doublesex* (*dsx*), which is the master regulator gene for sexual dimorphism, and the genes that encode the morphogens Wingless (*wg*) and Decapentaplegic (*dpp*). I have used a membrane-bound Green Fluorescent Protein (GFP) driven by a *lz-GAL4* enhancer trap to visualize *lz* expression in genital imaginal discs of these mutants and of wild-type controls. My preliminary results suggest that *dsx* and *wg* are required for *lz* expression, while the *lz* expression region expands without *dpp*. As the membrane-bound GFP gives weak and variable expression, crosses are currently underway to repeat the experiments using a more robust Red Fluorescent Protein reporter.

Using Object Category Recognition Technology to Sort Garbage for Recycling

*Melanie Clements, Computer Science**

Sponsor: Mr. Rob Fergus, Computer Science

In New York City, prodigious quantities of recyclable materials are discarded due to human laziness. The goal of our project is to create a garbage bin that can automatically separate mixed streams of trash into four categories (paper, cans, bottles, or general trash) using object recognition techniques. This is a simpler version of the general object recognition problem, since the background and lighting can be controlled. I used a prototype bin, deployed in various areas around campus, to collect large amounts of data with which to learn robust models for each category. I tested a number of different representations of the image data and found the SIFT descriptors to be the most robust. SIFT descriptors are a numerical representation of an image which take high variance portions of the image (for example a logo or text) and represent them as a set of high-dimensional vectors. I then experimented with different techniques from computer vision and machine learning to identify objects as belonging to one of the four classes, starting with a simple Nearest Neighbor approach and moving on to more complex classifiers such as Naïve Bayes and Support Vector Machine. The Nearest Neighbor approach simply counts the number of descriptors two images have in common, while the Naïve Bayes and Support Vector Machine methods use a set of training data to build descriptions of each class against which the test data is matched. My most recent results show the Support Vector Machine classifier to be the most effective, with over 80% recall at full precision for some data sets.

Reward Contingencies in Neuronal Coordination

*Margaret Fabiszak, Neural Science**

Sponsor: Dr. Bijan Pesaran, Neural Science

By examining neuronal activity, specifically in the lateral intraparietal area (LIP) and the parietal reach region (PRR) of the brain, we are exploring the coordination circuits which underlie behavior and decision making. Although these two systems have been studied independently, with particular emphasis on the LIP, the relationship between the two is still uncertain. It is known that the LIP guides saccades—which are fast movements of the eyes—and that the PRR primarily controls reaching movements of the limbs, but it still remains to be seen whether the two areas work together or separately to coordinate eye-hand movements through a feedback or integration system. In order to best understand the relationship between the two areas, it is also necessary to

know how decisions are made for saccades and reaches, as well as how this information is encoded in the brain. To study these particular aspects, though, it is necessary to train the subject to dissociate his reaches and saccades. Because, however, training induces changes in synaptic connectivity, I must first study the effects of training.

To do this, the mode I chose to track the neuronal circuit between LIP and PRR was to measure reaction time (RT) correlation of paired eye and hand movements. A high correlation would indicate that the two areas of the brain work together. I expected that in training the subject to dissociate his eye and hand movements, the RT correlation would correspondingly decrease throughout the learning process and would only return to a baseline of high correlation once the task was acquired. This would indicate that the neuronal pathways did present measurable change, but that, after task acquisition, there would be no lasting effect on how the two systems worked together. Yet, after 42 behavior sessions (in which I measured the RT correlation over a constant series of 200 trials), there was no significant change in RT correlation. This suggests that the training necessary to test a subject does not dissociate the neural circuits guiding coordinated eye-hand behavior.

The Role of Calmodulin in the Barbiturate Modulation of Neuronal Voltage Dependent Ca²⁺ Channels

*Anthony Fidaleo, Italian**

Sponsor: Dr. Kevin Gingrich, NYU Langone Medical Center

My research training experience (supported by a Freshman and Sophomore Training Grant, or FAST) centered on techniques utilized in the investigation of the pharmacological mechanisms governing the modulation of voltage-triggered calcium channels. My lab group was exploring the inhibition of neuronal voltage-triggered channels by the barbiturate pentobarbital and, more specifically, the role of the calcium binding protein calmodulin (CaM). Barbiturates are clinically beneficial in depressing the central nervous system (CNS) in the delivery of anesthesia and the treatment of epilepsy. Clarification of the overall barbiturate molecular pharmacology will aid in rational drug design and the synthesis of safer and more effective anticonvulsants and anesthetic agents. Research techniques that I learned during this experience included maintaining cells in culture, expression of functional ion channels in cultured cells, and mathematical techniques that provide for the detailed analysis of ion channel activity. In addition to learning these techniques, I created a multi-state mathematical model of a voltage-triggered

calcium channel that was used to evaluate the effects of barbiturates and other pharmaceuticals on channel opening and closing. We used sterile cell culture techniques to maintain cell lines for testing at various growth stages, and a process of transfection to induce cultured cells to synthesize ion channel proteins and functionally insert them into cell membranes; this allowed for the study of their electrical properties using the whole-cell patch clamp. The whole-cell patch clamp technique is currently being used to test the effects of pentobarbital on channel assemblies with and without CaM through the use of mutant channel proteins. This was performed in wild type channels and those containing CaM mutants with disabled calcium binding sites, which allows the testing of the CaM involvement in channel behavior. Anticipated results are expected to critically implicate CaM in the barbiturate pentobarbital modulation of P/Q channels, which are a type of calcium channel densely localized in nerve terminals.

Autofluorescence Findings in Bardet-Biedl Syndrome, An Inherited Ocular Disorder

*Jason Flamendorf, Chemistry**

Sponsor: Dr. Howard Fine, New York Presbyterian

Bardet-Biedl Syndrome (BBS) is an autosomal recessive disorder characterized by malfunction of the cilia within somatic cells. Retinal photoreceptors (rods and cones) have cilia that connect inner and outer segments. The defect in BBS leads to a severe retinal degeneration. Fundus autofluorescence (FAF) imaging is a recently developed technique that maps the distribution of fluorophores, primarily lipofuscin, in the retinal pigment epithelium-photoreceptor complex. An accumulation of lipofuscin is indicative of a degenerative ocular pathology.

Through my research, I sought to provide the first characterizations of FAF images for BBS patients and investigate the use of FAF to discern between BBS and other retinal degenerative disorders, such as retinitis pigmentosa. I reviewed the clinical histories and FAF images of four patients diagnosed with BBS. These FAF images disclosed a subtle speckling of the macula and a surrounding hyperautofluorescent ring. Three of the four patients also displayed a bullseye pattern of hyper- and hypo-autofluorescence extending circumferentially from the fovea. Additionally, hypoautofluorescence is observed predominantly in the peripheral retina nasal to the optic disc. Early macular and preferential nasal involvement in BBS, as imaged with FAF, may help ophthalmologists discern between BBS and other retinal degenerations. Finally, in one patient, follow-up FAF imaging over a period of one year appeared to demonstrate progression of the mid-peripheral mottling, which may correlate with disease progression.

Molecular Phylogeny of New World Monkeys

*Raisa Glabman, Anthropology**

Sponsor: Dr. Todd Disotell, Anthropology

Theories of platyrrhine (New World monkey) evolution have long been a source of contention. Interpretations of fossil data acquired from South American Miocene sites (ca. 20 Mya) estimate a late divergence from the most recent common ancestor (MRCA), closely relating it to extant forms, yet this interpretation is unsupported by any other evidence. Conflicting hypotheses have previously remained unresolved, yet advances in molecular techniques have now allowed the testing of these theories. By isolating mitochondrial DNA (mtDNA) from each taxa and sequencing each genome, comparison is possible to determine chronological radiations from the MRCA. Using these tools, my investigation focused on the pithecid taxa, comprised of three subgroups—genuses *Pithecia*, *Chiropotes*, and *Cacajao* (saki and uakari monkeys). By sequencing and examining the mtDNA of each of these species, a more precise model of platyrrhine evolution is inferred and the ambiguity resolved.

A Search for Rhodopsin Genes in *Niphargus ictus*

*Minda Gowarty, Biochemistry**

Sponsor: Dr. Richard Borowsky, Biology

Niphargus ictus, a cave amphipod, is endemic to the Frasassi Cave system in the Marches, Italy. In May of 2008, while conducting research in the Frasassi Caves, I noticed that, although they lack eyes, the amphipods reacted to my flashlight. Because no light can enter the pools where these animals live, such a reaction is unexpected. Opsins are responsible for the first step of photodetection in both vertebrates and invertebrates, and vary according to cell type and photoreceptor function. My research aims to determine if this species possesses genes that encode rhodopsin, a protein involved in light detection. I isolated a partial opsin gene from genomic *N. ictus* DNA by Polymerase Chain Reaction (PCR), using a sequence of degenerate and specific primers. This is the first step toward understanding the light reaction in *N. ictus* and is an additional data point that can be used for better characterization of the evolution of photoreceptor cells.

The Extensile Surgical Approach for the Resection of Large Tumors of the Axilla and Brachial Plexus

Brett Hayden, Psychology

Sponsor: Dr. James C. Wittig, Mount Sinai Medical Center

A utilitarian shoulder girdle incision has been described for resecting tumors around the shoulder girdle, including axillary tumors. The incision allows for safe extensile exposure of the brachial plexus and axillary blood vessels required for safe and reliable resection. This video demonstrates a large Schwannoma of the brachial plexus that was resected with this approach. The key to the procedure involves releasing the pectoralis major muscle from its humeral insertion and the strap muscles from their coracoid origins. A meticulous repair of these muscles is performed at the conclusion of the procedure. Patients return to normal function. This procedure can be adopted for treating any large tumor arising in the axilla, including sarcomas and metastases.

Construal Level Theory and Change

Alexander Hogan, Psychology and Economics

Sponsor: Dr. Yaacov Trope, Psychology

Construal Level Theory (CLT) posits that one's psychological distance from an entity will affect how one construes that entity. Specifically, distant entities are construed in general and global terms, while proximal entities are construed in specific and local terms. CLT has explained many social phenomena, but it has not been applied to the perception of change, which is the goal of my research. The experiment consisted of a mental rotation task that changed in difficulty throughout the task. This change in difficulty occurred at both a broad, global level and a narrow, local level. I manipulated participants' psychological distance from the experiment, thereby creating both a distant and a proximal group. CLT predicts that global change will be more salient to distant participants, and local change will be more salient to proximal participants. My initial results do not support this prediction. I did find an unhypothesized relationship that is consistent with CLT. When participants reported their perception of overall change, distant participants relied on their perception of global change to make this judgment. Although my main hypotheses were unsupported, this is likely because the changing difficulty was not noticeable enough to be accurately perceived. Possible follow-up studies may circumvent this problem.

Computational Analysis of Higher Order Junctions

*Abdul Qadeer Iqbal, Biochemistry**

Sponsor: Dr. Tamar Schlick, Chemistry, Mathematics, and Computer Science

DNA, RNA, and proteins have long been associated in a well-defined linear process. Interestingly, with recent findings, the RNA molecule has made a breakthrough from its conventional reputation of the "middleman" and worked its way to serve a broad range of functions in the cell. Even this highly complex structure is composed of basic secondary structural elements such as helices, hairpins, internal loops, and junctions which bind together via tertiary interactions into compact and functional three-dimensional structures. To fully comprehend the intricate architecture of three-dimensional RNAs, I analyze currently solved 3D RNA junctions with a broad degree of branching in terms of base-pair interactions and 3D configurations.

The Schlick group performed a comprehensive search of *k*-junctions ($3 \leq k \leq 10$) in the set of 553 high-resolution RNA structures, using the program FR3D. Each secondary structure was associated with a three-dimensional structure based on a match of its canonical Watson-Crick (WC) base pairs and the single stranded regions. Next, our search was set to find *k* distinct strands connecting in a cyclical way by at least two consecutive canonical WC base pairs; we found 42 crystal structures each containing at least one junction. I then employed visual programs such as Pymol (DeLano Scientific LLC) and Swiss PDB viewer to clear the analysis. We analyzed the junction data from different perspectives: sequence signatures, length of loop regions, 3D motifs, and the 3D organization of their helices. We analyzed orientation aspects—such as coaxial stacking, helices that form perpendicular inter-helical angles, and helices aligning their axes in parallel without the use of stacking forces—on the basis of inspection.

By accumulating recurrent structural motifs in RNA structures, which appear in the same or different molecules and have the exact or very similar conformations, I was able to find helical configurations occurring across all junctions regardless of their degree of branching. We conclude that nature has a finite and limited collection of RNA helical conformation preferences, where higher order junctions can be decomposed into smaller "sub-junctions" and knowledge from these more common junctions can be used to ultimately interpret RNA function.

Computational Generation and Screening of RNA Motifs in Large RNA Pools

*Joseph Izzo, Chemistry**

Sponsor: Dr. Tamar Schlick, Chemistry, Mathematics, and Computer Science

My work involves the modeling and computational design of biologically active small RNAs. Motivated by experimental technology, our research group aims to help discover and design RNAs *in silico*. RNA *in vitro* selection is an iterative experimental procedure to isolate desired novel RNA structures, termed motifs. First, a large volume of sequences (10^{15}) is generated; second, the sequences are run through a selection measure, such as column chromatography. Targets that strongly bind to the column are retained and amplified using polymerase chain reaction (PCR) for subsequent rounds. This procedure often requires months of labor in order to produce desired results. Therefore, a computational approach could be useful in advancing the field of *in vitro* selection.

We are developing a suite of programs for mimicking aspects of selection experiments. The parallelization and analysis work I have done has greatly increased the scope of biological systems that we were able to study. Our approach combines target pool generation, a motif-scanning software package, secondary structure matching algorithms, and flanking sequence analysis to simulate the generation of very large pools of sequences (up to 10^{14} sequences) and to screen potential candidates for compatible structure to the target motif. Tests indicate a close agreement between computational and theoretical yields for simple motifs. For complex motifs, we obtain more candidates than reported experimentally, but that is expected given the absence of 3D structure information. Further screening and 3D modeling will help fill the gap.

Our suite of programs is available on our web server (<http://rubin2.biomath.nyu.edu/>), and we invite theoreticians and experimentalists to explore its usage in the design of novel RNA motifs.

Understanding the Role of the Methyl/Phosphate Switch in Heterochromatin Protein Complexes

*Jonathan Lai, Chemistry**

Sponsor: Dr. Yingkai Zhang, Chemistry

The binding of the chromodomain of Heterochromatin Protein 1 (HP1) with the Nterminal peptide of histone protein H3 plays a crucial role in epigenetic expression. Regulation of this binding is controlled by a methyl/phosphate switch located on the lysine 9 and serine 10 of the Nterminal peptide. I investigated the conformational and energetic changes of the peptide caused by lysine methylation and serine phosphorylation of the histone

H3 N-terminal tail by molecular dynamics (MD) and thermodynamic integration (TI) simulations. I performed multiple independent 50-nsec MD simulations of fully solvated HP1-H3 histone protein complex from various initial conditions to a well-sampled ensemble of trajectories. I phosphorylated the histone protein complex *in situ* and studied the effect of the phosphorylation on the structural and dynamic properties. My results suggest that the methylated and jointly methylated/phosphorylated H3-Nterminal peptides have similar backbone conformations; however, the jointly methylated/phosphorylated H3-Nterminal peptides had additional salt-bridges that were not present in the methylated/unphosphorylated peptides. TI simulations of the protein-histone complex suggest that the unbinding of the HP1 protein is caused primarily by a change in solvation energy and that the dianionic form of the phosphoserine causes the dissociation.

Synthesis and Photophysics of 1,2,3-Triazole-Linked Porphyrin- [60] Fullerene Dyads

*Olivia Lee, Chemistry**

Sponsor: Dr. David I. Schuster, Chemistry

Artificial photosynthetic systems are currently being developed to harvest solar energy and convert it to electrical energy. In these systems, photoinduced electron transfer is the key to the energy conversion. The Schuster group is particularly interested in studying the electron transfer dynamics in organic macromolecules involving porphyrin-fullerene C_{60} hybrids. Upon photoexcitation at wavelengths ranging from 400 nm to 600 nm, the porphyrin moiety donates an electron to the C_{60} moiety. Since the linker connecting the porphyrin and C_{60} moieties plays an important role in the electron transfer dynamics in these systems, we decided to investigate the effect of 1,2,3-triazole on the charge separation and recombination dynamics. The 1,2,3-triazole ring can be synthesized at high yields by reacting a terminal alkyne and azide through Huisgen 1,3-dipolar cycloaddition, a typical example of so-called "click chemistry," under microwave-assisted conditions. I incorporated this method in the synthesis of the porphyrin-triazole-benzaldehyde, which is then reacted with sarcosine and fullerene C_{60} in the subsequent Prato reaction to form the dyad. Measurements from time-resolved absorption characterization indicate that these dyads have charge-separated state lifetimes on the order of nanoseconds, indicating that photoinduced electron transfer occurs in our systems. The longest charge-separated state lifetime, 869 ns, was measured in tetrahydrofuran. Furthermore, the rates of charge separation in these systems, on the order of 10^9 s⁻¹, suggest that electron transfer process in this system occurs through the space between the two

chromophores rather than through the linker. We will attempt crystallization of the dyads in the future to obtain the crystal structures of the dyad through X-ray crystallography. Moreover, although photophysical characterization indicates that electron transfer can occur in the presence of the triazole linker, the Schuster group will continue to modify and optimize the current systems to prolong the charge separated state lifetimes.

Effects of MK-801 and Diazepam on Neurogenesis in an Experimental Model of Chronic Chemical Exposure

Wing Sze Leung, Biology

Sponsor: Dr. Daniel G. Herrera, New York Presbyterian

Neurogenesis is the proliferation, migration, and differentiation of primordial central nervous system (CNS) stem cells into neurons. Previous studies indicate that chronic alcohol administration impairs adult neurogenesis and is accompanied by cognitive deficits. The mechanism of this effect is unknown but may relate to alcohol's pharmacological properties as an antagonist of N-methyl-D-aspartic acid (NMDA) receptors and an agonist of Gamma-Aminobutyric acid (GABA_A) receptors. NMDA receptor antagonists are chemicals that inhibit the effects of the neurotransmitter glutamate on NMDA receptors, while GABA_A receptor agonists are chemicals that mimic the effects of the neurotransmitter GABA on GABA_A receptors. The objective of this study was to investigate whether alcohol's effect on adult neurogenesis relates to its properties as an NMDA receptor antagonist and/or a GABA_A receptor agonist, and whether these substances separately can affect neurogenesis. I treated adult mice with either MK-801 (NMDA receptor antagonist) or diazepam (GABA_A receptor agonist) for a total of 7 days. I injected the mice either on day 1 (1st week) or day 8 (2nd week) following 5-Bromo-2-deoxyuridine (BrdU) injection. I perfused all of the mice on day 15. The results showed that there was no significant change in neurogenesis in the dentate gyrus when I administered treatment in the first week. However, we observed a significant impairment in neurogenesis when I gave the treatment in the second week. These findings suggest that alcohol's effect on adult neurogenesis may relate to its properties both as an NMDA receptor antagonist and a GABA_A receptor agonist.

Anxiety: Its Role, Impact and Prevalence in Tourette's Disorder

Bryan Lieber, Psychology

Sponsor: Dr. Barbara Coffey, NYU Child Study Center

Tourette's Disorder (TD) is a childhood onset neuropsychiatric disorder characterized by multiple tics, which are recurrent, non-rhythmic motor movements, and vocalizations. Previous research has established that Obsessive Compulsive Disorder (OCD) is disproportionately represented among TD patients. The prevalence and impact of non-OCD anxiety disorders in TD patients is not known. My research investigates the following: the prevalence of comorbid non-OCD anxiety disorders in patients with tic disorders, the relationship between non-OCD anxiety disorders and tic severity, the age of onset of each disorder, and the impact of each disorder on life functioning. I used a retrospective, cross-sectional design in this exploratory study. My results demonstrate that clinically referred tic disorder patients exhibit higher than population rates of Separation Anxiety Disorder, Generalized Anxiety Disorder, and OCD. Preliminary analysis suggests that anxiety disorders do not predict TD severity. In this sample, tic disorders and anxiety disorders had similar ages of onset; and anxiety severity was more significantly associated with impairment in overall life functioning than was tic severity. Clinicians should give considerable attention to treating anxiety in tic patients, as it is likely to significantly improve the overall quality of patient life.

Monofunctionalization of Dendrimers

*Rachelle Lodestar, Chemistry**

Sponsor: Dr. Marcus Weck, Chemistry

Dendrimers are three-dimensional, highly branched molecules that have unique features, making them the highlight of study among many researchers in both biological and chemical laboratories. Higher generation dendrimers have a favored globular shape and vacant internal core, which allows them to encapsulate molecules. These macromolecules can potentially be used in drug delivery where therapeutic agents can be sequestered in the hydrophobic core. The branches of dendrimers can be hydrophilic, which makes the resulting material water-soluble. In my project, I synthesized dendrimers through repetitive chemical reactions, causing them to grow geometrically in size with each new synthesis adding groups of branches. The goal of this project is to successfully synthesize a desired dendrimer and attach a fluorescent dye onto the surface of the dendrimer. Manipulation of the dendrimer periphery surface through successive reactions will allow for the selective attachment of the dye. The dye synthesized has a selected functionality that

is required for the specific attachment to the dendrimer via “click chemistry”. This dye will act as a fluorescent probe allowing the dendrimer to be monitored within cells. A near-infrared dye with excellent solubility was synthesized for its ideal emission capabilities in the bloodstream, soft tissues, and cells.

Population Genetics of the Economically Important Palm *C. tepejilote* and Its Taxonomic Relationship to the Endangered *C. alternans*

*Helen Ma, Self-Designed Major**

Sponsors: Dr. Rob DeSalle and Dr. Angelica Cibrian Jaramillo, Sackler Institute for Comparative Genomics

The genetic variation of natural populations can be critical for species evolution and long-term survival. Habitat deforestation and unregulated harvest practices can lead to rapid genetic erosion in plant species that are collected from the wild, such as palms. Palms are one of the most economically and ecologically important groups of non-timber forest products in tropical rainforests, often collected from the wild, and also one of the least studied in population genetics. In this research, we focused on *Chamaedorea*, the largest palm genus in the Americas with approximately 90 species, as well as the most widely traded ornamental palm genus worldwide. In this study, I am investigating the genetics of wild populations of the economically important palm *C. tepejilote*, commonly known as “pacaya.” I used molecular tools to characterize the genetic variation of its populations throughout its native distribution in tropical forests from Mexico to the north of Colombia. The main goals are to measure the genetic variation that exists in natural stands of this palm, and to clarify its taxonomy with respect to *C. alternans*, an endangered palm found only in Mexico that is often confused with *C. tepejilote*. My work first contributes to the existing genetic descriptions of wild palm populations, which will aid in their conservation and management. I compared the *C. tepejilote* with the *C. alternans* in Los Tuxtlas, Mexico, to delimit its range in an area that has been controversial for harvesting due to the fact that *C. alternans* is endangered. We optimized a set of microsatellite markers from a related species for *C. tepejilote*, making them available for the scientific community. I analyzed these microsatellites for basic levels of variation in Los Tuxtlas, and estimated how many populations exist there, based solely on individual’s genetic background. The results show that *C. tepejilote* and *C. alternans* are distinct species, which clarifies previous contentious assumptions that there is only *C. tepejilote* in Los Tuxtlas. There are three genetic groups in Los Tuxtlas, one is *C. alternans* and two are *C. tepejilote* in two distinct regions within Los Tuxtlas. This suggests that the variation among *C. tepejilote* individuals in its range is also

significant. The data also shows that both *Chamaedorea* palms have high allelic variation but low levels of heterozygosity. I suggest that their genetic variation is probably a result of volcanic activity in the Los Tuxtlas region, which has created local genetic bottlenecks. Their reproduction, among few genetically varied individuals, is also contributing to the patterns we observed. Overharvesting locally could worsen this, which is why I recommend that only a few individuals are collected from each harvesting site, significantly curtailing current harvesting practices for these palms. I also highlight the importance of conserving *C. alternans*, as it is indeed a unique species only found in Los Tuxtlas. We have expanded to other areas in the range of *C. tepejilote*, which will contribute to the understanding of the evolutionary history of this palm group.

Detection and Removal of Anomalies in Astronomical Images Using Hough Transform and Robust Estimation

*Patrick P Maffucci, Physics**

Sponsor: Dr. David W Hogg, Physics

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

The Birth of pTailgate

Grayson Maldonado, Biology

Sponsor: Dr. David Fitch, Biology

Understanding the molecular mechanisms that control morphogenesis is a major goal of developmental genetics. As a model to uncover the genes and mechanisms governing this process, we studied the male tail tip of *Caenorhabditis elegans*. *C.elegans* males undergo a sex-specific morphogenesis of the four most posterior cells (hyp 8-11) during their last larval stage, L4. Cells hyp 8-11 fuse together and retract from the overlying cuticle, resulting in a rounded tail tip in adults. I used RNA interference to systematically knock down genes on chromosome IV as a part of an ongoing genome-wide screen. A number of genes cause larval arrest/lethality. To study the effect of these genes in tail morphogenesis without causing lethality, I am developing a method to execute tail tip-specific RNAi knock-down of genes. This project requires two tools: (1) a vector that will express, only in the tail tip cells, a hairpin version (producing dsRNA) of any desired gene and (2) a *C. elegans* strain which produces a high frequency of males and is hypersensitive to RNAi but does not allow dsRNA to leak out of the tail tip once expressed there. To engineer the tail tip-specific vector, the lin-44 enhancer and promoter region is inserted into a Gateway vector. To make the strain, the gene *him-5*; *rff-3* (which is RNAi-hypersensitive and has a high frequency of males) is crossed to another gene, *rff-3*; *sid-1* (which disallows intercellular transport of dsRNA). The resulting strain will be hypersensitive to the effects of RNAi but maintain those effects in their respective cells. Together, these tools will make it possible to see the effects of RNAi specifically in the tail-tip without affecting the vitality of the organism.

Regulation of Female-Expressed Serine Protease Genes in *Drosophila melanogaster*

*Wilfredo Matias, Biology**

Sponsor: Dr. Mark L. Siegal, Biology

Serine protease genes (SP's) comprise the second largest gene family in *Drosophila melanogaster* and perform a variety of functions, ranging from digestion to immunity. Previous studies have predicted that SP's are involved in a poorly understood aspect of fly reproduction termed the female mating response that drastically alters the physiology and behavior of the fly. In an effort to elucidate the underlying regulatory mechanisms that govern the expression of SP's in the female reproductive tract, we have identified seven SP's that are specifically expressed in the female. Here, I identify the location of the DNA sequences that regulate the expression of these

genes. My results show that the DNA regions immediately upstream of the serine protease genes CG17012, CG18125, CG17234, CG17239, CG17240, CG9897, and CG32834 are sufficient to drive gene expression. Furthermore, gene expression is limited to the spermathecae, the fly's long-term sperm storage organs, suggesting the direct involvement of these genes in the reproductive processes of the fly. My findings lay the groundwork for understanding the regulatory architecture of a set of genes involved in a physiological and behavioral response common to flies, pests, and disease vectors relevant to human health and agriculture.

RNAi Screen Reveals Genes Essential for Circadian Rhythms in *Drosophila*

*Deborah McLaughlin, Biology**

Sponsor: Dr. Justin Blau, Biology

Endogenous molecular clocks drive circadian rhythms of behavior and physiology in many organisms. In *Drosophila*, circadian rhythms require the rhythmic oscillation of clock genes in constant darkness, particularly in a specialized group of pacemaker neurons named the ventral lateral neurons (LNvs). GeneChip analysis of LNvs revealed genes whose expression is enriched in these cells compared to other neurons in the fly brain. I conducted an RNA interference (RNAi) screen of ~100 genes enriched in LNvs to identify novel genes required for regulating circadian behavior. Here I show evidence that circadian rhythms require Lk6 and Pdk1, kinases involved in translation initiation. I found that RNAi knockdown of Lk6 or Pdk1 in all clock cells results in either arrhythmicity or long periods (28hr), respectively. I also demonstrate that over-expressing Lk6 in all clock neurons causes flies to have a long period (26hr). These data suggest a layer of translational control in *Drosophila* clock neurons that is necessary for establishing circadian rhythms. Further characterization of genes required for circadian rhythms will provide a greater understanding of the molecular basis of circadian behavior.

Political Ideology and Persuasion: Systematic and Heuristic Processing among Liberals and Conservatives

*Andrea Miller, Psychology**

Sponsor: Dr. John Jost, Psychology

Two studies explored the relationship between political orientation and the systematic and heuristic processing of persuasive messages. In Experiment 1, liberals, but not conservatives, differentiated between strong and weak arguments in their evaluations of argument quality, indicating the use of systematic processing. In Experiment 2, more

attitude change was observed among liberals in response to strong messages than weak messages, again suggesting the use of systematic processing in liberals. I observed no differences in attitude change among conservatives in response to strong versus weak messages. I did observe attitude shift among conservatives, however, in the presence of a source similarity cue, which indicates the use of heuristic processing. These results suggest that the divergent psychological motivations of liberals and conservatives lead them to process information in distinct ways and to be susceptible to different types of persuasive strategies.

RNAi-Mediated Gene Silencing of COX-2 and Cyclin D1 to Understand the Specific Effect on Cervical Cancer Growth

Rajkishen Narayanan, Biology

Sponsor: Dr. Bhagavathi A. Narayanan, NYU Medical Center

Cyclooxygenase (COX)-2 is a key enzyme involved in inflammation, which is inhibited by drugs such as aspirin or ibuprofen. COX-2 has been found to alter several cellular responses involved in cell cycle regulation, making it crucial in the development of cancer in humans. Working specifically with cervical cancer cells, I made COX-2 the focus of an effort to trace the downstream steps leading to carcinogenesis. Cervical cancer is caused by the Human papillomavirus (HPV), which inactivates the tumor suppressor genes p53 and Rb and leaves the cells prone to unregulated cell division and finally tumor formation. Even with this knowledge, we are still lacking vital information about key molecular events in cancer growth that occur after HPV infection. My research explored this aspect of carcinogenesis in more detail. The results of my study suggest a novel molecular mechanism for cervical cancer proliferation, where COX-2 interacts with the cell cycle regulatory protein, cyclin D1. To determine this COX-2/cyclin D1 interaction, we utilized the approach of siRNA mediated gene silencing in combination with cell culture studies. These gene knockdown assays allowed us to understand a unique association between two major oncogenes, COX-2 and cyclin D1, in cervical cancer.

A New Phylogenetic Analysis of Order Notoungulata Using Postcranial Anatomy

Alexandra Neinast, Biology

Sponsor: Dr. Bruce Shockey, American Museum of Natural History

Notoungulates are an extinct order of South American ungulates united primarily by their ear and dental characteristics. My project focused on documenting

discrete postcranial traits to determine a new phylogenetic analysis independent from cranial characteristics.

I collected and coded fifty-eight postcranial traits of twenty-three species, which included six outgroups and seventeen Notoungulata. I took anatomical observations from articulated skeletons on exhibit, bones in the museum collections, and numerous scientific papers. I created a matrix of character scores that allowed phylogenetic relationships to be determined via MacClade and PAUP, which are computer programs that use morphological data to infer the most parsimonious phylogenetic relationships. My preliminary results show that the postcranial characteristics are generally consistent with traditional allocations of Notoungulate families. My mentors and I discovered, however, several unambiguous synapomorphies that indicate that the traditional classification does not apply to postcranial analyses, such as the inclusion of the Interatheriidae within the suborder Toxodontia instead of the suborder Typotheria. The supporting evidence suggests that this new phylogenetic analysis must be taken into consideration for the postcranial anatomy of order Notoungulata, and that there is potential value in ordering the phylogenetic relationships of Notoungulates based on or including postcranial traits.

Cytokines and Autophagy in the Innate Immune Response to *Campylobacter jejuni*

*Steven Ovardia, Chemistry**

Sponsor: Dr. Nicole Iovine, NYU Langone, Medical Center

In the United States, *Campylobacter jejuni* is one of the most common bacterial causes of food-borne gastroenteritis. Infection by *C. jejuni* typically resolves within a few days, implying that the innate immune response plays an important role in clearing the infection. The specific mechanisms of the response are not known, however. In order to investigate the innate immune response to *C. jejuni*, we studied the impacts of two innate immune mechanisms upon *C. jejuni* infection: the effects of human cytokines and cellular autophagy.

After infection by *C. jejuni*, Interleukin-1 α , Tumor Necrosis Factor- α , and Interferon- γ cytokine levels become elevated as part of the innate immune response. Through spectroscopic analysis, quantitative polymerase chain reaction, and gene chip analysis, we determined that the impacts of cytokines upon *C. jejuni* growth and virulence factor production were minimal.

In a separate project, we studied the effects of autophagy upon intracellular *C. jejuni*. Autophagy is a newly described innate immune mechanism, which has been implicated in the innate immune response to various microbes, including Group A *Streptococcus*. Through

in vitro infection of wild-type and autophagy-deficient murine embryonic fibroblasts, we have shown an approximately three-fold autophagy-mediated killing of two clinical isolates of *C. jejuni*.

Quantum Mechanical Study of Clathrate Hydrates

Anna Powers, Chemistry

Sponsor: Dr. Zlatko Bačić, Chemistry

Clathrates are compounds that form when water comes in contact with a methane molecule (CH_4) at low temperatures and high temperatures. Under these conditions, a network of hydrogen-bonded water molecules builds polyhedral cages around the guest molecules. The most common structure formed is Structure I, which is composed of two types of cages: the small dodecahedral cage, which is formed by 20 water molecules, and the large tetrakaidecahedral cage, formed by 24 water molecules. My interest in methane clathrates arises from their potential use as a major energy resource in the future.

I used a method called simulated annealing to find the energy minima and the position of the CH_4 . Additionally, I explored the quantum rotational and translational dynamics of the methane molecule in both cages. For this purpose, I used the DVR (Discrete Variable Representation) method to calculate the translational eigenfunctions and their energies. This method simplifies the solutions to the Hamiltonian operator because they are expressed as the amplitudes at a well-defined set of coordinate points. Consequently, the matrix of the potential $V(x)$ is diagonal in the DVR. This significantly reduces the computational time because there is no numerical integration; only the values of the potential at the DVR points are needed. To calculate the rotational energy levels, I used Wigner D-functions as a basis in the angular coordinates. By examining the energy level patterns, the root mean square deviations and the wavefunction probability plots, we have decided that our results for the small cage match the 3D Harmonic Oscillator and 2D Harmonic Oscillator Model for the medium cage. In both the small and the medium cages, there was a slight anharmonicity, which is due to the fact that the energy depends not only on principle quantum number, n , but also quite strongly on the angular momentum quantum number, l . Additionally, there was also evidence of crystal field splitting in both cages.

Effect of Visibility on Efficacy of Social Support

Lance Rappaport, Psychology

Sponsor: Dr. Patrick Shrout, Psychology

This study extends research on processes related to both costs and benefits of the support that loved ones provide each other. Here I examine the role of visibility on the impact of agentic support. I am randomly assigning approximately 160 New York University undergraduate students to four support conditions before giving a spontaneous speech, which is known to be stressful. The four conditions are: no support, only private support, only public support, and private plus public support. I hypothesize that the harmful effect of support on recipient's mood will be observed as increased negative mood (i.e. anxiety, sadness) for participants in the two public support conditions relative to the private support condition. Further, I hypothesize a moderating effect of self-competence such that participants low in competence will be more sensitive to the costs of public support. Preliminary analysis of approximately 30 students confirms that anxiety increased from the baseline when participants were given the speech task ($p < 0.001$). The self-competence scale developed for this study is highly internally reliable ($\alpha = 0.89$); as expected, participant competence correlates inversely with pre-speech anxiety ($r = -0.553$). Although there is not yet evidence of a difference between support conditions as they affect anxiety, there currently is not adequate statistical power to reliably detect a potentially large effect (partial $\eta^2 = 0.170$). I recently received a grant to extend this design to study approximately 30 intimate, cohabitating couples. I also plan to expand this in order to examine the effect of support behavior in other interpersonal relationships and across different recipient characteristics.

Costs and Benefits of Social Support on Adjustment to Stress

Lance Rappaport, Psychology

Sponsor: Dr. Patrick Shrout, Psychology

People employ a range of behaviors intended to help a loved one in distress. Recent investigations suggest, however, that there are both costs and benefits for support behaviors related to daily anxiety and depressed mood of the recipient (N. Bolger, A. Zuckerman, & R. C. Kessler, 2000). This study employed multilevel model regression analyses to assess the impact of support behaviors in the daily diary reports of 308 recent law school graduates, and their intimate partners, during the period when the graduates were preparing for the New York State bar examination. In addition to confirming previous results that daily support is associated with increased negative

mood, I hypothesized that examinees who feel unprepared will suffer more costs of daily support than persons who feel prepared. My analyses revealed partial confirmation of this hypothesis. Results confirmed the general costs of daily support indicated by a marginally significant positive regression weight for support receipt ($\beta = 0.091$) on the recipient's subsequent anxiety. This analysis, however, does not replicate the negative association between unnoticed support provision and recipient anxiety which had previously been reported in the literature. In the current analysis the effect was significant and positive ($\beta = 0.085$). The hypothesized interaction between support provision and the recipient's sense of preparedness was not demonstrated in the current data set; in fact, this association became negligible once a between-person measure of average support receipt was included in the model. The results indicate the need for future investigations to develop guidelines for skilled support provision that minimize these evident potential costs of social support.

Rare Earth: Possibilities of Complex Life Elsewhere in the Universe

Steven Rasovsky, Environmental Studies

Sponsor: Dr. Steven Soter, Environmental Studies

Looking at the seemingly endless night sky, it seems almost absurd to think we are entirely alone as a complex life form capable of interstellar communication. I examined the feasible possibilities of complex life elsewhere in the universe by first looking at the factors alleged to make the Earth unique as a habitat conducive for complex life to arise. This claim is highlighted in Peter Ward and Donald Brownlee's *Rare Earth Hypothesis*, which concentrates on how an extraordinarily improbable sequence of events in Earth's history resulted in its hospitable habitat. I followed this exploration with a critical analysis that presented various viewpoints, including: the role of chaos in planetary formation, the magnitude of biological advantage of a moon, the implications of a habitable zone, the mathematical logic of the Drake Equation, and the possibilities of Jupiter as a "sniper" rather than a shielding body. My conclusion favors the existence of other advanced life forms in the galaxy or universe. In concluding so, it becomes necessary for further study to delve into the Fermi Paradox and attempt to piece together further astrobiological evidence to understand why there is currently no concrete evidence of extraterrestrial contact or of any extraterrestrial artifacts on Earth or in space.

Rapid Multistep Synthesis of a Bioactive Peptidomimetic Oligomer for the Undergraduate Lab

*Abhinav Rohatgi, Chemistry**

Sponsor: Dr. Kent Kirshenbaum, Chemistry

N-substituted glycine oligomers, known as peptoids, are synthetic compounds that recapitulate many of the attributes of natural polypeptides. Peptoids are generated by an efficient multistep synthesis that is accessible to organic chemistry undergraduates. We present a solid-support-based protocol that allows for the rapid multistep synthesis of a bioactive peptoid oligomer. We synthesized a peptoid trimer by incorporating one tetrahydrofurfuryl and two diphenylpropyl side chains. Mas Moruno *et al.* have shown that the tripeptoid exhibits antiproliferative activity. Peptoids are synthesized through a two-step submonomer addition cycle which involves an acylation of a resin-bound amine by a haloacetic acid, followed by a nucleophilic displacement of the halogen by a primary amine. The peptoid trimer was synthesized by three iterations of the two step cycle for a total of six bond forming reactions. In order to meet the time constraints of an instructional lab period, I reduced the synthesis time of each monomer cycle from forty minutes to seven minutes. The module includes analysis by a Chloranil colorometric assay and Thin Layer Chromatography. The multistep synthesis protocol was successfully tested in an NYU undergraduate organic chemistry laboratory and illustrates a "real-world" relationship between synthetic organic chemistry and the biomedical sciences.

Role of "Form" and "Motion" Pathways in Strabismic and Anisometropic Amblyopia

*Elena Ryapolova-Webb, Neural Science**

Sponsor: Dr. Lynne Kiorpes, Neural Science and Psychology

Amblyopia is a visual disorder characterized by a loss of acuity in one eye as a result of abnormal visual experience during development. There are several subtypes of amblyopia, which are defined by the type of visual abnormality present in infancy or early childhood. For example, anisometropic amblyopia results from a blur in one eye, while strabismic amblyopia results from a misalignment of the eyes. There are two primary divisions of the visual system, known as the "form" and "motion" pathways. Prior research has suggested that amblyopes have difficulty with both form and motion discrimination tasks, implicating these pathways in the disorder. My hypothesis is that the different subtypes of amblyopia differentially affect these two pathways, causing specific form or motion losses in each subtype. Using behavioral vision testing methods, I will test amblyopic non-human

primates on three tasks of figure-ground segregation: motion discrimination (engages motion pathway), contour integration (engages form pathway), and motion-defined form discrimination (engages both). I will test four subjects: two with anisometropic amblyopia and two with strabismic amblyopia. I expect anisometropic amblyopes to perform more poorly on motion-based tasks, and strabismic amblyopes to perform more poorly on primarily form-based tasks. At press time, my research is still ongoing.

Genetic Contributions to Fear Learning and Memory

*Rabia Salman, Psychology**

Sponsor: Dr. Elizabeth Phelps, Psychology

Both genes and environment are thought to influence emotional behavior. Current research suggests that the serotonin transporter (5-HTT) gene may play an important role in emotional learning. During aversive conditioning, one form of emotional learning, a previously neutral stimulus comes to elicit a fear response after it is repeatedly paired with an aversive stimulus. Extinction refers to the new learning that occurs when the stimulus is no longer reinforced, yielding reduced conditioned fear expression. A recent study in mice indicates that the 5-HTT gene may critically influence extinction retention, the ability to sustain extinction memory over an extended period of time. In our study, we investigated whether normal allelic variation in the 5-HTT gene influences extinction retention in humans. We utilized a two-day conditioning paradigm, probabilistically pairing visual stimuli with electric shock. Day one consisted of the acquisition and the initial extinction phase. Day two consisted of the extinction retention test phase, allowing us to determine whether participants were able to retain extinction learning from the first day. Results revealed that individuals carrying the short-allele variant of the 5-HTT gene showed significant deficits in extinction retention, suggesting that genetic variation amongst individuals influences fear memory.

Relating Dibenzo[a,l]pyrene Oligonucleotide Adduct Conformation to Nucleotide Excision Repair

Adam Schwaid, Biochemistry†*

Sponsor: Dr. Nicholas Geacintov, Chemistry

Dibenzo[a,l]pyrene (DB[a,l]P) is among the most powerful known carcinogens in animal model systems. It is a naturally occurring polycyclic aromatic carcinogen that, after metabolic activation, forms covalent adducts with exocyclic amino groups of purine bases in DNA. Damage to critical genes is believed to cause initiation of the complex, multi-step tumorigenesis phenomenon.

Nucleotide excision repair (NER) is an important cellular defense mechanism that removes these DNA lesions. The efficiency of repair of different DNA adducts varies greatly depending on the chemical structure of the carcinogen-DNA lesion. Interestingly, guanine adducts are excised by the human NER system, while analogous adenine adducts are resistant to repair. My research seeks to understand the molecular basis for differences in NER efficiencies in DNA repair.

To understand this, I compared the conformations of the DB[a,l]P-adenine (DBP-A) and DB[a,l]P-guanine (DBP-G) adducts in 11 mer oligonucleotide duplexes using biophysical techniques. The existence of NMR data for different DBP-G adducts provides insight into the conformations of the DNA lesions, allowing me to infer that DBP-A adducts have unusually stable intercalative conformations that stabilize DNA duplexes, in contrast to the destabilizing DBP-G lesions. These results provide novel insights into the structural basis of DNA lesions that are poor substrates for the NER system.

Validating Genes That Control Morphogenesis

*Khushbu Shah, Economics**

Sponsor: Dr. David Fitch, Biology

Morphogenesis is an important aspect of development where tissues rearrange to take on the form of adult organs and overall body anatomy. A major goal of developmental biology is to understand the molecular mechanisms that control morphogenesis. Specifically, I am interested in identifying the genes that control a specific aspect of morphogenesis, tail tip retraction, in a simple model organism, *Caenorhabditis elegans*. A comprehensive understanding of the genes that direct and control morphogenesis in simpler organisms will help establish a foundation for understanding how morphogenesis transpires in humans. *C. elegans* males undergo sex-specific morphogenesis of their tail tips during development. Prior to the last larval stage, L4, the four most posterior cells, hyp8-11, form a pointed tail tip. Morphogenesis occurs exclusively in males in which hyp8-11 fuse and retract away from the overlying cuticle, resulting in a rounded or "peloderan" (Pel) tail tip in the adult. Using an RNAi based approach, we previously identified a number of genes in multiple genetic pathways that are involved in male tail tip morphogenesis. My work exclusively dealt with the genes identified on chromosomes III, V, and X, of which we had identified 190 genes as positive candidates. I performed a secondary screen using an alternate strain of L1 larvae to ensure that any abnormalities were from the RNAi knockout, and not due to the chosen strain, and to confirm that these genes are indeed involved in tail tip morphogenesis.

In vivo, N-methyl-D-Aspartate Receptor Blockade in Drebrin A Knockout Mice*Lokesh Shah, Neural Science***Sponsor: Dr. Chiye Aoki, Neural Science and Biology*

I investigated the levels and distribution of the NR2A subunit of the NMDA receptor (NMDAR) in both the wild type (WT) and drebrin A knock-out (DAKO) mouse cortex following an NMDAR blockade. I used the electron microscope to count the presence of the NR2A subunits, which were immunolabeled by silver intensified gold particles. D-2-amino-5-phosphonovalerate (D-APV), the NMDA receptor antagonist, was applied to one hemisphere, while its inactive enantiomer, L-APV, served as the control in the opposite hemisphere. In similar experiments with wild type mice, a homeostatic upregulation of NR2A receptors is seen following D-APV blockade. The DAKO mice, however, did not show such a homeostatic increase of NR2A receptors following the blockade. This is support for drebrin A as a key player involved in homeostatic synaptic plasticity. Given drebrin's strong role in receptor trafficking, drebrin may also be strongly linked with learning and memory storage mechanisms at the cellular level.

Trypanosome Lytic Factor: Innate Immunity Against *Salmonella typhimurium**Jillian Shapiro, Chemistry**Sponsor: Dr. Jayne Raper, NYU Langone Medical Center*

African trypanosomes are eukaryotic parasites that invade a mammalian host resulting in trypanosomiasis, commonly referred to as African Sleeping Sickness. Humans are immune to one of the three trypanosome subspecies, *Trypanosoma brucei brucei*, due to the innate trypanosome lytic factor (TLF), which is comprised of apolipoprotein-I (apoL-I) and haptoglobin related protein (Hpr). TLF may also prove to be effective against bacteria such as *Salmonella typhimurium*, a gram negative bacteria that grows within acidic compartments in cells. When humans are infected with *Salmonella typhimurium*, the infection usually resolves itself without medical attention. By contrast, mice, which are devoid of TLF, cannot control the infection and it leads to bacteremia and death. I have determined the forty percent lethal dose of *Salmonella typhimurium* in the Swiss Webster mouse strain to be only 13 bacteria, concluding that these outbred mice are sensitive to the bacteria. I have also shown that when transgenic TLF mice are infected with the bacteria, their median survival is three days greater than mice without the lytic factor. Ultimately, by decreasing the presence of the TLF inhibitor haptoglobin (Hp), I hope to further

increase the lytic activity and thus decrease the burden of a *Salmonella typhimurium* infection.

Manipulating the Dynamics of Photoinduced Electron Transfer in Porphyrin-Fullerene Rotaxane Architectures*Robert Spencer, Chemistry***Sponsor: Dr. David Schuster, Chemistry*

Photoinduced electron transfer (PET) is a phenomenon that has various potential applications, including the harvesting and storage of solar energy, light-driven molecular machines and computing. Porphyrin-fullerene donor-acceptor (DA) systems have been of particular interest in exploring the dynamics of electron transfer, particularly owing to their straightforward synthetic construction. In this presentation, we report the synthesis of a novel rotaxane which, unlike a previously prepared analogue, has triethylene glycol linkers separating the porphyrin and [C₆₀]-fullerene. We reveal the effect that the distance between these moieties has on the dynamics of photoinduced electron transfer processes. Structural modifications that limit intramolecular donor-acceptor pi-stacking interactions have also been investigated.

Effects of AAV-Mediated XIAP Gene Therapy in a Mouse Model of Huntington's Disease*Maryam Sultan, Biology***Sponsor: Dr. Michael G. Kaplitt, Weill Cornell Medical Center*

Huntington's disease (HD) is an autosomal dominant neurodegenerative disorder characterized by the selective and progressive cell death of GABAergic medium spiny neurons (MSNs) in the neostriatum (caudate and putamen). Symptoms include characteristic movement disorder, cognitive dysfunction, and psychiatric disturbances, with onset between 35-50 years of age and death usually occurring 10-15 years after the onset of symptoms. HD is caused by a mutation encoding an abnormal expansion (>37) of trinucleotide (CAG/polyglutamine) repeats at the N-terminal of the Huntingtin (Htt) protein. Mutated Htt protein (mhtt) induces apoptotic cell death and mitochondrial dysfunction in the striatum. IAP (Inhibitor of apoptosis) proteins are intrinsic cellular regulators of apoptosis. XIAP (X-chromosome-linked inhibitor of apoptosis) is the most potent and versatile member of this family. This project seeks to characterize dXIAP's effects on YAC128 mice, which express the full-length human mhtt protein, in terms of effects on motor ability, body weight, striatal volume, striatal neuronal count, and whether or not it stops htt inclusions from forming within the striatum. I hypothesized that treatment with

dXIAP would cause each of these enumerated values to approach the wildtype level. I observed that motor ability, body weight, striatal volume, and striatal neuronal count in YAC128 mice all approached wildtype level after treatment with dXIAP. I continued to observe aggregation of Htt in YAC128 mice treated with dXIAP, though to a lesser extent than in those on which no surgery was performed and those that were injected with the control EGFP virus. The results of this project have implications for a novel gene therapy approach for treatment of human Huntington's disease.

Bariplastic Surgery: A Patient Questionnaire Study at the Cleveland Clinic Florida

Kimberly Swartz, Biology

Sponsor: Dr. Martin I. Newman, Cleveland Clinic

Recently there has been a significant increase in adult obesity. Bariatric Surgery is the only long-term treatment proven effective in alleviating obesity and its co-morbidities. Secondary to an increased number of patients undergoing massive weight loss after bariatric surgery, there has been an increased demand on plastic surgeons for body contouring procedures. This study aims to examine the prevalence of body contouring procedures following massive weight loss and the factors guiding a patient's choice to engage in plastic surgery. In September 2006, I mailed out questionnaires to all Bariatric Surgery patients at the Cleveland Clinic Florida from June 2001 to June 2006. This questionnaire regarded their participation in plastic surgery after having achieved massive weight loss. I received 179 eligible questionnaires for analysis. The returned questionnaires revealed that 45.3 percent (n=81) of patients who were >18 months post-Bariatric Surgery sought a plastic surgery consult. Furthermore, 58.0 percent (n=47) of those patients seeking a plastic surgery consult had plastic surgery, representing 26.3 percent of all returned questionnaires from those >18 months post-op. The only demographic factor that showed correlation to undergoing plastic surgery was insurance coverage. The motivation to undergo plastic surgery is likely rooted in personality traits that are not easily elicited through a survey.

Structure, Function, and Expression of a Stochastically Regulated Transcription Factor

*Shivani Thanawala, Biology**

Sponsor: Dr. Claude Desplan, Biology

Drosophila melanogaster have compound eyes composed of 800 ommatidia (unit eyes). The inner photoreceptors, R7 and R8, express specific light-detecting rhodopsin proteins that enable color vision. There are

two major ommatidial subtypes defined by the expression of Rhodopsin 3 or Rhodopsin 4 in R7. The PAS-bHLH transcription factor Spineless (Ss) is expressed in 70 percent of R7s and is necessary and sufficient for the expression of Rhodopsin 4 (Rh4) in a subset of R7s. In the absence of Ss, all R7s express Rh3. In order to identify which domains of the Ss protein are required to induce expression of Rh4, I created various Ss constructs that had deletions of particular domains or uncharacterized regions. I used the UAS/GAL4 system to ectopically express these altered Ss proteins in all R7s. As I expected, the N-terminal PAS domain and the bHLH domain are necessary for the expression of Rh4, but, surprisingly, the Ss PAC domain and C-terminal PAS domain are not required. This suggests that the bHLH and N-terminal PAS domains are responsible for DNA and ligand binding. However, the C-terminal PAS domain and the PAC domain, which assists in the folding of the PAS domain, are not active players in inducing Rh4 expression. In addition to our studies of Ss protein function, I have also begun research to understand patterns of stochastic Ss expression by tagging the endogenous spineless gene with GFP using a homologous recombination technique.

Auditory Mirror Neurons in Autism Spectrum Disorders

Ana Tryfon, Psychology

Sponsor: Dr. David Grodberg, Mount Sinai Medical Center

The mirror neuron system (MNS) describes a population of neurons located primarily in the fronto-parietal cortex. They become activated not only when a person performs an action but also when the same action is observed, such as grasping an object. There is evidence of mirror neuron dysfunction in autism spectrum disorders (ASD) when viewing/imitating facial expressions. (Dapretto et al., 2006) My experiment will study auditory mirror neuron activity in adolescents in response to the perception of rhythms. I will use an established paradigm from a previous study that tested healthy adults. They found that passive listening without associated action led to activation in the motor regions of the mid premotor cortex, the supplementary motor area, and the cerebellum lobule VI—areas consistent with the idea of an auditory MNS. (Chen, Penhune, and Zatorre, 2008) Experiment 1 will measure listening with knowledge of future tapping (anticipation), and Experiment 2 will measure listening without knowledge of future tapping (passive), both using a functional magnetic resonance imaging (fMRI) scan. Based on these previous mirror neuron studies, my hypothesis is that auditory mirror neurons will also show

less activation for both listening experiments. This result would further suggest a fundamental dysfunction within the MNS of adolescents with ASD.

Targeting Hsp70 with J-Domain Peptidomimetics

*Michael Witten, Chemistry**

Sponsor: Dr. Paramjit Arora, Chemistry

Molecular chaperones form an essential component of proper cellular function. They are involved in protein folding, unfolding, translation, and degradation. The unfolding of certain proteins has been implicated in many diseases, including neurodegenerative disorders. Thus the stimulation of chaperone function may prove useful in therapeutic treatments. One molecular chaperone, Hsp70, consists of a substrate-binding domain for unfolded peptides and a nucleotide-binding domain for ATP. Hydrolysis of a bound ATP induces conformational changes in the substrate-binding domain, thus activating protein folding. The ATPase activity of Hsp70 is itself tightly controlled by allosteric activation via the binding of a J-domain-containing cochaperone Hsp40. The J-domain consists predominantly of an α -helical secondary structure. I have designed and synthesized short J-domain peptidomimetics which are conformationally constrained in an α -helical structure through a covalent surrogate for an intrinsic hydrogen-bond. These constrained peptidomimetics have been shown to exhibit a helical structure and to induce ATP hydrolysis by the Hsp70 chaperone.

Testing Mechanisms as Buffers of Both Environmental Variation and Genetic Variation

*Maryam Zaringhalam, Biology**

Sponsor: Dr. Mark Siegal, Biology

Although species maintain a great amount of genetic variation and experience a variety of environmental conditions, phenotypes within a particular species do not vary as much as expected. A number of genes contribute to this phenomenon, known as phenotypic robustness. These genes, known as phenotypic capacitors, suppress variation when functional but result in widely varying phenotypes when rendered nonfunctional through mutation. Previous studies have demonstrated that deletions of numerous capacitors result in highly heterogeneous morphological phenotypes in response to microenvironmental fluctuations. It has been proposed that mechanisms that buffer environmental variation will also buffer genetic variation; however, this hypothesis has not yet been rigorously tested. We aim to test this hypothesis using a genetically diverse set of mutation accumulation (MA) lines in the baker's yeast, *Saccharomyces cerevisiae*. We knocked out several capacitors in these lines, phenotype

them using live high-throughput microscopy, and then measure the morphological variation between and within strains. To perform the quantitative phenotyping, I generated a plasmid that will fluorescently mark several cellular landmarks using chimeric protein constructs in one large selectable plasmid: the pMZ phenoplasmid. I stained the nucleus with a red fluorescent protein by placing a nuclear localization signal upstream of a red fluorescent protein, tdTomato. I placed the yellow fluorescent protein, yEmcitrine, in-frame with Myo1, a protein that localizes to the bud neck and can be used to accurately measure the cell cycle. I placed the blue fluorescent protein, cerulean, in-frame with PEA2, a protein localizing to the site of polarized cell growth. The final plasmid will be transfected into the MA lines. The morphology of transfected cells can then be assayed using time-lapse fluorescent and bright-field microscopy. Images will then be computationally analyzed for cell-to-cell morphological variation. These results will be used to test the hypothesis that the same mechanisms that buffer environmental variation also buffer genetic variation.

Mechanisms of Oceanic Jet Formation

*Ken Zhao, Mathematics and Mechanical Engineering**

Sponsor: Dr. Shafer Smith, Mathematics

Zonal jets are observed in the gas planets as well as Earth's atmosphere and oceans, but some aspects of their development and evolution are not well understood. In my research, I try to understand the jets' mechanisms of formation as well as their spacing as a function of latitude, since this also causes changes in the strength of rotational effects. In Earth's oceans, scientists, using satellite altimetry, have recently made observations of zonal jets (Maximenko 2005) as well as Rossby waves (Chelton & Schlax 1996), which both exist due to the meridional gradient of the Coriolis parameter, Beta. In order to explain the formation of jets in the ocean, I use the barotropic vorticity equation, which is an idealized model of planetary fluids exhibiting both Rossby wave and zonal jet solutions. This provides two possible mechanisms for jet formation in the presence of Rossby waves: 1) the Barotropic Instability of zonal Rossby waves in the presence of small amplitude perturbations, which results directly in the growth of zonal jet modes; and 2) the Rhines effect. In 1), I computed the analytic solution to the linear barotropic instability problem and found the wavenumber of maximum growth as a function of Beta. The results indicate that, as Beta increases, the horizontal scale of the fastest growing mode also increases. In 2), turbulent interactions cascade energy to large scale where it interacts with Rossby waves, result-

ing in turbulently driven zonal jets. In this case, however, as Beta increases, the scale of the jets is expected to decrease. To analyze the two jet formation mechanisms, I ran a series of non-linear numerical simulations of the barotropic vorticity equation, initialized with a horizontal sine wave and superimposed random perturbations, with varying Beta. The results show that, before the dominant, turbulent inverse cascade towards the Rhines scale takes place, the interactions of the barotropic instability cause a predictable pattern of peak wavenumber growths proportional to the Beta parameter. Thus both effects are present, but, in the case of strong turbulent interactions, the Rhines effect ultimately determines the jet scale.

Neurons Expressing SIFamide as Light Avoidance Mediators in *Drosophila melanogaster*

Jamie Zhen, Biology*

Sponsor: Dr. Justin Blau, Biology

Genes and neural circuits controlling behavior can be studied in *Drosophila melanogaster* larvae, which have a simple central nervous system and are amenable to genetic manipulation. The *Drosophila* larval eye, Bolwig's organ, contains photoreceptor neurons projecting to the circadian pacemaker neurons, which regulate the innate behavior of light avoidance. The neurons downstream of the Bolwig's organ and the circadian pacemaker neurons involved in this behavior are unclear. Using the UAS-GAL4 system and a temperature sensitive allele, *shibire^{ts1}*, which codes for dynamin involved in endocytosis, I searched for subsets of neurons involved in generating the light avoidance response. The expression of *shibire^{ts1}* results in interference in synaptic vesicle recycling. The inability to avoid light at the restrictive temperature indicates that neurons expressing *shibire^{ts1}* are involved in mediating light avoidance. I found that neurons which express a neuropeptide, SIFamide, with *shibire^{ts1}* abolish photophobic behavior in larvae. SIFamidergic neurons are expressed in the pars intercerebralis of the brain, which is analogous to the hypothalamus of the human brain. Several other GAL4 lines were also deficient in

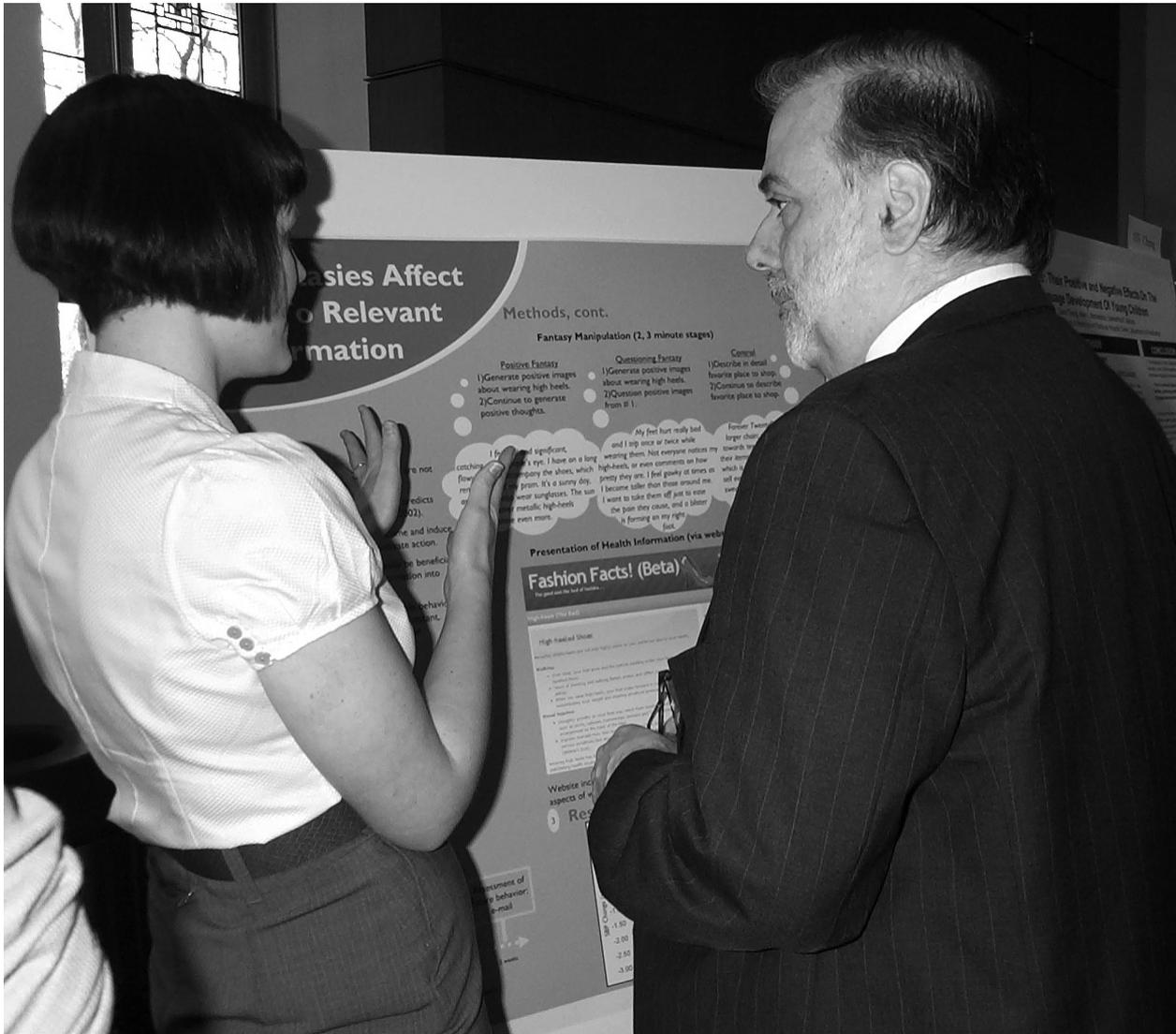
avoiding light, and the neurons expressed in those lines are distributed mainly within the pars intercerebralis. These data indicate that neurons which mediate light avoidance are located within the pars intercerebralis and require the signaling of SIFamide to achieve this behavior. Understanding how a simple behavior like avoiding light is achieved may provide greater insight into how neurons communicate with each other and mediate a behavioral response in *Drosophila*, and possibly in more complex organisms, like mammals.

A Role for the TGF- β pathway in *Caenorhabditis elegans* Male Tail Tip Morphogenesis

Elinor Zhou, Biology and French*

Sponsor: Dr. David Fitch, Biology

Caenorhabditis elegans males undergo a sex-specific morphogenesis when the tail tip retracts from a pointed form to a rounded form as the worm transitions from its last larval (L4) stage to adulthood. These changes involve the four tail tip cells (hyp 8-11) fusing together and retracting away from the overlying cuticle. A genome-wide RNA interference (RNAi) screen has implicated *sma-3*, which encodes a Smad protein that functions in the TGF- β -related signaling pathway, as being involved in tail tip morphogenesis. Phenotypic characterization of *sma-3(e491)(-); him-5(e1490)(-)* mutants (which have an increased frequency of XO males in their population) and analysis of *sma-3::mCherry* expression were performed to better gauge *sma-3*'s role in tail tip morphogenesis. Lower temperatures caused a higher occurrence of abnormal adult male tail tips in *sma-3(e491)(-); him-5(e1490)(-)* mutants, suggesting that the phenotype produced by the *sma-3(e491)* allele may be cold-sensitive. We found greater expression of *sma-3::mCherry* in the nuclei of the male tail tip cells during morphogenesis, and expect that this localization will be disrupted with a lack of signaling from the PHC neurons, which run through the tail tip. Knowing the TGF- β pathway's role in tail tip morphogenesis will allow us to better understand this morphogenetic process, and morphogenesis in general.



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