

# INQUIRY:

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# 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 to which original inquiry is central. The College's annual Undergraduate Research Conference was established over 30 years ago and now encompasses projects in the humanities, natural sciences, social sciences, and 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. Finally, departmental funding is also available, particularly in the sciences, through individual faculty members' grants.

The annual journal *Inquiry* showcases abstracts of selected student research. This issue contains abstracts of projects undertaken in the 2004–2005 academic year. Some projects were presented at the Undergraduate Research Conference held that spring, some were supported by the Dean's Undergraduate Research Fund, and some were conducted with the assistance of various departments. Several projects also took advantage of NYU's study abroad programs. These abstracts represent only a very small fraction of the research undertaken by College students, both as individuals and in groups, under the close mentorship of faculty. All attest to the crucial importance of independent inquiry as a paradigm for a liberal arts education for the 21st 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*  
*Professor of Classics*  
*Angelo J. Ranieri Director of Ancient Studies*



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

## **Puritan, Pilgrim, Pioneer: The Rhetoric of Prophecy and Violence in Early American Christian Sects**

*Erin Anderson, English and Religious Studies*

*Sponsor: Dr. Phillip Harper, English and American Studies*

Latter-day Saints President Gordon B. Hinckley once remarked that “the lives of our people must become the most meaningful expression of our faith and . . . the symbol of our worship.” In exploring the history of Mormonism’s “expressions of faith,” certain parallels between nineteenth-century Latter-day Saints and early New England Puritan rhetoric have come to light. Although there are significant differences in their fundamental beliefs, both groups professed anxieties concerning the settlement of a new region, and conveyed those sentiments through a shared language of Biblical prophecy. Both communities spoke of establishing a “New Israel,” founded on the principle of moral and spiritual purity. In doing so, instances of violence incurred through the process of colonization became couched in that language, taking on the gloss of divine sanction. The precedent for this practice set by the American Puritans has had long-lasting ramifications beyond the writings of the Latter-day Saints. My research critically examines the presence and origins of religious language in this contemporary socio-political dialogue.

## **Rebellion amid Apathy: Creating a Counterculture of Reform and Democracy in the Teamsters, 1948–1976**

*Joel Brooks, History and Political Science*

*Sponsor: Dr. Richard Hull, History*

My paper explores the relationship between rank-and-file activism in the International Brotherhood of Teamsters in the years between 1948 and 1976 in the New York metropolitan area. This was a period of pro-business government intervention and increased infiltration of organized crime into positions within the union, a policy historian David Witwer calls the “crass opportunism” of so-called business unionism by the leadership of the union. This climate produced collusive employer-union relationships, illegal and exploitative relationships between members of organized crime syndicates and the union, as well as legal and illegal restraints on the union’s socio-economic leverage.

Because the American labor movement is currently at a historical low point, it is significant to examine what was once the largest and most powerful trade union in the country at a period where reform seemed possible, either from the “bottom up” by the rank and file or from the “top down” by government intervention. This wholesale reform did not occur, and the Teamsters remained mired under leadership that engaged in the same collusive, exploitative, undemocratic, and authori-

tarian practices for years after. At the same time, pockets of reformers working towards increased democracy and transparency within the union emerged. These were decentralized and militant individuals who at times jeopardized their lives by advocating reform. Eventually, in 1976, many of these dissidents would come together as a reform caucus within the union, a group that still exists today: Teamsters for a Democratic Union.

**Early Cro-Magnon Stone Tools: The Abri Blanchard (France) Collection at the American Museum of Natural History**

*Amy Clark, Anthropology*

*Sponsor: Dr. Randall White, Anthropology*

This study analyzes an important collection of stone tools housed in the American Museum of Natural History (AMNH). Located in the southwest of France, the rich site of Abri Blanchard was excavated in the years before the First World War and since then, its artifacts have been dispersed to several museums around the world. These artifacts could reveal important clues about the site's ancient inhabitants, living at a time when modern humans were first entering Europe and replacing the indigenous Neanderthals. The research consisted of two parts: to categorize the stone tools using the widely applied stone tool typology created by Dennis de Sonneville-Bordes; and to organize the stone tools according to their raw material, thereby giving information about their geographical point of origin, possible human movements, and even exchange networks.

Significant differences between the AMNH-type frequencies and those from type collections of Blanchard artifacts remaining in France, suggest that the latter are not a representative sample of the original assemblage. This has implications for the age of the site. Furthermore, an analysis of the raw materials reveals that, although the collection was dominated by pieces of local origin, there was a notable amount of raw material collected from sources some 80 km from the site.

***De Ventorum Situ et Nominibus: An Exercise in Textual Criticism***

*Victor B. D'Avella, Classics*

*Sponsor: Dr. David Sider, Classics*

The purpose of my research has been to provide the scholarly community with a critical edition of, and accompanying commentary on, a text that hitherto has not received much attention. In order to achieve this goal I

first obtained knowledge of how classical texts are transmitted from ancient times down to our own and then learned to read the various scripts used by medieval scribes to write Greek. I then undertook the task of inspecting the twelve extant manuscripts that contain *De Situ*, dating from the twelfth to fifteenth centuries. By examining the similarities and aberrations from one manuscript to another, I was able to establish the genealogical relationship among the manuscript family. Finally, I established the text that I felt best represented what the ancient author had written, indicating the various readings of the manuscripts in the *apparatus criticus*, as well as the conjectures of previous editors. In my commentary, which includes notes on geography, wind-roses, and other such pertinent information, I have explored the variants readings and have provided explanations based on both ancient geographical misconceptions and scribal errors.

**Victor Horta's Maison du Peuple and Frank O. Gehry's Walt Disney Concert Hall: Revolutionary Turn-of-the-Century Architecture**

*Julie Engh, Metropolitan Studies and Urban Design*

*Sponsor: Dr. Thomas Serdari, Fine Arts*

Victor Horta's late nineteenth-century art nouveau architectural monuments draw striking parallels to architect Frank O. Gehry's contemporary works. While Horta's predominately decorative style incorporates organic tendrils and fanciful curves, Gehry's billowing three-dimensional forms and amorphous materials are more structurally innovative. Nevertheless, the architects' individual relationships to turn-of-the-century architecture inspire a more in-depth comparison. Analyzing Horta's Maison du Peuple (1899) and Gehry's Walt Disney Concert Hall (2003) reveals how both architects developed revolutionary architectural trends while addressing societal and urban needs. Horta's combination of exposed iron elements, a material traditionally reserved for industrial development, with the avant-garde art nouveau style parallels how Gehry's billowing, metallic shells break from modernist and postmodernist architectural trends. The Maison du Peuple's spatial layout carefully considers working class needs and incorporates socialist ideals, while the Walt Disney Concert Hall stimulates urban revitalization by contributing to a cohesive downtown Los Angeles center. Although separated by over one hundred years, Horta's Maison du Peuple and Gehry's Walt Disney Concert Hall demon-

strate architecture's potential for stimulating stylistic development and urban renewal.

### **The Cathedral of Monreale as the City of God**

*Caroline Fowler, Fine Arts*

*Sponsor: Dr. Carol Krinsky, Fine Arts*

In this study I show that the Cathedral of Monreale in Palermo, Sicily, is a visual representation of Augustine's *City of God*. This late twelfth-century church, built by the Norman William II, embodies Augustinian thought about the meaning of human existence. With an extensive use of angel iconography in both the narrative panels and the architectural decoration, the cathedral illustrates the relationship between men, angels, and God that is a central Augustinian preoccupation. The mosaic panels for the Old Testament begin with the seven days of Creation and continue through the stories of Noah, Abraham, Isaac, and Jacob. Once again, Augustine's *City of God* provides the explanation for the otherwise puzzling narrative choices to end with Jacob and to omit Moses. The mosaic panels for the New Testament follow the particulars that Augustine chose to emphasize in the larger theme of redemption; therefore, Monreale depicts the healing ministries of Jesus in a detailed narrative and ends the sequence with Pentecost. Here again, these choices, unusual in comparison with other twelfth-century narrative cycles, make sense in light of Augustinian thought.

### **The Verlaine Settings of Debussy and Fauré: A Comparative Study in Prosody**

*Michael Fram, Music*

*Sponsor: Dr. Louis Karchin, Music*

The symbolist literary movement of the mid-nineteenth century saw the reinterpretation or destruction of many of the set poetic forms that had long served as the basis for French versification. Among the most prolific of the French symbolist poets was Paul Verlaine, who, in his artistic manifesto *L'art Poétique*, urged his contemporaries to explore "l'Impair" (verse of an uneven number of syllables) and to move away from the adherence to strict end rhyme. During their careers, the composers Claude Debussy and Gabriel Fauré set to music the same six poems by Verlaine. This comparative study focuses on issues of prosody in their respective settings, and specifically the ways in which the prosodic construction of their settings interacts with the innovations of the symbolist movement.

In an attempt to compare systematically the settings, I have examined five aspects of Debussy and Fauré's compositions: a line-by-line comparison of prosodic construction, for which I have employed a system of visually mapping both regular "downbeat" stress, as well as what I have termed "moderate" stress, which occurs within a measure; adherence to or deviation from the natural French prosody of Verlaine's poems as they would be recited; the effect of the prosodic construction on rhyme, and specifically end rhyme; the respective treatment of Verlaine's often uneven syllabification; and finally, the respective treatment of the French feminine -e ending, whose pronunciation or elision affects the overall syllable structure of Verlaine's lines. From these comparisons, it can be observed that, while Debussy was clearly more interested than Fauré in complementing Verlaine's innovative poetry with similarly innovative music, Fauré's settings are no less effective, and are, in fact, remarkable in that the composer was able to weave a decidedly modern and innovative poetic aesthetic into his established, more conservative musical language.

### **In the Mood for Nostalgia: The Reimagination of Time and Space in Wong Kar Wai's Cinema**

*Rijie Ernie Gao, Comparative Literature and Philosophy*

*Sponsor: Dr. Xudong Zhang, Comparative Literature*

Fredric Jameson's theories on nostalgia and the postmodern experience are a useful starting point in thinking about the films of Wong Kar Wai. As the most influential auteur to emerge from the Hong Kong New Wave in the last decade, Wong Kar Wai has continued to dazzle film-goers with his boldly innovative style and unique approach to narrative, in which time is fractured and space becomes fetishized. In this paper, I provide an account of the insistent themes that pervade his work.

Wong's films can be seen as nostalgic reflections which aim to reimagine a historical past in the neon glow of the city or through the melancholic haze of cigarette smoke. Through this reimagination, as a function of the nostalgic impulse, the past is reappropriated and cast in a different light. Films such as *Days of Being Wild*, *In the Mood for Love*, and *Ashes of Time*, among others, have an important place in this philosophical project. The theoretical space opened up by Jameson's theories provides a rich hermeneutic perspective on Wong Kar Wai's cinema which illuminates these films in a new light.

**The Technology of Reading in James Merrill's *The Changing Light at Sandover***

*Benjamin Glaser, English and Mathematics*  
*Sponsor: Dr. Virginia Jackson, English*

Although the first book of James Merrill's *The Changing Light at Sandover* is easily placed alongside his much lauded "lyric" work, the second is a convoluted, polyphonic struggle. In it occult spirits seem to force us into new age "pop-think" and scientific jargon, evidently at the expense of Merrill's very personal style. My research focuses on the changing composition of the work and asks a series of questions about what is identified as lyrical, what is not, why such distinctions are made, and whether they are viable. How and why could a poem be non- or part-lyrical, and perhaps most importantly, how can we read it? Does the text suggest how to do so? Drawing on the work of Paul de Man, I ask how the poem's retention or utilization of occult transcripts challenges not merely the reader but the lyric's claim to expressivity and authorial voice.

A careful examination of critical responses proved that such questions are fundamental to the study of this difficult work. Equally important, Merrill's metapoetic, meditative work is justified as a locus from which to interrogate not only questions of the lyric and lyric reading, but of the current place of poetry and the critic. I also attempted, through close rhetorical readings, both to formulate and to engage in a suitable method for reading the work. Derived in part from the methodological theorizations of Benjamin, Heidegger, several of their readers, and above all the text itself, I delineate a "photographic reading," focusing on typography and the disruption of tropes. Throughout, the significance of "science" is studied as both subject and indeterminate infestation of the poem. I attempt to establish a connection between the alienation caused by a poem, which though steeped in tradition clearly violates our sense of knowing how to read, and the veiled technological "up-rooting" within which the text operates.

**The Ambiguous Nature of Pre-Norman Irish Music: A Symbol of Traditional Irish Culture and a Method of Christian Conquer**

*Michelle Granshaw, Dramatic Literature and History*  
*Sponsor: Dr. Richard Hull, History*

Irish social and geographical contexts, in combination with European influences, helped shape the devel-

opment of a unique, characteristically Irish musical tradition. Gaelic Irish society used music to maintain its social system, as well as to define the social status of individuals. Connotations associated with the music led to it becoming a fundamental and inseparable part of everyday life, including part of military action, conceptions of time and life, and markers of identity. As a result of this role of music in Irish local traditions, Christianity legitimized itself as a religion in early medieval Ireland through the appropriation of music and musicians as an integral aspect of its propagation and practice.

**Oh Brave New World, with Such Barbarians in It!**

*Elizabeth Isaac, English*  
*Sponsor: Dr. Martha Rust, English*

I employ William Shakespeare's *Tempest* in conjunction with Michel de Montaigne's essay "Of Cannibals" to ascertain how each author addresses relationships between early modern European society and the society of the New World, civility and human nature, and how the desire for power effects these relationships. Using Montaigne's claims about the social structure, morality, and ethics of the indigenous peoples as a starting point, I found that Shakespeare's use of language and the structure of relationships between his characters can be interpreted as a comment on Montaigne's claims. One question that arises is whether the savage culture that Montaigne represents is actually purer than that of Europeans. To what extent does Shakespeare urge his audience to reevaluate this relationship? While Montaigne asserts that the energies and passions of these "savages" are free from the corruption of morality, constituting a more utopian society, Shakespeare qualifies this claim through characters such as Caliban, Gonzalo, and through the filial bond between Miranda and Prospero. I also examine historical works on exploration and slavery, and how this information may have affected Shakespeare's notions of the effect that Europeans had on natives who displayed both moral tendencies, as well as natural urges, as exemplified by Caliban.

**Dante, Rossetti, and the Court of Arty Love**

*Jennifer Jordan, Medieval and Renaissance Studies*  
*Sponsor: Dr. Martha Rust, English*

Dante, in *La Vita Nuova*, writes about his love for Beatrice. Rossetti, over five hundred years later, paints the book's scenes over the course his career. But there

is something more complicated at work here than mere illustration. There is a change of perspective as well towards the purpose of art itself. Both artists believed in blurring the boundaries between life and art; reality and fiction collide in Dante's books and on Rossetti's canvasses. Dante, in *La Vita Nuova*, is aestheticizing his life; and Rossetti is grafting this life onto his own. Dante, however, uses his art to heighten emotion, to experience things more fully, while Rossetti uses it to distill emotion, to distance himself from it, to effectively remove it from him. To prove this, I compare several scenes from *La Vita Nuova* to Rossetti's paintings to show how Rossetti's paintings are reflective of both his emotional life and his artistic life. In the process, I demonstrate how their philosophies of art differ when text is converted to image.

**The Bestowal of Honor in Western Epic**

*Margaret Kelleher, Classical Civilization and Medieval and Renaissance Studies*

*Sponsor: Dr. Kenneth Krabbenhoft, Spanish and Portuguese Language and Literature*

My paper explores the bestowal of honor as a convention in epic tradition and its evolution from classical epic to Renaissance epic. The classical epic hero faces the choice between a transcendent honor bestowed by some higher power and societal honor bestowed by men. The Middle Ages sees the beginning of a consolidation of these two different sources of honor as Christianity becomes integrated into the state. In the Renaissance epic, country and religion are completely intertwined and the hero acts as a part of his country. This evolution is evident in the conflict the heroes in these epics face. Earlier epic heroes such as Achilles and Beowulf confront an internal conflict over how to gain appropriate honor. In the later Middle Ages, the conflict becomes externalized since the ideal Christian warrior struggles with his polar opposite within his own people. In the Renaissance, because of set social structures, the hero's conflict disappears, and he is left only to fight the Muslims. This evolution is also manifested through the hero's perception of the king. In classical and early medieval epic, the king is a peer and fellow warrior, but with the onset of Christianity the king rises to a social status above that of the hero. The king's rise in status and the continued consolidation of power from the later Middle Ages into the Renaissance limit the hero's choices of ways in which to gain honor.

**From Sideline to Headlines: A Legal History and Analysis of Title IX and the University of Maryland Collegiate Cheerleading Team, 1972–2005**

*Megan Kirby, History*

*Sponsor: Dr. Lisa Duggan, History*

Title IX is arguably one of the most important pieces of social legislation passed in the twentieth century. In 1972, Title IX was implemented to bring women's sports to the level of men's sports in participation as well as funding. Some argue, however, that while it has increased, women's athletic participation has been at the expense of men's opportunities. In attempt to comply with Title IX, many athletic directors achieved proportionality by cutting small-scale non-revenue producing men's sports such as wrestling, swimming, and gymnastics, rather than implementing additional women's programs. Many believe that the addition of a predominantly female sport, such as cheerleading, is the most effective way for schools to alleviate Title IX compliance problems. In 2003, the University of Maryland upgraded competitive cheerleading to varsity sports status. With the change, Maryland became the first higher education institution in the nation to recognize cheerleading as a sport under Title IX and offer financial scholarships. On the other hand, several women's sports groups argue that the inclusion of cheerleading threatens the progress of women's sports. Why, they ask, would Maryland choose to elevate an activity that historically has been more about rooting competitions rather than participating in them?

My research integrates the history of Title IX with the rise of competitive cheerleading, focusing on the University of Maryland from 1972–2005 and how its innovation might impact Title IX in the future.

**A Romanesque Oliphant as Object and Propaganda**

*Elizabeth Koch, Childhood Education and Fine Arts*

*Sponsor: Dr. Kathryn Smith, Fine Arts*

This paper is a comprehensive study of a Romanesque oliphant, a large horn carved from the tusk of an elephant, currently in the collection of the Metropolitan Museum of Art (accession no. 04.3.177). Although probably carved by Islamic craftsmen, oliphants were apparently commissioned by Christian patrons, and a significant percentage of these objects survived in church treasuries. Previous scholarship on oliphants is sparse and is concerned mainly with organizing the seventy-

five surviving examples into stylistic subgroups and on determining date and place of manufacture. My work analyzes the iconography of the Metropolitan Oliphant and uses the artifact as an anchor for broader consideration of the meanings of oliphants in a variety of medieval religious and cultural contexts. I demonstrate that the imagery on, and functions of, oliphants are intricately linked to propaganda for both the pilgrimage to Santiago de Compostela and the crusade to Palestine through association with the *Song of Roland* and the Christian concept and imagery of the Last Judgment.

**Is Possibility a Good Guide to Imaginability?**

*Matthew Lindauer, Philosophy*

*Sponsor: Dr. Kit Fine, Philosophy*

Philosophers have often questioned whether or not the fact that we can conceive of X is good evidence for the possibility of X. This question has remained central to the mind-body problem since Descartes used the move from conceivability to possibility to argue that the mind and body are distinct. Dualist theories of mind hold an irreducible difference between our mental and physical goings-on, whereas materialist theories of mind hold that mental facts supervene on physical facts. In *Naming and Necessity*, Saul Kripke advanced a conceivability argument designed to resuscitate dualistic philosophies of mind. Not straying far from the Cartesian paradigm, the argument was novel in the terms that it employed in licensing the inference from conceivability-possibility claims to the conclusion that the mental state “pain” cannot be identical to any brain state. Holding that all imaginings are modally probative, Kripke’s account cannot allow that we actually imagine impossibilities. I argue that one well-known materialist response to Kripke’s argument, proposed by Christopher Hill, is misguided and ad hoc. I then present arguments defending what may be taken to be Hill’s main thought, contra Kripke, in order to demonstrate that we can and do imagine impossible scenarios, and thus, not all imaginings provide evidence for possibility.

**Piety on a Canvas Placard: Processional Banners of Italian Medieval and Renaissance Confraternities**

*Ksenya Malina, Fine Arts and History*

*Sponsor: Dr. Kathryn Smith, Fine Arts*

The confraternity testifies to the fusion of secular and religious life for the laity of late medieval and Renaissance Italy. The most prominent symbols of confraternities were the decorated banners carried by members during processions on feast days and funerals. As a visual counterpart to the beliefs and practices of the con-

fraternity, each banner reflected the nature and priorities of the order that commissioned it. These banners have heretofore received little scholarly attention. My investigation of the imagery of the banners and the artists who executed them reveals valuable information about the manner in which images were employed in public rituals in Italian medieval and Renaissance society.

My project involved on-site visits to numerous locations throughout central Italy that house the banners. My work traced the iconographic sources of the themes depicted on the banners, and analyzed this imagery within the broader context of Italian visual culture. By placing my findings in the historical context of late medieval lay religion, my research demonstrates that Italian society set high value on festival and visual spectacle in which images served as vehicles of both divine intercession and affirmation of communal identity during periods of social and political strife.

**The Role of the Camera in Bergman’s *Persona***

*Heather McCalden, Film and Television, Tisch School of the Arts*

*Sponsor: Dr. Elke Siegel, German*

After evaluating Bergman’s *Persona* against specific textual points of Sartre’s *Being and Nothingness*, the role of the individual in the “one soul two bodies” configuration is one that shifts between the two “half soul” components. According to Sartre, the subject of a relationship (involving myself) is initially the Other, because the Other transforms me into the object of his gaze. In order to regain subjectivity, I attempt to switch the structure by making the Other the object of my gaze. A similar reversal occurs in *Persona*; the tie of the camera to the unit of the two protagonists conveys the “one soul two bodies” relationship. This suggests that the narrative and the formal properties of the medium are wedded together. Despite this bond, there are moments when the narrative transcends its boundaries by having a character objectify the camera through a gaze. This, in turn, makes the character the subject of the camera character’s relationship. The structure reverses when the camera abandons its role of “observer” and actually intrudes on the drama by manipulating it. The gaze of the camera and its aggressive influence on the actual narrative construes the camera as the subject of the relationship. Because the role of subject alternates throughout *Persona*, an inference may be drawn that the role of the individual in the “one soul two bodies” configuration is one that shifts from one half soul to the other. A point made by Derrida in *The Politics of Friendship* supports this supposition, that “a friend, hav-

ing more than one place ('twin bodies'), would never have a place of his own."

**Elihu Root as Peacemaking Imperialist**

*Jonathan Mincer, International Relations*

*Sponsor: Dr. Paul Mattingly, History*

Elihu Root, an 1867 NYU Law graduate, went on to become a very successful corporate lawyer, the secretary of war, the secretary of state, and a senator. His record is mixed and seemingly dichotomous. He bears almost sole responsibility for the often harsh colonial policy he administered under President McKinley in Puerto Rico, Cuba, and the Philippines after the Spanish-American War; he publicly defended President Theodore Roosevelt, his later superior, in taking the Panama Canal Zone from Colombia; and he played a major role in sequestering Santo Domingo's custom houses in order to help it efficiently collect its taxes and repay its debts. On the other hand, Root traveled to Latin America to proclaim the U.S.'s disinterest in dominating the hemisphere; he established mechanisms for international arbitration at the Hague, between world powers, and in Latin America, with weaker states; he negotiated many international agreements, including one with Japan named Root-Takahira; and he won the 1912 Nobel Peace Prize.

My research seeks to explore the basis by which Root's most egregiously imperialist actions—his brutal suppression of the native rebellion against American control in the Philippines—can be explained. To defend colonial suppression, Root argued that the Filipinos were backward and uneducated and would cause havoc if they tried to rule themselves. In his Noble Peace Prize address, Root echoed the same theme: only highly educated permanent judges were qualified to arbitrate international law and settle international disputes. Regular people, ruling an international parliament such as the League of Nations, against which he would become one of the primary opponents, would negligently violate national sovereignty and bring about more strife than peace.

In other words, only educated elites, using international law based on legal precedents, were qualified to hold power, while the uneducated had to be taught to do so. Whenever he negotiated with people he considered qualified, Root did so and was a peacemaker. When he could not, Root ruled them without consulting them and became an imperialist. A product of nineteenth-century laissez-faire ideology, Root preferred to use an ad hoc approach. He chose imperialism or peacemaking based on what was appropriate in the particular situation.

**Dokked Lyk a Preest: Chaucer's Reeve and the Entanglement of Temporal and Religious Authority in Fourteenth-Century England**

*Thomas Morton, English*

*Sponsor: Dr. Martha Rust, English*

In the decades leading up to the turn of the fifteenth century, England was in a state of religious turmoil. Holding the newly ascended Urban VI's erratic behavior a potential threat to the church authority, the College of Cardinals elected a second pope in 1378, Clement VII, leading Christendom into a schism decided almost purely on political lines. At home John Wyclif's calls for clerical reform were gaining a fervent and rapidly swelling following, the first widespread, programmatic challenge to ecclesiastical authority in English history. Although its adherents were officially exonerated after the fact, Lollardy was held in the public mind as the principal driving force behind the London Peasants' Revolt in 1382. Against this tumultuous backdrop, Geoffrey Chaucer composed the bulk of *The Canterbury Tales*, and yet the work's sole explicit reference to the sweeping change that Wyclif's doctrine heralded in English life and letters is the Host's facetious comment on the Parson's sober bearing, "I smelle a lollere in the wynd." While Chaucer's views on the church in his time are generally thought to rest in his sarcastic characterization of the clergy, it seems a bit off that the author of so comprehensive an examination of English life would fail to address such a pressing crisis outside a sideways jab at the puritanical tendencies of Wyclif's devotees.

I argue that Chaucer sublimated this debate and all its contingent ugliness into the character of Osewold the Reeve. Through close reading and broad critical analysis, the complex nature of religious authority and its challengers becomes evident as a major subtext running through the Reeve's description in the General Prologue, his prologue, and his tale. This undercurrent of thought not only reshapes Osewold's intended meaning in the text, but more fully elucidates Chaucer's apparent intentions in the structure and content of the First Fragment.

**Vogue of Virtue: The Cult of Antiquity, Dress, and Political Culture in Revolutionary France**

*Mary-Elizabeth O'Neill, French and History*

*Sponsor: Dr. Stéphane Gerson, French*

Using contemporary written and visual sources, I analyze the emergence of Greco-Roman inspired clothing as official government and every-day dress under the Directory period of the French Revolution, beginning in 1795. After Thermidor, the Directory sought to

establish a liberal republican government honoring the ideals of the Revolution without resorting to the debilitating dictatorial practices and policies of the Terror. Through a comparison of competing understandings of civic virtue, the roles of men and women, the importance of dress and the antique ideal under the Terror and under the Directory, I argue that the neoclassical model served as a conceptual apparatus for the reconstruction of identity after Thermidor. For men, republican identity revolved around a classical understanding of the duties of the ideal citizen. For women, responsibilities were largely domestic in nature, conforming to the ideal of the republican mother. I argue, furthermore, that the rise of “fashion,” as opposed to dress, reveals the tension between republican virtue and luxury and is symptomatic of the failure of the Directorial project to establish a unique republican identity in the midst of changing social and political pressures.

**Orientalism in the West: The Exoticization of Chinese Immigrants during the California Gold Rush**

*Haley Plourde-Cole, History*

*Sponsor: Dr. Richard Hull, History*

Orientalism as a phenomenon emerged from the study by European scholars of Asian peoples through a colonialist lens, a scholarship that unflinchingly rendered such groups as homogenous, exotic, and unchanging. The problem I investigate is the beginning and development of Orientalism in America. To do this, I researched various primary sources, most notably the *Los Angeles Times* during the 1880s and 90s, as well as secondary sources from historians, sociologists, and anthropologists whose work pertained to Orientalism and Asian-American history, including Susan Lee Johnson, Henry Yu, and Edward Said. Through this investigation I conclude that with the influx of Chinese immigrants into the United States during the period of the Californian gold rush of 1949, a new form of Orientalism emerged that combined the known opinions of European scholars with new stereotypes generated by interaction between Anglo-Americans and the Chinese in the gold mines and cities. My research details how white Anglo-Americans situated themselves in contrast to the Chinese, how the Chinese in turn utilized certain stereotypes of their culture to their advantage, and how the history of Asian immigration proved subversive to Frederick Jackson Turner’s myth of “the West” as a place of Anglo-American domination.

**“The History of Error”: Hardy’s Critics and the Self Unseen**

*Jill Richards, English*

*Sponsor: Dr. Perry Meisel, English*

Near the end of the preface to William Barnes’s poems, Thomas Hardy apologizes for his critical judgments with a succinct defense, one undoubtedly referring to his own reception as well: “the history of criticism is mainly the history of error.” What is interesting about Hardy’s own reception history is how easily it falls into the mode of the poems themselves. His earliest reviewers valued Hardy’s poetry in spite of its language. The best poems were those that managed finally to shrug off such a handicap, so that a select canon of works might emerge unscathed from their marred diction and syntax. More recently, critics have found themselves praising Hardy’s language for the very awkwardness that was once condemned. Such purposeful moments of gracelessness are read by these critics as “authentic,” and thus closer to the speech of a rural working class, one that sits opposed to a purely literary language (Lodge 1966; Larkin 1968; Williams 1970).

Using Dennis Taylor’s *Hardy’s Literary Language and Victorian Philology* (1993), I examine how Hardy’s language works on historical levels to distort a purely chronological or static model. Using dialect that is in and out of usage, words old and new, familiar and coined, Hardy demonstrates his own voiced refusal to treat English as “a dead language—a thing crystallized at an arbitrarily selected stage of its existence, and bidden to forget that it has a past and deny that it has future” (1901). Yet such a stasis is paradoxically the goal Hardy’s speakers make for themselves, one perpetually frustrated given the temporal and spatial planes from which they arise. These lyric voices aspire to construct a history—a “stage of existence”—that can situate selfhood in the present moment. These voices look backward to locate a past that never was, and anticipate the present moment on the blankness of its contingencies. Ultimately, Hardy’s language estranges these speakers from the voices they echo, so that past and present selves are distinct and contradictory to, rather than continuous with, the speech that renders them.

**The Secularization of Sainthood**

*Paula Segal, Communications and History*

*Sponsor: Dr. Richard Hull, History*

My research investigates the medieval Christian church and the politics of the process of canonization.

Once an unrestricted process located outside of church affairs, the celebration of saints in the Middle Ages was a purely religious phenomenon. The Church's formulation of processes for the delaration of sainthood, however, gave political significance to the once holy personages. I researched various saints of the Middle Ages and conducted an in-depth analysis of the life, death, and subsequent canonization of St. Francis of Assisi, one of Italy's most venerated saints. By viewing firsthand the sites of pilgrimages, the revered relics of various saints, and the multitude of churches erected in the name of St. Francis, including San Francesco in Assisi, which houses his remains, I have discovered evidence that the newly introduced interference of the church in the celebration of saints introduced an aspect of secularity to a once-sacred practice.

**Beyond the Sentimental Woman: Exploring Intimate Couplings in Wollstonecraft's *Mary* and *Maria***

*Beth Shane, English*

*Sponsor: Dr. Bryan Waterman, English*

This paper closely examines both Mary Wollstonecraft's earliest fictional work *Mary, A Fiction* (1788) and her last, *Maria, or the Wrongs of Woman* (pub. posthumously in 1797), in order to illuminate their common purpose of conceiving a fortifying relationship that would present both an alternative and thereby a defense to patriarchal values perpetuated through sentimental literature and reflected in society. Working with Claudia Johnson's argument in her book, *Equivocal Beings*, concerning Wollstonecraft's relationship to representations of women in the sentimental novel, I discuss the implication of *Mary's* failure to present a relationship that offers any enduring promise of emancipation for women. I consider Wollstonecraft's literary reviews, published by Joseph Johnson in the *Analytical Review*, and demonstrate how the critic positions herself in a relationship with the audience of the books under review that is characterized, as Mitzi Myers argues, by the critic's maternal solicitude. This posture is doubly significant as it corresponds with the relationship of narrator to audience as developed in *Maria*. I address Barbara Taylor's argument, presented in her chapter on *Maria*, "Jemima and the Beginnings of Modern Feminism," in her book *Mary Wollstonecraft and the Feminist Imagination*, which asserts the observable emergence in *Maria* of a diverse female collective, regarded as unprecedented and a precursor to modern feminism. I contend with her

conception of diversity, but agree that the novel presents a more progressive model for female emancipation than its precursor, largely through the recognized potential of the bond between mother and daughter.

**An American in Paris? Chasing the Dream**

*Jeremy Sigall, Economics*

*Sponsor: Dr. Jindrich Zezula, French*

The withering of the American Dream—not only with regard to its feasibility but also to its essence—is a common theme in American literature, addressed in works like Fitzgerald's *The Great Gatsby* and Miller's *Death of a Salesman*. The dream and its failures, however, are not distinctly American. In fact, the same theme is prevalent in de Maupassant's belle époque era novel, *Bel-Ami*.

While Fitzgerald and Miller demonstrate the futility of the dream through characters who fail to achieve it—in stunning and mundane fashions, respectively—de Maupassant does just the opposite. His protagonist, Georges Duroy, is actually quite a success, at least on the surface. From his humble beginnings as the son of country peasants, Georges fashions himself into a force among the monied elite. Georges's Achilles heel is his apparent inability to appreciate, in the moment, who he is and what he has. He is constantly coveting both what he has left behind and what he has yet to acquire. Through *Bel-Ami* more than through the American works, we can see that the failure of the American Dream is perhaps more a function of a flaw within our own mind-set than of a flaw inherent in the dream itself.

**Heidegger, Adorno, and the New Music of the Twenty-First Century**

*Alexander Starr, Anthropology and Music*

*Sponsor: Dr. Elizabeth Hoffman, Music*

The philosophies of both Martin Heidegger and Theodor Adorno proved instrumental in shaping our conceptions of art in the twentieth century. Adorno, however, is a sharp critic of German existentialism and many of his writings on music disparage the serialist music that he felt embodied Heidegger's ideas. The two nonetheless saw both the modern age and the increasing presence of technology within it as fundamentally changing how humans viewed both art and the world. Neither, however, could have imagined an iPod or the possibilities of music production on a computer.

My study examines Heidegger's idea about technology's ability to alter how we view the world. It

also discusses his general view of the function of the artwork alongside Adorno's aesthetic system, and his understanding of the "culture industry" to explore an aesthetics that deals with the issues that recent technological issues pose to these twentieth-century theories. I endeavor to show that both Heidegger and Adorno are similarly opposed to technology that facilitates a modification of the experience of a preexisting artwork. Finally, I argue that a common ground is to be found in the way in which the two philosophers both ultimately call for art in the modern age to directly engage technology and position it in a "negative relation" to itself. My analysis also incorporates ideas on this subject from Walter Benjamin, Dick Hebdige, Friederich Kittler, and Robert Morgan.

**"No Oscar Ruled the Table": Yeats's Role in the Rehabilitation of Wilde's Reputation**

*Maria Rita Drumond Viana, English*

*Sponsor: Dr. Declan Kiely, Irish Studies*

When he began his autobiography in the autumn of 1913, W. B. Yeats told his friend and collaborator, Lady Gregory, that "the power of our epoch on Ireland in the next generation will greatly depend upon the way its personal history is written." In *Four Years: 1887–1891* (1921), Yeats includes a pen portrait of Oscar Wilde, a friend from his youth, whose demise is later recounted in *The Trembling of the Veil* (1922), both later collected in *Autobiographies* (1926). Although critical of the "vague impressiveness that spoils his work," Yeats attempts to use personal history to provide an influential testament that reestablishes Wilde's reputation in a period when Wilde, and his literary work, was regarded as, at best, suspect.

My paper focuses on contemporary reviews that survey the critical reception of Yeats's portrait of Wilde in *Four Years*, *The Trembling of the Veil*, and *Autobiographies*. Through these documents I assess the effectiveness of Yeats's attempt to repair Wilde's reputation.

Whereas most reviewers recognize the importance of Yeats's testimonial, some still read Wilde as a tragicomic character. Whenever this idea was refuted, however, Yeats's portrayal of Wilde could be seen as "eye-opening" and was capable of dissipating the prejudice that had colored criticism.

**Visions of America, Visions of Judaism: Jewish Immigrant Community Development of Elizabeth, New Jersey, 1900–1950**

*Philip Wolgin, History*

*Sponsor: Dr. Paul Mattingly, History*

How did turn-of-the-century Jewish immigrants migrate to cities without an established Jewish upper-class construct of "community," and how did they deal with the pressure to reconcile their Jewish background with American life? The focus of this study is Elizabeth, New Jersey, from 1900–1950. Jewish immigrants began to settle in Elizabeth in the late nineteenth century, peaking at 10,000 members by the mid-1930s. I attempt to answer these questions through oral histories of long-time residents and demographic sampling, in addition to archival materials.

Elizabeth's Jewish residents became one unified community by the 1920s, based on a shared set of immigrant needs and through immigrant associations such as philanthropies and charities. With a rising Jewish middle class by the 1920s, a discussion of religious ideology began, previously suspended by more pressing needs. Two opposing visions of American-Judaism took root in the community, one seeking to adapt Jewish tradition to American life, and one seeking the reverse. By the 1940s, two separate synagogue-community centers emerged in Elizabeth, each espousing one of these visions. Elizabeth suggests that the common bonds formed during the immigrant generation served as a basis for one American-Jewish community, even as a discussion of ideology splintered the community into two factions.





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

## **Applicability of the Endowment Effect**

*Deepti Anbarasan, Economics*

*Sponsor: Dr. Guillaume Frechette, Economics*

Recent studies of the endowment effect have tried to explain the Willingness To Accept–Willingness To Pay (WTA-WTP) gap that arises between sellers and buyers respectively by attributing the difference to ownership. They have yielded, however, contradictory results about the effect's validity and its applicability. This paper presents the results of an experiment which uses two different variables in order to determine the nature of the WTA-WTP price disparity and to understand better the robustness of the endowment effect under different situations. I found that differences in academic exposure to economic theory can be associated with differences in subject preferences, since there are statistically significant differences in the WTA and WTP valuations of a consumer good between economics students and non-economics students. I also found that an inconclusive relationship exists between the initial endowments of different quantities of an object and the corresponding magnitude of the WTA-WTP gap. These tests allowed me to conclude that the variables in question influenced the buyer and seller prices to some degree

and, accordingly, the nature of the WTA-WTP disparity. Better understanding of these individual variations in economic behaviors would allow investigators to characterize the propensity of different individuals to the endowment effect and how to take this into account.

## **Examining HPA Axis Dysregulation and Neuroticism in Relation to Subjective Memory Complaints**

*Alyssa Arentoft, Psychology*

*Sponsor: Dr. Antonio Convit, Psychiatry, NYU School of Medicine*

Subjective memory complaints tend to increase with age, frequently in the absence of objective memory impairment. Two factors that may relate to this are HPA axis functioning and personality. Using the Global Deterioration Scale (GDS), participants with no memory complaints (GDS 1) were compared to participants with subjective memory complaints (GDS 2) on HPA axis functioning (measured using cortisol and ACTH values obtained during the Dex/CRH Challenge test) and subscale scores on the NEO-FFI personality inventory. Correlations were also examined between number of subjective memory complaints (obtained from the to-

tally MAC-Q score), HPA axis measures, and NEO-FFI scores. I hypothesized that those with GDS 2 or higher MAC-Q scores would have elevated HPA axis functioning and score higher on the NEO-FFI Neuroticism subscale. Results indicated that GDS 2 participants had higher ACTH values than those with GDS 1. Correlations between MAC-Q scores and two personality variables were also observed for males: Neuroticism and Conscientiousness. HPA axis measures correlated with both Conscientiousness and Extraversion for females. These results suggest that subjective memory complaints may be accurate predictors of future cognitive decline, and that those at risk may be identified by certain physiological and personality factors, particularly those relating to stress and coping skills.

### **Coping and Maternal Sensitivity in Mothers of Craniofacially-Disfigured Infants**

*Jennifer Boike, Psychology*

*Sponsor: Dr. Harriet Oster, School of Continuing and Professional Studies*

It has been well established that the impact of infants' medical diagnoses, specifically craniofacial disfigurements, puts them at risk for later psychosocial problems and that this may pose many challenges for parents. This study examined coping processes in two groups of mothers whose infants had craniofacial anomalies: mothers of infants with uncomplicated cleft lip and palate (CLP), and mothers of infants with more complicated and severe craniofacial anomalies or hemangiomas (CFH). I hypothesized that there would be significant group differences and that coping styles would be significantly correlated with levels of maternal sensitivity.

Videotaped *Reaction to Diagnosis Interviews* were transcribed and analyzed for mothers' coping styles according to Folkman and Lazarus's *Ways of Coping Questionnaire*. Statistical analyses showed that the CLP group engaged in Self-Controlling, Seeking Emotional Social Support, and Positive Reappraisal coping processes significantly more than the CFH group. Additionally, I found significant correlations between mothers' coping styles and levels of maternal sensitivity, depression, and social support. These findings may be useful for providing earlier, more effective interventions, helping mothers to respond more positively to their children's medical diagnoses, and beginning the process of creating the nurturing relationship integral to strong mother-child attachment bonds.

### **Do Russian, Mandarin, and Spanish Bilinguals Process English Sentences Differently from Native English Speakers?**

*Jennifer Chen, Psychology, and Zoya Popivker, Psychology*

*Sponsor: Dr. Doris Aaronson, Psychology*

Participants were 88 Russian-, 75 Mandarin- and 117 Spanish-speakers who learned English as their second language and 28 native English monolinguals. Each participant received computer-based grammaticality judgment tasks in both oral and written forms. Accuracy and reaction time were recorded to assess participants' English proficiency. Accuracy rankings among the groups from highest to lowest were English monolinguals, followed by Russian-, Spanish-, and finally Mandarin-speakers. Results indicated that monolinguals and bilinguals displayed different patterns in processing English sentences across the two modalities. In terms of reaction time, monolinguals were faster in processing sentences visually than auditorily, but no significant difference in accuracy was found. Russian-speakers showed no difference in reaction time and accuracy between the two modalities. Mandarin- and Spanish-speakers had slower reaction time for the reading than the listening task. Mandarin-speakers scored significantly higher on the reading task than the listening task, whereas Spanish-speakers did not show a significant difference in accuracy. Findings suggest that as individuals' English proficiency increases, less time is spent on processing sentences visually than auditorily. Possible explanations for these findings include the influence of environmental factors.

### **The Effects of Mental Contrasting on Category Width**

*Jonathan Cipriani, Psychology*

*Sponsor: Dr. Gabrielle Oettingen, Psychology*

In this study, I investigated mental contrasting, a mode of self-regulatory thought in which positive expectations about the attainment of future goals are contrasted with negative obstacles that stand in the way of achieving those goals. I specifically examined the link between this phenomenon and category width, which is how individuals mentally categorize things, and how broad or narrow those categories are.

I predicted that individuals who engage in mental contrasting would see more similarities between items and construct categories of broader sizes than those who

focus only on positive expectations (indulgers) or negative obstacles (dwellers). Indulging and dwelling would cause individuals to get stuck on details, leading to narrow categorization.

To test this hypothesis, I administered a questionnaire to 118 undergraduate students from the NYU Psychology Department's subject pool. Participants were randomly assigned into one of four conditions: control, mental contrasting, indulging, or dwelling. As measured by an object-sorting task, participants in the mental contrasting condition statistically were significantly more likely to be broad categorizers who create smaller groups with many items in each group than were participants in either the dwelling or indulging conditions.

### **How Do Pre-readers Perceive Letters of the Alphabet?**

*Juliet Davidow, Psychology*

*Sponsor: Dr. Scott Johnson, Psychology*

Much of previous research relevant to the acquisition of early reading skills has been limited to phonetic perception of letter combinations as children learn to read. The present study explores differences between visual perception of letters of the English alphabet and meaningless forms which are perceptually similar to letters. Eye-movements of children between the ages of three- and five-years old were recorded as they simultaneously compared paired letter and non-letter forms. Accuracy of identifying and naming the letter in the pair was recorded as a behavioral measure. As expected, there was a difference in performance between younger and older groups on accuracy of identifying and naming the letter. Accuracy positively correlated with gaze duration and number of fixations made in regions of interest. The relationship between the eye-movement measure and the measure of accuracy has implications for understanding the development of early reading skills in young children.

### **Organizational Attractiveness in Higher Education: An Application of the Instrumental-Symbolic Framework**

*Hugh Davis, Psychology*

*Sponsor: Dr. Scott Eggebeen, Psychology*

The instrumental-symbolic framework of organizational attractiveness was used to investigate the specific factors influencing the perceived attractiveness of academic institutions as potential employers. Twenty-two

graduate students completed a paper-and-pencil measure designed to quantify the relationship between the subjective desirability of an institution as a potential place of employment and the instrumental and symbolic attributes that participants ascribe to that institution. While institutional desirability did not significantly affect subscale means, the instrumental or symbolic character of the survey items had a significant effect ( $p < .05$ ) on participant responses. A marginally significant difference ( $p = .66$ ) was also found between participants' responses to the two subscales under the highest level of the survey's three-tiered operationalization of institutional desirability. This study's findings suggest that a dual-faceted conceptualization of organizational attractiveness, as posited by the instrumental-symbolic framework, may be applicable to the study of personnel recruitment among institutions of higher education.

### **Cuban Hip Hop: Its History and Influence on Cuban Culture**

*Vanessa J. Díaz, Latin American Studies and Politics*

*Sponsor: Dr. Arlene Davila, American Studies*

Major media attention has been given to Cuba's version of Hip Hop culture—a culture originally developed in the Bronx, New York, in the late 1970s as a vehicle of expression for disenfranchised youth. Serving the same purpose within the socialist Cuban society, Cuban Hip Hop is defying numerous misconceptions that anti-Castro propaganda has lead foreigners to believe about censorship in Cuba (via its highly critical lyrics). It also reaffirms certain limitations Cuban society faces under Castro's regime (i.e., the lack of commercial success for artists). International attention to Cuban Hip Hop grew after the first annual Cuban Rap Festival, held in 1995; my research, however, indicates that the foundation for the growth of Hip Hop in Cuba was set in the 1970s. My thesis is based on firsthand investigation carried out over the course of four years, including observation of, and participation in, Cuban Hip Hop concerts and colloquiums at the eighth annual Cuban Hip Hop Festival in Havana, at which I interviewed influential Cuban Hip Hop artists and producers. My research traces Cuban Hip Hop step-by-step in a way that has yet to be formally recorded or published. As each year goes by, Hip Hop in Cuba becomes more distinct from that in the U.S. It maintains its radical political charge while, on the other hand, American Hip Hop veers further away from socially-conscious content.

**Making Words from Sounds: Does Statistically-Based Segmentation Facilitate Word-Learning?**

*Rebecca Dreyer, Psychology*

*Sponsor: Dr. Gary Marcus, Psychology*

One early challenge a child faces in learning a language is extracting words from mostly continuous speech. While linguistic and social cues are instrumental in this task, an ability to keep track of distributional information (e.g., varying probabilities of syllable co-occurrence) might also play a crucial role. Saffran et al. (1996) demonstrated that pre-linguistic infants and adults are sensitive to such statistical information, discriminating experimental test “words” (groups of three syllables with a high probability of co-occurrence) from “part-words” (triplets with low transitional probabilities). It is still unclear, however, whether human beings utilize such information in the acquisition of new words.

To test this hypothesis, I presented adults with a continuous stream of nonsense syllables with varying transitional probabilities and overall frequency. Four triplets contrasted for transitional probability, and overall frequency was then uniquely associated with novel objects in a word-learning task. In a test of recall, participants responded significantly faster to the high-frequency “word” than to the low-frequency “word.” Crucially, however, there was no advantage of statistically-defined words over frequency-matched “part-words.” Overall, the results suggest that while sheer frequency of occurrence of syllable-groups is important, transitional probabilities between syllables may not play a significant role in word acquisition.

**Explaining Educational Outcomes Using District-Level Data**

*Maria Fadeeva, Economics*

*Sponsor: Dr. Sydney Ludvigson, Economics*

The idea that increased school funding leads to positive educational results is fairly new. Prior to the 1980s, the influence of the family was considered more important than schooling. Consequently, educational expenditures were not a major policy issue. More recently, however, a growing body of empirical work finds that higher levels of public school funding do, in fact, predict increases in high school graduation rates. The question has now turned from whether increased spending matters to where the increased spending matters most.

Using a database from the National Center for Educational Statistics, I have constructed a unique data set

of over ten thousand American public school districts, averaged over the 1996–2000 school years. Controlling for demographic variables, I used regression analysis to find which funding policies are associated with the highest graduation rates, and in which geographic regions of the U.S. expenditures are most effective. I found that different regions of the U.S. have varying trends in revenue absorption, and that the most effective factor overall for improving graduation rates was a low pupil-to-teacher ratio.

**Does Control Matter in How We Experience Reward?**

*Dominic Fareri, Psychology*

*Sponsor: Dr. Elizabeth Phelps, Psychology*

Research has shown that rewards can be perceived differently as a function of control. This study examined the impact of control on physiological responses to receiving a reward. Are similar responses observed when people receive a reward contingent on their own actions, as opposed to when they receive a reward contingent upon someone else’s actions? I used a gambling paradigm in which pairs of participants took turns guessing the numeric value of a card in an attempt to contribute to a total sum of money that would be shared equally. I hypothesized that experiences of reward would be higher when participants perceived having control over receiving a reward than when they are observing the other participant’s performance. I assessed this by two means: galvanic skin response (a measure of physiological arousal) and self-report questionnaires asking about participants’ feelings of control and motivation during the experiment. I found significantly higher self-ratings of reward-associated feelings on the questionnaires when control was perceived. Physiological recordings, however, were not affected. The results suggest that, subjectively, rewards are experienced more intensely when one perceives control over obtaining the reward as opposed to watching passively as someone else obtains it.

**Orienting Sexuality: Marginalization, Sexual Identity, and Secondary Education**

*Jillian Farrara, English and Sociology*

*Sponsor: Dr. Ruth Horowitz, Sociology*

My research documents and assesses the high school experiences of gay, lesbian, and bisexual students. Through a series of twenty-six in-depth, retrospective interviews with eighteen- to twenty-five-year-old queer students and alumni of four-year colleges and universi-

ties, I sought to determine whether and how queer students are marginalized by contemporary mainstream education. I attempted to decipher the role of education in the construction of sexual identity, to ascertain the coping mechanisms and navigational strategies employed by queer students to attain success, and to acquire insight into the current controversy surrounding the place of queer issues and students in secondary education. I supplemented the analysis of the data with relevant literature. My findings indicate that a hegemony of heteronormativity prevails in contemporary schools. Queer identities lack positive affirmation or recognition, and are largely misrepresented or unrepresented in school curricula and extracurricular activities.

Student success in the face of this marginalization can be significantly attributed to the breadth of the students' "scope"—a combination of students' impressions of the possibility of queer identities and lifestyles and their ability to conceive of an identity-affirming environment upon graduation—and their capacity to hone any number of various coping strategies, including adaptive, relational, compensative, substitutive, and constructive methods. The data suggest that high school success is not indicative of a healthy or positive schooling experience; most students experienced considerable delays in social maturation and identity development.

#### **Reactions to Interactions with Authority Figures**

*Jennifer Fox, Psychology*

*Sponsor: Dr. Tom Tyler, Psychology*

When are people motivated to do more than they must for a group to which they belong? My research examined the effects of exclusion concerns and treatment by an authority figure on group members' willingness to engage in group-serving behaviors. Participants were informed that they were members of a small group. They were then primed with words connoting either social inclusion or exclusion. Participants received feedback, ostensibly from an authority figure within the group, regarding their contribution to the group assignment. This feedback was based on either fair or unfair procedures. Results indicated that participants identified more strongly with and desired more of a connection to the group when they were primed with social exclusion; and that they were more committed to the group and willing to perform extra-role behaviors when treated fairly. Additionally, an interaction revealed that participants who received fair feedback perceived themselves as having a closer relationship with the group when

they were primed to feel excluded, in comparison to those who were primed to feel included. These findings suggest that when dealing with people who have been socially excluded, it is important to treat them fairly to enhance their contributions to the group's well-being.

#### **Subsidized Segregation: Federal Housing Programs and Racial Segregation**

*Ryan Gee, Metropolitan Studies and Politics*

*Sponsor: Dr. Simone Buechler, Metropolitan Studies*

This project examines the relationship between federal housing programs and racial segregation, especially regarding tenant-based subsidies (e.g., Section 8 vouchers). Archival research places the problem in a historical context, while quantitative methods of mapping and statistical analysis illustrate the relationship between vouchers and segregation in Manhattan.

There is little question among scholars that early public housing perpetuated segregation, sometimes purposefully. In the wake of the 1960s race riots, President Johnson proposed new housing programs with the implicit goal of desegregating the racial "ghetto." President Nixon, by privatizing public housing, greatly reduced the government's ability to bring about integration. The shift of low-income housing production to the private market prevented the federal government from ensuring that such housing would promote racial integration. Nixon claimed that giving households the economic wherewithal to enter the private market would guarantee freedom of choice. This belief ignored the prejudices and constraints on minorities existing in the private market. The analysis of Section 8 vouchers in Manhattan today suggests that vouchers alone do not ensure racial integration. While vouchers may theoretically safeguard residential choice, assistance must be provided in overcoming the barriers to integration found within the private market.

#### **Perspectives on the Voting Behavior of Gay Men, Lesbians, and Bisexuals in New York City**

*Justin Goldbach, Politics*

*Sponsor: Dr. Anna Harvey, Politics*

Based on data gathered from polling research during the general election in New York City, this project revealed a number of remarkable findings. The first question this study focused upon is whether, regardless of demographic variables, a voter who self-identifies as gay, lesbian, or bisexual is more likely to vote for the Democratic candidate. To test this theory, logit analysis

was run on the general election data collected, with presidential vote choice as the dependent variable. Besides ideology, which one would expect to have a high prediction value in determining vote choice, the estimated coefficients of race and gay, lesbian, or bisexual (GLB) identity were statistically significant. Surprisingly, GLB identity was found to be a better predictor of vote choice than race. GLB identifiers and nonwhites in New York City were significantly more likely than non-GLB identifiers and whites to cast their ballots for the Democratic candidate in the 2004 election, independent of other demographic variables.

When asked, 23 percent of New York City GLB voters in the data collected indicated that gay rights is a serious concern. This was determined by including the specific wording “gay rights” in the Gallup “most important concern” question frequently asked in exit polling. Holding all other variables at their means, respondents who identified as gay, lesbian, or bisexual were 15.80 percent more likely to list gay rights as either their first or second concern than were those respondents who did not identify as GLB. Age was found to be the sole variable that had significant impact upon one’s decision to respond to this question.

Another central question of this study was if one identifies as GLB, will marking gay rights as one’s first or second primary concern increase the probability that he or she will vote for the Democratic candidate. This theory proved to be unsupported after statistical data analysis.

### **The Generality of Rule-Extraction**

*Jamie Gonzalez, Childhood/Special Education, and Ngoc Lan Man, Psychology and Sociology*  
*Sponsor: Dr. Gary Marcus, Psychology*

Marcus et al. (1999) have found that seven-month olds can learn simple “algebraic” rules (e.g., *XYX*) from sequences such as *ga-ti-ti* and generalize them to novel sequences (e.g., *wo-fe-fe*). Endress et al. (2005) question the generality of these mechanisms on the basis of differences between medial and final identity detection in their adult studies. They conclude that rule acquisition occurs because of “perceptual analyzers” constrained to salient positions (e.g., the ends of words and sentences).

Our studies were designed to evaluate systematically the effects of position on rule-learning. In a between-subjects design, adults learned a syllable iden-

tity rule in sequence-medial or sequence-final positions and were asked to identify the training pattern in novel sequences. As expected, we found that participants trained with final identity were better at identifying the pattern than those trained with medial identity. This suggests that salience does play a role in focusing attention on patterns. In the crucial medial identity condition, however, participants performed significantly above chance in generalizing the pattern to novel sequences. Contrary to Endress et al.’s claim, our results suggest that rule-learning mechanisms are not constrained by salience, but are fully general with respect to position.

### **Participacion Ciudadana in the Dominican Republic: Changing the Nature of Citizen-State Interaction**

*Yanilda Gonzalez, Politics and Latin American Studies*  
*Sponsor: Dr. Christopher Mitchell, Politics*

Throughout its history, the Dominican Republic has faced numerous obstacles to the development of a viable democracy. Over the last several decades, the challenge has come in the form of neopatrimonialism, a type of government in which power is concentrated in the hands of a single leader who runs the state as though it were an extension of his household. This leader maintains the dependence and loyalty of his followers through a complex system of clientelism, patronage, and coercion. Since its transition toward democratic rule in 1966, the Dominican political system has continued to exhibit neopatrimonial characteristics, as revealed by a quick examination of the state’s provision of basic services in health and education between the 1960s and 1990s.

A strong connection exists between democracy and the provision of public services, due to the competitiveness of democracies and the relative ease with which leaders can be removed from office through periodic elections. The success of this process depends on the ability of voters to act collectively to communicate their preferences to leaders, and to remove them from office at the next election if they do not act on voter preferences and improve services. Such mechanisms have not functioned in this desired manner in the Dominican Republic because interactions between citizens and public officials have traditionally taken place through patronage and clientelist structures, and formal organizations have remained either weak or nonexistent except for political parties.

A promising change, however, has developed over the past decade, which has significantly changed the nature of the relationship between citizens and the government. In recent years the emergence of groups such as Participacion Ciudadana, which carries out extensive public education campaigns, creates ever-growing spaces for direct interaction between citizens and government, promotes mechanisms for citizen monitoring of government activity, and aggressively works to combat corruption in public administration, is cause for optimism, even as remnants of neopatrimonialism continue to surface.

### **Effects of Suspiciousness on Control of Implicit Impressions of Others**

*Jonathan Gorman, Psychology*

*Sponsor: Dr. James S. Uleman, Psychology*

People spontaneously infer dispositional qualities of actors when they encounter behaviors performed by those actors (Uleman, Newman, Moskowitz 1996). What situational factors mediate one's control over spontaneous trait inferences? Research suggests that suspiciousness about the motivations underlying the behaviors of an actor can reduce the effects of automatic processes (i.e., correspondence bias, Fein 1996). I hypothesized that when observers become suspicious of the motives of an actor, the effects of implicit impressions could be relatively better controlled. Participants in this study were instructed to look at photographs of individuals that were paired with trait-implying descriptions of their own behavior. Participants were either made highly suspicious, somewhat suspicious, or not at all suspicious about the motivations of the behaviors. Participants were then instructed both to include and exclude the information they learned about the actors in making explicit trait ratings. The difference between the ratings under these two instructions allowed me to make an estimate of the amount of control over judgments (Jacoby 1991). While analyses for this study continue, I predict higher suspiciousness will yield higher amounts of control over the effects of spontaneously-inferred traits on later impressions.

### **A Three-Process Theory of Reading Rate: Letters, Words, and Sentences**

*Shuang Guo, Psychology*

*Sponsor: Dr. Denis G. Pelli, Psychology*

People with central field loss can read only by using their peripheral vision. Their reading has been shown

to be slow, even after training. In order to explain the cause of slowed peripheral reading rate, the computational processes of reading must be identified. I introduced a three-process model of reading with several components: Letters, for letter-to-letter decoding; Words, for holistic recognition; and Sentence, for contextual effects. Each process makes an additive contribution to reading rate in words per minute. I constructed knockout manipulations, which selectively and effectively knocked out one or more of these processes. I expected the Letter process to be most affected in peripheral reading due to crowding, or interference by nearby letters. I measured the foveal and peripheral RSVP (Rapid Serial Visual Presentation) reading rate of three observers by using text that incorporates different combination of the three processes. Consistent with my model, reading rates decline when one or more of the processes are knocked out, and the reading rates yielded by each process are additive. As I expected, the Letter process was most affected in the periphery.

### **MEGaVis: Perceptual Decisions in the Face of Explicit Costs and Benefits**

*Deepali Gupta, Psychology*

*Sponsor: Dr. Michael S. Landy, Psychology*

In perceptual tasks involving rewards and penalties, observers appear able to maximize expected gain. Can observers estimate their own variability and compensate for it to maximize expected gain? Participants were shown a texture followed by a test display. The textures consisted of a set of randomly oriented line segments. The participant's task was to estimate mean line orientation. The mean and variability of the orientations varied from trial to trial. The test display consisted of two white arcs (the reward region) and two black arcs (the penalty region), both located at opposite ends of a circular window. Participants rotated the test display to an orientation based on their estimate of the mean orientation in the texture. If the mean texture orientation fell within the setting of the reward region, the participant lost 0, 100, or 500 points (in separate blocks of trials). Performance was compared to a model that maximizes expected gain. Such a model predicted that participants would set the test display more conservatively (avoiding the penalty) when penalties were larger and when variability was greater. It was found that participants did not shift away from the penalty in accordance with the model, thereby signifying that they were not optimal at this task.

**Basic Gender Identity Development: A Cognitive-Developmental Approach to the Relationship between Gendered Vocabulary and Children’s Play Behaviors**

*Michelle Haddad, Psychology*

*Sponsor: Dr. Diana Ruble, Psychology*

The knowledge that one is a boy or a girl, known as basic gender identity, is the foundation of an individual’s gender development. There is considerable debate, however, over when basic gender identity emerges and its link to sex-typed behavior. To gain insight on the timing of the emergence of basic gender identity, this study focused on the relationship between gender labeling and the development of sex-typed behaviors, as evidenced by gender typical play. This study used data from a longitudinal study of seventeen- and twenty-one-month-old infants, and included both videotaped sessions of the children playing alone and with their mothers, and parents’ reports of the children’s spontaneous gender vocabulary (Tamis-LaMonda et al. 2001). The study found that children who used gender labels by seventeen months demonstrated more gender-typical behaviors by twenty-one months than those children who did not use gender labels by seventeen months. This study also found that girls began using gender labels at a significantly younger age than boys, and that girls demonstrated more gender typical play at both ages than boys.

**Rikers Island and Representative Democracy: Collateral Consequences of Incarceration in New York City**

*Ellie Happel, Metropolitan Studies*

*Sponsor: Dr. Daniel Walkowitz, History and Metropolitan Studies*

There are five times more people incarcerated in the United States today than there were thirty years ago. The decline of welfare governance, the exodus of jobs from the inner city, the war on drugs, and the onset of determinate sentencing have contributed to the prison surge. New York State exemplifies the national trend of incarceration. My study explored the relationship between poor urban communities and the prison. It specifically focused on the political consequences of mass imprisonment—disenfranchisement, redistricting, and representation.

The Census Bureau counts prisoners as residents in the county that imprisons them. In New York State, over 85 percent of prisons are in upstate, rural areas. Two-thirds of all prisoners, however, call New York City neighborhoods home. Thus, these “imported” prisoner

constituents, most often black or Latino, increase rural populations (and potentially the number of rural political districts) at the expense of their home communities. Recently, legal rights activists began studying how the Census Bureau count impacts state assembly and legislature district lines. They found that upstate, rural districts depend on prisoners to meet the minimum population mandated for legal district lines.

My study shifted the level of political analysis from state districts to city districts. Specifically, I asked how the Rikers Island population impacted city council redistricting. My research framed the Census Count as one issue among a web of collateral consequences of incarceration. By focusing on neighborhoods with high rates of incarceration, I analyzed the relationship between the prison and urban space. Drawing on theoretical and empirical works, my research illustrates the symbiotic and reinforcing relationship between the institution of the prison and poor, urban neighborhoods.

Compounded by the loss of jobs from central city areas, the war on drugs, changes in sentencing, and a decline in state welfare spending, the political consequences of incarceration—namely felony disenfranchisement and the Census Bureau prisoner count—harm poor, city neighborhoods. Ultimately, my research showed that if the Census Bureau changed its method of counting prisoners, the New York City Districting Commission would have to create an additional City Council District in the South Bronx. Although changing the Census count or creating an additional South Bronx City Council District would not solve the problem of mass incarceration, these proposed policy changes would create an important opening of democratic justice and community empowerment.

**How Infants Generate Information for Action**

*Alan Harissis, Psychology*

*Sponsor: Dr. Karen E. Adolph, Psychology*

Infants acquire independent mobility toward the end of their first year. At the same time they are learning to integrate perceptual and social information to control their locomotor actions—whether to crawl over the edge of a bed, descend stairs, and so on. Infants generate perceptual information through exploration (looks and touches) and prompt social information by vocalizing toward their caregivers. Furthermore, information gathering may elicit social information from caregivers when they observe their children failing to solve the task.

In this study, mothers encouraged their eleven-month-old crawling infants to descend safe and risky

slopes. The study had two aims: to document the exploratory and communicative behaviors infants use to generate perceptual and social information, and to test whether infants use perceptual and social information to guide locomotion in an adaptive fashion.

Infants generated a wide range of perceptual and social information before deciding whether to descend. They exhibited more exploratory behaviors (prolonged looks, touches, and vocalizations) on risky than safe slopes. Mothers' vocalizations also increased with risk. Infants were less likely to attempt descent on risky slopes when they had generated or received perceptual or social information. Infants are able to use perceptual and social information to make adaptive locomotor decisions.

### **A Sociological Perspective of New York City Busses**

*William Holton, Sociology and Politics, and Michael Kokozos, Sociology and Psychology*  
 Sponsor: Dr. Ruth Horowitz, Sociology

Our study examined what people encounter on New York City busses, an unfocused gathering place where civil inattention permeates the experience. Passengers follow the rules, for the most part, and in the process create private spaces for a variety of reasons. Sometimes they create private space because they are maintaining their self-preservation, while other times they simply enjoy the benefits that come with having more space. The unique landscape that is New York City places the bus rider in a precarious social position, but following the rules and maintaining the order of the bus experience make it bearable. This civil inattention and lack of meaningful relationships are caused because the bus is organized in a way that is focused on efficiency. People learn through routines, through participating in New York City bus culture. As with any activity that becomes habit, people act like automatons who follow these rules without even realizing they are doing so. They only react to what is happening if these rules are violated or if they sense a problem.

### **Racial/Ethnic Differences in Undergraduate Academic Performance as Understood through Alcohol Use, Drug Use, and Parents' Education**

*Antonio Infante, Psychology and Sociology*  
 Sponsor: Dr. Patrick Shrout, Psychology

My study investigated the question of how alcohol use, drug use, and parents' education can be used to understand racial/ethnic differences with regards to undergraduate academic performance. Data for this project

came from the 1999 *Harvard School of Public Health and College Alcohol Study*, conducted by Professor Henry Wechsler, which included self-reported information about the backgrounds, alcohol and drug habits, activities, and behaviors of undergraduates. The data set comprised responses from approximately 14,138 undergraduates from 119 colleges in the United States. Regression analysis was used to examine racial/ethnic differences in self-reported academic performance. The regression model was adjusted for alcohol use and drug use, and then for parents' education to explore how such factors affect the relationship between racial/ethnic identity and academic performance. I found that after adjusting for alcohol and drug use the reported grade point average differences between non-Hispanic whites and other racial-ethnic groups were more pronounced. Conversely, adjusting for parents' education reduced, but did not eliminate, the differences between groups. I interpret these results in the context of theories regarding the achievement gap and the limitations of the available data.

### **Combining Achromatic and Chromatic Cues to Generate Perceived Transparency**

*Steven V. Kardos, Chemistry and Psychology*  
 Sponsor: Dr. Laurence Maloney, Psychology

Previous studies on visual transparency have focused either on luminance or chromatic domains for creating a percept of transparency. Kasrai and Kingdom (2001) have shown that transparency can be attained achromatically by using a six-region display. They have concluded that observers' perceptions of a uniform transparent filter were both accurate and precise with Metelli's episcotister predictions. Furthermore, D'Zmura and Chen (1998) hypothesized a chromatic convergence model in which participants' choice of color would lie along a line segment in color space. Their results, however, showed that the convergence model fits the data of observers in limited situations. In the present study, therefore, I explored whether the combination of both achromatic and chromatic properties contribute to better percepts of transparency. The experiment consisted of four different stimuli. Results showed that there was evidence for cue combination because additional information, both achromatic and chromatic cues, enhanced percepts of transparency. Simply adding color to a display would not create an improvement in the percepts of transparency. The color must be added in a transparency-consistent manner in agreement with Metelli-like results.

**A Shift in Strategy: Why the Anti-apartheid Movement in South Africa Returned to a Strategy of Nonviolence with the Formation of the United Democratic Front in the 1980s**

*Bari L. Katz, Politics and Sociology*

*Sponsor: Dr. Ruth Horowitz, Sociology*

My research examined why there was a shift in strategy during the late 1970s and early 1980s in the fight against apartheid in South Africa, specifically with the formation of the United Democratic Front (UDF). Mass mobilization during this period occurred through protests and boycotts as opposed to the more violent tactics that had been used in the decades before. In analyzing primary source documents, including speeches, memoirs, articles, and conference transcripts, I uncovered the motivations of the leaders of the UDF that led to this shift.

I have reached several conclusions about why the UDF and its affiliated organizations chose to reemploy nonviolence after years of militancy and violence. First, the African National Congress (ANC) had faded away by the beginning of the 1970s as a leading force in the anti-apartheid movement. After massive nonviolent campaigns in the 1950s and the government's violent response to such demonstrations, many of the most influential members of the ANC by the 1960s were either banned, exiled, or imprisoned. Second, militancy as a general strategy had failed to achieve the goals that the movement represented. In the early 1980s, several groups formed and reemerged, which prompted the formation of the UDF. A third conclusion is that the reduced violence by the state during the early part of the 1980s created an opening for the organization, allowing it to use nonviolent tactics.

The data suggest that the reason the UDF was able to mobilize widespread support during this time was because it framed the struggle in terms of local issues (e.g., high rent, living wages, food and electricity prices) that directly affected peoples' lives. The UDF succeeded in mobilizing many South Africans because it shifted the focus of the movement from one of race to one of nation, which was much more inclusive.

**Emerging Infant Communicative Abilities in the Still-Face Paradigm: The Effects of Maternal Sensitivity and Craniofacial Anomalies**

*Rachael Katz, Psychology*

*Sponsor: Dr. Harriet Oster, School of Continuing and Professional Studies*

This study examined the relationship between maternal sensitivity and depression and infants' commu-

nicative abilities in infants with and without craniofacial anomalies. Three groups of infants, including infants with uncomplicated cleft lip or cleft lip and palate (n = 12), other craniofacial anomalies or hemangiomas (n = 9), and comparison infants (n = 14), and their mothers were videotaped in the Still-Face Paradigm. I predicted that infants of mothers with higher levels of maternal sensitivity, as determined by the Ainsworth Maternal Sensitivity Scale (Ainsworth 1969), and mothers with lower levels of depressive symptoms, as determined by the Center for Epidemiological Studies-Depression Scale (CES-D; Radloff and Wales 1977), would direct more gaze to their mothers than infants of mothers with lower levels of maternal sensitivity or higher levels of depressive symptoms. I also hypothesized that infants who direct more gaze to the mother would have fewer social and communicative delays at one year. I found that diagnostic group indirectly affected infant gaze behavior through maternal sensitivity. Infants of mothers with lower levels of maternal sensitivity directed their gaze towards the mother for a smaller percent of time in the interaction and had less synchronous interactions as measured by the *Interaction Rating Scale* (Field 1980). In addition, maternal sensitivity was negatively correlated with maternal depression. Interventions are therefore important to ensure positive early infant interactions and later social and communicative infant development. Because they are at high risk for later problems, these interventions are especially important.

**Construal Level and Self-Control in Repeated Events**

*Miya Kitahara, Psychology*

*Sponsor: Dr. Yaacov Trope, Psychology*

Research has shown that construing events at high levels (reflecting abstract, essential features), as compared to low levels (reflecting concrete, incidental features), leads to greater self-control. I propose that high level construals lead to self-control by promoting sensitivity to global consequences of one's decisions and actions. I tested this hypothesis by priming high and low construal levels, and then observed participants' preferences for global versus local outcomes in a self-control task modeled on implicit learning paradigms. The results indicated that high level construals led to greater preferences for global outcomes, but that this effect is moderated by goal importance. Although results were as predicted when the importance of performing well on the task was low, this pattern was reversed when importance was high. I interpret these results to mean that high importance induces active, consciously-

driven psychological strategies that override passive, implicit processes. When in passive modes (i.e., low importance), high levels lead to preferences for global outcomes as hypothesized. High level construals, however, may not only enhance sensitivity to global consequences. They may also lead to more rigid, less flexible decision-making and behaviors when in active modes. This may explain the unexpected results and encourages research on construal level theory in active modes of processing.

### **Building Market Failure, but It's Okay: An Economic Interpretation of Architectural Design**

*Robin S. Kloc, Economics and Urban Design*  
*Sponsor: Dr. Jean-Pierre Benoit, Economics*

Economic theory is an important context for architectural design. Previous literature on this topic reveals underlying themes of subjectivity, of value, and of differentiating between functionalism and aesthetics. I describe a general market for architectural design, one in which firms face a complex system of microeconomic constraints, and in which "consumers" subjectively assign value to architectural design. It is not only an economic good in itself; "good" architectural design in particular is an amenity, proven to meet the definition of a pure public good which poses significant problems for the efficient allocation of resources within competitive markets. Moreover, the inevitable presence of positive externalities associated with "good" architectural design leads to this same problem of underproduction. Such market failure is categorical, unable to be addressed by either public- or private-sector parties. Thus, the hypothetical solution to this market failure (e.g., the implementation of measures to increase the production of "good" architectural design) is simultaneously its cause as well. Market failure is therefore a self-replicating phenomenon. Nevertheless, it may be interpreted as a positive motive force behind the sustained drive to improve aesthetic qualities of our built environment.

### **Transference, the Relational Self, and Ethnic Intergroup Bias**

*Christina Kooij, Psychology*  
*Sponsor: Dr. Susan M. Anderson, Psychology*

Research on the social-cognitive model of transference suggests that the activation of mental representations of significant others leads to the activation of generic social knowledge pertaining to those significant others. The present research examines the implications of this for ethnic intergroup bias. In two studies, par-

ticipants read about a person who resembled a significant other whom they had described in an earlier session. Participants were then asked to assist in the selection of partners for a fictitious NYU program by indicating their preferences for students who either shared or did not share their ethnicity. In Study 1, participants showed a greater degree of intergroup bias when the person shared (vs. did not share) his/her ethnicity with the participant. Transference with a shared-ethnicity significant other also increased the accessibility of traits that were descriptive of their ethnic in-group. In Study 2, activation of a significant other with an ethnically diverse social network (versus one with an ethnically narrow network) led participants to exhibit less intergroup bias. In both studies, the findings did not hold for control groups in which participants were not in transference. These findings contribute to recent endeavors to examine jointly relational and collective levels of social cognition.

### **Characterizing Visual Performance Fields in Children**

*Rishi Kothari, Psychology*  
*Sponsor: Dr. Marisa Carrasco, Psychology*

For adults, it is known that contrast sensitivity and spatial resolution are better along the horizontal than vertical meridian—also known as horizontal vertical anisotropy (HVA), and better in the lower than upper vertical meridian, also known as vertical meridian asymmetry (VMA). Speed of information accrual in adults follows this same pattern, i.e., it is faster along the horizontal meridian and slowest at the upper locations (Carrasco et al. 2001, 2004). To assess whether ecological factors modulate these performance fields, I investigated whether the discriminability asymmetries are present with grammar school children.

Observers performed a 2AFC orientation discrimination task on Gabor patches tilted  $\pm 30^\circ$  from vertical. Each trial consisted of a central fixation point ( $.2^\circ$ ), which was soon replaced by a smiley face ( $1^\circ$ ) to maintain participants' fixation and to signal the onset of the trial. A  $2^\circ$  Gabor (4-cpd) was presented for 100 ms at one of eight equally probable iso-eccentric ( $6^\circ$ ) locations. The brief display duration precluded eye movements, allowing me to equate field and retinal eccentricities.

Results indicate that HVA was present for all adult and child observers. Surprisingly, the children exhibited an inverse VMA to that of adults. Whereas adults' performance was superior at the lower regions of the vertical meridian, children's performance was better at

the upper regions. This finding suggests that ecological factors may help modulate the visual constraints underlying the VMA. Studying the developmental course of visual field asymmetries helps elucidate the role that the environment plays in perceptual performance, and may have implications for human factors.

**Variation of Formality in Written Communication**

*Joy Lehmann, Linguistics*

*Sponsor: Dr. Gregory Guy, Linguistics*

The effect new mediums of written communication have on how people write presents an interesting opportunity for linguistic study. Could writing, which has always been viewed as more formal than speech, have evolved levels of formality akin to spoken interaction? For speech, I used the familiar formality scale of sociolinguistic research which ranks spoken conversation as least formal, recorded interviews as being at an intermediate level, and reading aloud as most formal. My hypothesis was that instant messaging would be the least formal written style and resemble conversation by its interactivity; that e-mail would have a middle level of formality; and that academic writing would be highly formal.

To test this hypothesis I recorded conversations, interviews, and readings. I collected samples of instant messaging conversations, e-mails, and papers from four subjects. I analyzed this data for the occurrence of contractions, which are easily recognizable and related to formality. I acquired about three thousand examples, and a multivariate analysis produced these relative probabilities of contraction for each mode:

	Informal	Middle	Formal
Speech	0.71	0.62	0.10
Writing	0.61	0.51	0.03

The data indicate that written communication, while still more formal than speech in general, exhibits the same variability of formality that once was reserved for speech.

**The New Deal Order in Dominance and Crisis: Urban Renewal in Newark, New Jersey, 1940–1970**

*David Levitus, History*

*Sponsor: Dr. Paul Mattingly, History*

This historical study investigates Newark’s response to its perceived decline and how the failures of that response changed politics and policymaking in the city. Slums had been a feature of Newark since the rise of

industrial production after 1800. The jobs created by this boom attracted thousands of European immigrants, who became a source of cheap labor for economic growth. Yet by the end of World War II, the slums became the primary symbol of, and reason for, Newark’s decline. Perpetuating concerns from the pre-Depression era, civic leaders worried about the city’s image, its fiscal health, and the influence of bad housing on the welfare of the poor and working classes. Rather than confront the economic inequality or the suburban exodus of manufacturers and higher-income families which had created and spread the slums, civic leadership adopted a widely circulated notion that total clearance and redevelopment of areas was the solution. In place of crumbling apartments that paid minimal property taxes, new “modern” buildings would rise. In keeping with the city’s longstanding political culture, neither representatives of the city’s various ethnic communities nor allies of business interests sought to ask what citizens in the slum areas thought. In the headlong and unreflective rush to cure the city, its “urban renewal” program of demolition and redevelopment displaced tens of thousands of mostly African-American residents, and in the process destroyed thousands of small businesses. When one of America’s worst race riots erupted in July 1967, in large part because the “urban renewal” program had aggravated Newark’s problems instead of curing them, the paternalism of the old order cracked. Both the exclusion of ordinary citizens’ voices and the obsession with images and budgets over social conditions gave way to an invigorated grassroots debate about the deep social problems of the city.

**How Infants Keep Balance While Carrying Loads**

*Grace Lin, Psychology*

*Sponsor: Dr. Karen E. Adolph, Psychology*

Learning to keep balance is a remarkable motor achievement. Upright balance is especially difficult for infants because they must learn to maintain their bodies within a region of permissible postural sway while mastering the biomechanics of walking. Carrying loads compounds the problem by pulling the body toward the edge of the sway region.

Previous work showed that fourteen-month-olds’ walking patterns were more disrupted by asymmetrical loads to the sides, front, or back of the body than by evenly distributed loads. The current study investigated infants’ strategies for coping with symmetrical and asymmetrical loads. I coded videotapes from the previous experiment to determine whether infants adopted a

uniform balance control strategy—keeping their bodies stiff across all conditions; implemented an adult-like strategy—leaning away from the direction of the load; or relied on a default strategy—allowing their bodies to be pulled in the direction of the load.

In over 70 percent of trials, infants relied on the default strategy to keep balance while coping with loads. While front-loaded, infants were more likely to keep their bodies rigid against the pull of the load. No infants implemented an adult-like strategy.

### **Rule Abstraction and Rule Generalization: Are They the Same?**

*Justin P. Little, Neural Science and Psychology*

*Sponsor: Dr. Gary Marcus, Psychology*

The ability to combine symbols productively through a system of rules (grammar) is a defining feature of human language. Marcus et al. (1999) have shown that seven-month-old infants can abstract simple “algebraic rules” like ABB from syllable sequences such as *la-ni-ni* and generalize such rules to novel sequences (e.g., *wo-fe-fe*). Yet infants have difficulty abstracting and generalizing comparable rules from equivalent sequences of nonspeech sounds such as tones, timbres, or animal vocalizations (Marcus et al. submitted).

The ability to abstract a rule, however, is logically distinct from the ability to generalize a rule. In this study, I investigated if infants could generalize a rule learned from speech sounds to sounds from novel domains. Infants were familiarized with a rule (ABA or ABB) with speech sounds and tested for their learning in a head-turn preferential-looking method. I found that infants ( $n = 8$ ) trained on the ABB pattern looked significantly longer at the novel ABA rule with timbre sounds (e.g., *saxophone-piano-saxophone*) than the familiar ABB rule (e.g., *saxophone-piano-piano*). Preliminary data also indicate an analogous trend with infants trained on the ABA rule. These results suggest that rule extraction and rule generalization are separable processes that work over different domains.

### **Does the Past Predict the Future? Construal Level Theory in the Past**

*Anna Luerksen, Latin American Studies and Psychology*

*Psychology*

*Sponsor: Dr. Yaacov Trope, Psychology*

This study tested the hypothesis that temporal distance influences the level of mental construal of an individual’s behavior in the past. In accordance with prior research on Construal Level Theory (Liberman and Trope

1998), I predicted that information about a person’s behavior in the distant past is construed at a high level, with behavior seen as a reflection of global personality traits, or his/her essence. Alternatively, information about a person’s behavior from the recent past should be construed at a low level in which contextual details are considered more and thus interfere with the extraction of his/her essence. Specifically, I hypothesized that when predicting distant future behavior of a target, participants will use information about the distant past more than information about the near past because they would employ the same high level of mental construal. Likewise, participants were expected to use information about the near past more when predicting near future behavior because they would evoke the same low level of mental construal. While the results of this study did not support these predictions, there are several methodological improvements that could be made to address better the role of construal level in interpreting past behavior.

### **Level of Construal and Allocation of Effort**

*Nicole Martingano, Psychology*

*Sponsor: Dr. Yaacov Trope, Psychology*

Construal level theory posits that situations may be viewed at various levels of abstraction. Individuals tend to construe situations that are temporally distant more abstractly than those that are nearer in time. A high-level, abstract construal is associated with a focus on the general, overarching features of a situation, while a low-level, or concrete, construal is associated with a focus on nonessential, peripheral features of a situation. The present study examined the relationship between temporal distance and allocation of effort. Based on previous research, it was expected that participants would exert a larger proportion of effort for the most essential features of a task if they were told that feedback regarding performance on the task would occur in the distant future, rather than in the near future. Contrary to predictions, participants in the near future group recalled a greater proportion of primary words to secondary words than did those in the distant future group. This indicates that participants in the near future group allotted a greater amount of effort to the high level aspect of the task than did those in the distant future group.

### **Depressive Realism and Bar Exam Performance**

*Erica Maya, Psychology*

*Sponsor: Dr. Patrick Shrout, Psychology*

Depressive realism posits that depressed individuals have more accurate perceptions and judgments than

nondepressed individuals because they do not discount negative information. I studied whether depressive realism operates in a prospective life situation where future performance on a demanding test is predicted. My sample consisted of 427 recent law school graduates who were preparing to take the State Bar Exam. On each day for five weeks before the exam participants reported confidence in their preparation. Examinees also completed questionnaires that included measures of depression. I predicted that the association of the confidence to the probability of passing the exam would be stronger among examinees who were depressed. Using logistic regression models, I found that passing the bar was predicted by confidence and by some measures of depression. I did not, however, find an interaction between confidence and depression. Overall, I found that being discouraged made it less likely to pass the Bar Exam, but this was not related to the examinees' history of depression. I concluded that depressive realism does not seem to operate on prospective judgments, but may be restricted to retrospective judgments as initially proposed.

#### **Interpersonal Penalties for Failure on Sex-Consistent Domains**

*Corinne Moss-Racusin, Psychology*

*Sponsor: Dr. Madeleine Heilman, Psychology*

A total of forty-one subjects participated in an experimental study which investigated reactions to women who had been shown to fail on either a sex-consistent (female) or sex-inconsistent (male) sex-typed task. Subjects read six-month performance evaluations of target employees who had either demonstrated unclear failure, or who had been shown to fail irrefutably. Consistent with previous research on success situations, targets were interpersonally penalized for clear failure on sex-consistent domains due to the violation of prescriptive gender stereotypes. Specifically, I hypothesized that when they are shown to fail on a female sex-typed task, women are rated as less likeable and are more personally derogated than those women who have been shown to fail on a male sex-typed task. Furthermore, these differential evaluations are also greater when failure has been clearly shown to stem from true lack of competence than when this failure can be attributed to more situational factors.

#### **The Manifestation of Emotion Regulation in Children with Craniofacial Anomalies**

*Elizabeth Murphy, Psychology*

*Sponsor: Dr. Harriet Oster, School of Continuing and Professional Studies*

The regulation of positive and negative emotions is an essential feature of individual development that begins during infancy and persists beyond childhood. Self-regulation occurs on multiple levels across a broad spectrum of internal and external processes. Current research links deficits in self-regulation to adjustment difficulties in early childhood (Calkins and Howse 2004), but research is lacking concerning special populations of children who may be at a high risk for developing adjustment problems. The current research is a longitudinal study examining regulatory behavior in three groups of six-month-old infants: uncomplicated cleft lip with or without cleft palate (CLP); more complicated and often more severe craniofacial anomalies or hemangiomas (CFH); and unaffected comparisons (COMP). I examined group differences in regulation during the Still-Face Paradigm (Tronick et al. 1978) and relations between these behaviors and childhood adjustment at six to ten years of age as measured by the Child Behavior Checklist/4-18 (Achenbach 1991). Results show that group differences in self-regulation exist at six months, but that regulatory behaviors are not significantly related to childhood adjustment difficulties. Although groups differ in specific regulatory behaviors at six months, I did not find that these differences have predictive implications for later problems in childhood adjustment.

#### **The Role of Causal Reasoning in Category-Based Generalizations**

*Maya Nair, Psychology*

*Sponsor: Dr. Bob Rehder, Psychology*

People take causal explanations into account when making generalizations about a novel property from one category member onto many category members. I sought to determine what aspects of the causal mechanism affect how people would generalize a given novel property. I explored the effects of prevalence of a causally-related existing feature and the direction of the causal mechanism on category-based generalizations. In the

study, each novel property was either the cause or the effect of an existing feature which varied in prevalence. In Experiment 1, I told participants to consider both prevalence and causal direction, but found that only increased prevalence led to stronger generalizations of the novel property; causal direction had no effect. These results held in Experiment 2, in which participants were only told to consider the causal direction, and even in Experiment 3, in which participants only became familiar with prevalence information indirectly via a classification task. My findings suggest that people make category-based generalizations with a particular set of guidelines of causal reasoning in which the prevalence of an existing feature is used to infer the prevalence of a causally-linked novel property, whether it is the cause or the effect of that feature.

#### **Walkers' Use of Friction Information for Prospective Control of Locomotion**

*Priya J. Narayanan, Psychology*

*Sponsor: Dr. Karen E. Adolph, Psychology*

Perceptual information guides locomotion prospectively. Friction is an emergent, resistive force that is necessary source of information for balance and locomotion. Previous work showed that walkers use friction information *reactively*, after they begin to slip. To investigate walkers' ability to use friction information for *prospective* control of locomotion, I examined walkers' perceived abilities for performing particular actions under changing friction conditions.

In Experiment 1, participants chose the steepest slope they thought they could safely walk down while standing on high- and low-friction surfaces. In Experiment 2, participants made the same decisions after performing movements designed to generate friction information. In Experiment 3, participants made decisions about walking and standing on uphill and downhill slopes while wearing shoes with high- and low-friction soles. In Experiment 4, participants judged the farthest distance they thought they could leap while standing on high- and low-friction surfaces.

Across studies, judgments varied with the coefficient of friction (COF) of the surface-footwear pairing, suggesting that participants were sensitive to changes in friction. Participants, however, generally overestimated their ability to descend, ascend, or leap across

low-friction surface, and underestimated their ability to cope with high-friction surfaces. This suggests that adult walkers do not reliably incorporate friction information into prospective control of locomotion.

#### **Peeled Apples Are Red, Aren't They? Generating Emergent Features in Conceptual Combinations**

*Tamara Ochoa, Italian and Linguistics, and Psychology*

*Sponsor: Dr. Brian McElree, Psychology*

When interpreting conceptual combinations such as *peeled apples*, we must "cancel out" incompatible local features of apples (i.e., are red) in order to generate emergent features of the new concept (i.e., are white). Previous research has found that new, emergent features are comprehended more quickly and more accurately than local, noun features. These studies, however, have not examined the effects of early, immediate processing. Using the response-speed accuracy-tradeoff procedure, the present study measured accuracy at different processing intervals, ranging from 500 to 3250 msec. Participants were asked to judge the truth-value of sentences that were either verifiable by virtue of the noun alone ("peeled apples are round") or verifiable by virtue of the whole combination ("peeled apples are white"), thereby requiring the generation of an emergent feature. Contrary to previous findings, properties consistent with the noun were more accurately and more quickly verified than emergent features at early processing times. This suggests that the noun in a combination interferes with the generation of emergent features. These findings support a compositional model of conceptual combination in which properties of the noun are active during early phases of processing even if those properties are incompatible with the interpretation of the phrase.

#### **The Unique Social Services of an FBO: A Solution to Lowering Poverty in Underdeveloped Nations?**

*Katherine Otto, Politics*

*Sponsor: Cheryl Mills, Esq., University Operations and Administration*

My research explores how faith-based organizations (FBOs) can provide unique social services to children in poverty. I observed firsthand the role of the Hogar Rafael Ayau, an Orthodox Christian orphanage, in pov-

erty-stricken Guatemala City. The Hogar avoids connections with the government and seeks relationships with the children in the hope of creating potential for lowering poverty. In tumultuous Zone One, I witnessed the citizens' reactions to their government's domestic policies. While orphanage administration provided crucial knowledge about the daily challenges and opportunities, I also noted the children's behavior and the structure of the Hogar's "social curriculum."

My research showed that a fundamental reliance on faith and not funds was at first an obstacle, but later became a benefit. Separation from the government severely cuts funding and resources, but simultaneously frees the children from government manipulation and resulting street violence. Guatemala has the potential to foster healing, growth, and understanding, but only if the citizens, beginning with the children, can personally experience a safe and positive environment. On a small scale, with sufficient funding and support, FBOs are certainly a solution to decreasing poverty in developing nations.

### **Do Infants Understand the Consequences of Rigidity for Action?**

*Angela Palmer, Psychology, and Amelia Renhard, Psychology*

*Sponsor: Dr. Karen E. Adolph, Psychology*

Rigidity is one of the first object properties that infants can differentiate. By one month old, they look differentially between hard and soft objects, and by six months old, they prefer to mouth, push, and squeeze softer objects. At sixteen months old, infants use handrails varying in rigidity in appropriate ways to augment their balance.

Our aim was to observe how infants progress from simple discrimination of rigidity to using rigidity to aid actions by testing eight- to sixteen-month-old infants in a door-opening task. Infants sat on their mothers' laps facing one of two doors—a solid wooden door or a deformable foam door. To open each door, infants had to understand its rigidity: the foam door had to be squished down and the wood door slid sideways. Infants were first shown how the door moves by the experimenter, and were then coaxed to open each door via games, toys, and snacks in twenty randomly-ordered trials. Videotapes of the sessions were scored for strategies used for opening each door, exploratory actions, and task success.

Pilot data ( $n = 8$ ) showed that eight-month-olds have difficulty with the task, whereas twelve-month-olds learn how to open the doors quickly.

### **The Relationship between Parental Expectations and Grades in an Ethnically Diverse Population**

*Gunja Parikh, Psychology*

*Sponsor: Dr. Niobe Way, Applied Psychology, Steinhardt School of Education*

This study examined how parental expectations predict academic achievement for a group of urban minority adolescents. Past research has shown that parental expectations predict achievement, but it has mostly been evaluated for suburban, Caucasian, middle-class populations. This project looked at a metropolitan, low-income, and ethnically diverse population consisting of African-American, Caucasian, Puerto Rican, Dominican, and Chinese students. The sample size was 379 students from three New York City schools. The method used to explore this relationship was student self-report surveys administered during school. The hypotheses that parent expectations would predict grades and that parent expectations and grades would vary significantly by ethnic group were supported. It was found that Chinese students ( $M = 3.19$ ,  $SD = .4$ ) reported significantly greater levels of parental expectations compared to all the other ethnic groups. Caucasian and Chinese students reported similar levels of academic achievement by grades. Caucasian and Chinese students ( $M = 6.61$ ,  $SD = 1.42$ ) reported higher grades when compared to students who were African-American ( $M = 5.19$ ,  $SD = 1.72$ ), Dominican ( $M = 5.04$ ,  $SD = 1.84$ ), or Puerto Rican ( $M = 4.82$ ,  $SD = 1.84$ ). These results indicate that parental expectations predict academic achievement as measured by grades even in an ethnically diverse population and that differences among the Puerto Rican and Dominican students need to be further explored.

### **Human Causal Reasoning**

*Ellen Parks, Philosophy and Psychology*

*Sponsor: Dr. Bob Rehder, Psychology*

How do people make inferences and predictions based on their causal understanding of the world? The present study was designed to investigate one model of human causal reasoning known as Bayesian Network Theory. A defining principle of Bayesian Networks is the Causal Markov Condition which asserts that irrelevant variables are "screened off" from individuals' predictions about the causal states of variables that are unobserved. In Experiment 1, I used a rating task to test whether or not reasoning about causally related variables honors the Causal Markov Condition. Three different types of causal schemas were examined. Experi-

ment 2 employed a forced-choice paradigm to explore in more detail the possible impact of Bayesian Network strategies on causal reasoning. The results of both experiments clearly reveal pervasive violations of the Causal Markov Condition. Individuals did, in fact, draw upon irrelevant information during their predictions. These findings provide the first evidence that Bayesian Network Theory does not characterize general human causal reasoning.

### **Los Jípis y Los Peces: The Mexican Student Movement of 1968**

*Magdalene R. Perez, History*

*Sponsor: Dr. Sinclair Thompson, History*

My research investigates both the internal dynamics and the external relations of the anti-government student movement in Mexico City during the summer and fall of 1968. The movement, which arose in response to government repression and attacks on groups of youth, has often been portrayed as a popular revolutionary uprising. By reviewing firsthand accounts, I sought to reexamine and complicate previous analyses of the movement which have too often assumed both the homogeneity of the movement's student base and its widespread popular support. A close analysis of the sources reveals that students participating in the movement were both politically and socially diverse. The movement's radical left wing, often presented as broadly representative of the student base, in fact represented only a small although vocal minority. Most youth were mobilized not by radical political ideology, but by their direct experience of state repression and the identification of the movement with the ideals of an emerging anti-authoritarian, youth-based culture. While the movement's aims were largely moderate, its rebellious youth-centered image precluded students' ability to build a wider base of popular support apart from the university.

### **Racial Fear in the Urban Environment**

*Aaron Platt, Sociology*

*Sponsor: Dr. Ruth Horowitz, Sociology*

This study examined the following questions: how do white people assess their safety when walking around New York? How does one account for the results of Kenneth Ferraro's 1995 study which documented people who perceived themselves to be in unsafe places but were not fearful? How are whites' fears affected by

the presence of blacks or the knowledge that they are in a black neighborhood?

The data suggest that the construction of safety happens in two steps. First, individuals observe the physical characteristics of their environment, as well as the appearance and behavior of the people in it. Second, through a symbolic interactionist process, they insert these observations into narratives about the locations in which crime takes place, who is likely to commit crimes, and who is likely to be a victim. Fear appears to be related to one's perceived ability to decrease the likelihood of victimization engendered by these narratives. Whites who have narratives about blacks harboring anger against whites and who perceive cultural differences as being incendiary are those who are most afraid of blacks. This comes from the perception that there are few possible precautions to reduce the anger or avoid intercultural misunderstandings.

### **The Power of Income and Education in Second Language Acquisition**

*Zoya Popivker, Psychology, and Jennifer Chen, Psychology*

*Sponsor: Dr. Doris Aaronson, Psychology*

This study examined 88 Russian-, 75 Mandarin- and 117 Spanish-English bilingual speakers to determine the environmental factors that affect their English development. To assess participants' English proficiency, two grammaticality judgment tasks were given in both oral and written forms. Accuracy was recorded. To examine how various learning factors influence participants' performance, background information such as parents' educational level was collected by giving the participants a Language Background Questionnaire. Participants retrospectively reported the amount of English used in various situations during their years in America. Results indicated that family income and parents' education were correlated. These factors, both separately and in combination, predict the participants' English language proficiency. Other correlations support a theory that five factors mediate this relationship. English exposure was recorded in the five mediators: the television watched, books and magazines read, the English spoken to friends and siblings, the English the parents spoke to participants, and the parents' English ability. Statistically significant relations between the predictor variables and English proficiency were supported by four mediators for Mandarin speakers, three mediators for Russians, and zero mediators for Spanish

speakers. The current study suggests that only when family income and parental education are highly correlated does socioeconomic status have a profound influence on second language development.

**Empathy for a Coworker and Its Effect upon Employees' Fondness for Their Managers**

*Stefanie Pugliese, Psychology*

*Sponsor: Dr. Steven Blader, Management, Stern School of Business*

This experimental study explored the effect empathy felt for a coworker had on employees' subsequent preferences for a helping or non-helping manager. An experimental study was set up to test the hypothesis. Fifty-eight students at New York University were told to imagine that they were employees of a manager named Bob. Participants were given some information about Bob and then watched a video of him either helping or not helping a coworker at a meeting. Before viewing, half of the participants were told to take the coworker's perspective (high empathy) and half were told to take an objective approach (low empathy) towards the situation. Later, participants were given a questionnaire assessing their thoughts and feelings about the manager. In contrast to predictions, the results reveal a statistically significant preference for the helping manager regardless of empathy condition. Participants in both high and low empathy conditions liked the manager more when he helped than when he did not help the coworker. Contrary to plan, participants in the low empathy conditions felt empathy for the coworker. The results partially support the hypothesis that employees who feel empathy for a coworker would prefer a manager who demonstrates helping behavior.

**Perestroika without Glasnost: The Meaning of Human Rights Violations in Cuba during the Special Period**

*Joy M. Purcell, Latin American Studies and Politics*

*Sponsor: Dr. Ana Dopico, Spanish and Portuguese Language and Literature*

My research investigates the causes of the increase in human rights violations during the 1990s in Cuba. I consider the repressive actions of the government as part of a political calculus. As they clearly tried to cope with the economic collapse of 1989, Cuban officials clearly

realized that the socialist economy would not be sufficient to support the needs of the state. The decision was made to reform the economy. In some cases, this meant the liberalization of certain sectors. As I demonstrate, however, the quasi-liberalization was undertaken as a last effort to save the Revolution. This was not the perestroika of the Soviet Union which was followed by the political opening known as glasnost. Castro and the other Cuban officials saw these actions as a means to an end—the continuance of the Revolution. By examining the political and economic reforms in Cuba throughout the 1990s, I interpret the meaning of these reforms as political machinations intended to rescue the declining economy and to present the appearance of democratization to the outside world. At the same time they ensured the continued survival of the Castro regime by restraining any political liberalization.

**Perceiving Sexual Orientation from Physical Cues**

*Vicky Reichman, Psychology*

*Sponsor: Dr. Kerri Johnson, Psychology*

When encountering an individual, people easily make numerous social judgments that can affect subsequent interactions. For example, people rapidly and accurately perceive others' sexual orientation (SO). The cues, however, that engender this perception and the social judgments that accompany it remain unspecified. I conducted this study to identify the perceptual determinants (Experiment 1) and social consequences (Experiment 2) of perceiving SO. Experiment 1 examined the perceptual determinants of perceived sexual orientation using cues previously related to sex (e.g., waist-to-hip-ratio) and masculinity/femininity (e.g., gait). Experiment 2 examined the social consequences of perceiving SO. In both experiments, participants viewed stimuli in which targets exhibited gaits concordant and discordant with apparent sex. In Experiment 2, participants also rated the social acceptability and communicative intent of each target. In both experiments, targets depicting discordant cues (e.g., feminine gait coupled with male morphology) were more likely to be perceived as homosexual and as inappropriately conveying their sexuality than targets depicting concordant cues (e.g., masculine gait coupled with male morphology). Furthermore, these effects were stronger for "male" targets. For "men," perceived SO was related primarily to

gait, but for “women” SO was related to both gait and morphology.

**Differences in Family Relations and Anxiety Levels between Adolescents with Asthma and Healthy Controls**

*Jade Rusoff, Psychology*

*Sponsor: Dr. Jean-Marie Bruzzese, Psychiatry, NYU Child Study Center, School of Medicine*

This study explored possible differences in parent-child interactions and anxiety levels of pre-teens with asthma versus healthy controls. Children in New York City public middle schools were screened to identify students with and without asthma. Parents of students at the schools were contacted and appointments were made for survey completion. Children with asthma (n = 43) and healthy controls (n = 49) along with their parents completed questionnaires which asked them about their relationship and interactions. They also completed a questionnaire which assessed the level of anxiety the children had experienced recently. Contrary to predictions, the interactions of families of adolescents with asthma were not significantly different from those of healthy families in terms of problem-solving skills, negative communication, hostile affect, or conflict behavior. The true/false response format of the questionnaires may not have been sensitive enough to detect differences between the two groups in this study. Adolescents with asthma did not differ significantly from healthy controls in terms of anxiety levels, with the exception of the Separation Anxiety Subscale in which both child and parent reports showed adolescents without asthma to have higher levels of separation anxiety. The small sample size may have contributed to these surprising findings.

**The Effect of Communication Medium on Language Use**

*Anna Russell, Linguistics*

*Sponsor: Dr. Gregory Guy, Linguistics*

All speakers adjust their use of language to the differing communicative events in which they participate, reacting to elements of these events such as interlocutor identity or topic. One element of every communicative event that has significant impact on language use is the channel of communication, e.g., speech vs. writing

(Hymes 1964). Spoken and written interactions entail distinct language varieties, partially determined by their channels of transmission. Through technological innovation, with the creation of new channels such as Instant Message, new grammatical and lexical conventions and constraints emerge. The Instant Message channel blends some of the linguistic characteristics of other spoken and written channels. My current investigation explores the influence of channel on the speech act, using Biber’s “Multi-Feature, Multi-Dimension” approach to contrast samples of communicative events conducted over the telephone and via the Instant Message formats, while maintaining constant other event elements. Analysis of the language used by speaker pairs in the two channels confirms the similarity of Instant Message conversation to spoken interaction (e.g., topicality, contraction), while simultaneously revealing features of language use typical of the written channel. The results clearly demonstrate the influence of channel on language use, and the hybrid nature of Instant Message.

**Outreach Efforts towards Young Gay Latino Males**

*Jared Salcedo, Sociology*

*Sponsor: Dr. Ruth Horowitz, Sociology*

My research investigated outreach activities, specifically in the distribution of condoms and HIV/AIDS and STI prevention information, among young Latino men who have sex with men (MSM). I examined how host organizations and sponsoring programs used social interactions to create and foster queer identity. They then used that identity to discuss, arrange, evaluate and disperse information about safe sex in the field. This organizational imposition of a queer identity was collectively risky for them when dealing with the Latino MSM, whose acceptance or rejection of the prophylactics conflicts with the existing “tacit subject,” or the Latino male who operates from both “in and out” of the closet. The overriding notion, however, is that the number of HIV/AIDS cases will be reduced if men on the “down-low,” or not explicit about their sexuality, “out” themselves. The condom is promoted as a way for homosexual men to experience sexual pleasure and remain “safe” and healthy without the risk of contracting HIV. In this framework, the condom also works to isolate those who “bareback,” or who have sex without condoms. Host organizations use the condom to pro-

mote masculinity and safe sexual behavior, to enhance sex roles, and to influence the ways in which sex is negotiated in the gay bar/club scene.

**The Influence of Sibling Relationships on Adjustment in Foster Care**

*Yosef Salvay, Psychology*

*Sponsor: Dr. L. Oriana Linares, Psychiatry, NYU Child Study Center, School of Medicine*

Evidence concerning the effects of placement conditions in foster care homes (together or apart from other siblings) provides mixed results. Previous research has failed to examine the influence of the sibling relationship, which has been shown to influence specific areas of normal childhood adjustment such as behavioral and emotional functioning (Bryant 1989; Dunn, Stocker, and Plomin 1990; Smith 1998). The present study examined the influence of sibling relationship quality and foster care placement conditions on behavioral and emotional adjustment. Participants were siblings (n = 160) from eighty sibling groups legally placed in foster care after at least one sibling had a substantiated report of abuse or neglect. The quality of the sibling relationship, depressive symptoms, and behavioral problems were assessed approximately two to six months after placement (Time 1), and approximately twelve months after the first assessment (Time 2). ANCOVA found that split and intact siblings differed significantly on behavior problems when the sibling relationship was taken into account [ $F(7, 278) = 5.94, p < .02$ ]. No significant difference, however, was found between split and intact siblings for depressive symptoms. The results support the need to assess sibling relationships prior to placing siblings in foster care.

**The Effects of Stereotype-Inconsistent Information on Memory**

*Nadia Sandozi, Psychology*

*Sponsor: Dr. James Uleman, Psychology*

This study investigated whether stereotypes facilitate or inhibit trait inferences from stereotype-inconsistent behaviors. More specifically, this study focused on how motivation of either intentionally forming a trait inference or just forming a spontaneous trait inference (STI) affected which types of behaviors predominated. Previously, some have thought that one's motivation

determines which types of behaviors (stereotype-consistent or stereotype-inconsistent) he or she is more likely to remember. I hypothesized that stereotype-inconsistent information dominates when one is motivated to form an intentional inference, thus changing the stereotype one had previously held. On the other hand, stereotype-consistent information is more diagnostic and carries more weight when forming STIs, consequently helping one maintain the stereotypes. Because the associations between stereotypes and different social categories have been explored previously, the present research attempted to study these associations using novel groups, thereby eliminating any pre-existing stereotypes or biases the participants may hold. Results indicate that motivation does not strongly determine which behaviors are more diagnostic; instead, initial stereotypes are maintained despite one's goal of either forming intentional inferences or STIs.

**For Better or Worse? The Impact of Regional Trade Agreements on International Trade Liberalization**

*Isha Sheth, International Relations*

*Sponsor: Dr. Fiona McGillivray, Politics*

Economists and the World Trade Organization have long deliberated the effects of regional trade agreements on international trade liberalization. Despite extensive analyses and discussion, both groups remain equivocal on the subject. As the debate on this controversial topic continues, this paper joins the fray, inquiring if regional trade agreements are indeed a threat to liberalizing global trade.

Although, the evidence is not infallible, I believe that regional trade agreements (RTAs) create more trade than they divert. The results of my cross-sectional panel study indicate that when RTAs are present, their ability to boost trade flow is not eliminated by country membership in other RTAs. Even though my results also show the negative effect of RTAs on trade, it is important to remember that this negative effect generally occurs in cases where common RTA partnership is not present. In light of the recent rapid and continued expansion of RTAs, my research shows that they will continue to have a positive impact on the international trade system by increasing trade levels and decreasing trade barriers. I conclude that the benefits of RTAs will outweigh any negatives as long as regional trade agreements continue

to expand, thereby encompassing more countries and allowing them to enjoy the benefits of RTA membership.

### **Cross-Linguistic Differences in Sound**

#### **Representation: The Case of /ts/**

*Serafina Shishkova, Linguistics and Psychology*

*Sponsor: Dr. Lisa Davidson, Linguistics*

Every language has its own set of sounds, but it is not always the case that each sound has the same cognitive status across languages. Although most previous research has focused on cross-linguistic differences in representation of individual sounds in a given language, this study investigates differences in representation of sounds that occur in two languages. Specifically, I looked at /ts/, which in Russian is classified as a single sound; but in English, it is often considered a sequence of /t/ and /s/. There has been little psychological evidence, however, to support the traditional linguistic classification of these sounds. This study looked at how Russian and English speakers syllabify pseudo-words with medial /ts/, using an oral syllable reversal task and a written multiple-choice syllable division task in Latin orthography. Results indicate that in the oral task, English speakers split /t/ and /s/ into two syllables (e.g., kot-sop), while Russian speakers placed /ts/ into one syllable (e.g., ko-tsop). In the written task, both Russian and English speakers frequently split /t/ and /s/. These results demonstrate that Russian and English speakers do differ in their representations of /ts/, but that other factors such as orthography may influence syllabification decisions.

### **How Effective Are Gesture and Speech in Mothers' Social Messages?**

*Michael T. Smith, Psychology and Sociology*

*Sponsor: Dr. Karen E. Adolph, Psychology*

Previous studies suggest that mothers use gestures to augment speech to their young children. Researchers, however, know little about whether gestures convey unique information about the message, information redundant with speech, or no functionally useful information at all.

The current study compared the effectiveness of verbal, gestural, and combined messages as mothers requested novel shapes from their infants. Undergradu-

ates viewed short video or audio clips of mothers introducing their children to novel shapes in each of three conditions: both speech and gesture, gesture only (no audio), or speech only (no video). In all three conditions, the shape labels were removed. The participants' task was to judge which of three target shapes the mothers requested in each clip.

By comparing the accuracy of responses across conditions, I determined the role of gestures in mothers' speech. In a pilot study of thirteen participants in two conditions (gestures only and speech only), participants identified the target shapes significantly above chance in both conditions, and they performed better in speech than gestures. Participants performed better with messages from mothers of thirty-six-month-olds than mothers of eighteen-month-olds. These findings suggest that gestures convey meaningful information and that mothers' messages improve as children become competent in communication.

### **Depression among College-Aged Young Adults: Results from a National Survey**

*Elina Spektor, Psychology*

*Sponsor: Dr. Patrick Shrout, Psychology*

Depression is prevalent among young adults (Kessler et al. 1994), with women twice as likely to experience depressive symptoms (Nolen-Hoeksema 2002). Furthermore, the stress-diathesis model states that those susceptible to depression will become depressed when stressed (Kendler et al. 2001). The objective of this study was to examine nationally representative data to determine if university students aged eighteen to twenty-three experienced higher distress/depression levels when compared to those who were not in higher education and if the university experience moderated the gender association with depression. I analyzed the NIAAA's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) data which was conducted in 2001–2002. I included individuals between the ages of eighteen and twenty-three who were no longer in high school. The sample contained 3,479 persons.

I found that college students were no more distressed than nonstudents. Although college women were more distressed than college men, the difference was smaller than the gender effect for noncollege young adults. The results indicate that college provides an atmosphere that

allows women to be on an equal footing with men, thus reducing gender biases which may be the cause of higher prevalence of depression among women.

**The Implications of Study Drugs on NYU's Campus**

*Vatche Tchekmedyan, Anthropology and Biology*  
*Sponsor: Dr. Lok Siu, Anthropology and Asian/Pacific/American Studies*

Recent media coverage indicates a growing trend in the illicit use of prescription psychostimulant medications, popularly known as “study drugs,” among college students. These drugs are prescribed to treat Attention Deficit Hyperactivity Disorder (ADHD), but without proper medical attention can cause irregular heartbeat, hypertension, dependency, weight loss, and even heart failure (National Institute on Drug Abuse). By employing ethnographic methods of survey-taking and interviewing, my study examined the prevalence of this phenomenon and its qualitative influence on NYU student life. The students surveyed were either on-campus residents living in the Greenwich Hotel or willing students passing through the lower levels of the library. Among the 170 students surveyed, forty-seven students (28 percent) had at least used study drugs once. Surprisingly, twenty of the forty-seven users (42 percent) had never heard about the adverse effects of using study drugs without the guidance of a doctor. During interviews, many students expressed concern for the lack of administrative attention given to this issue. Given the appreciable rate of study drug use in the NYU student community, this study recommends that action be taken in the form of educational programming and an informed policy throughout the university. Although further study is needed, by promoting the safe use of study drugs and encouraging good study habits, the university will minimize the threats that these adverse physical and psychological effects pose.

**The Role of Coercion in Sentence Processing**

*Preeti Thyparampil, Biology and Psychology*  
*Sponsor: Dr. Brian McElree, Psychology*

The likely interpretation of the sentence “The students started the lectures” is “The students started attending the lectures.” The mental manipulation of “started the lectures” into something that students are more likely to “start” doing is an enriched sentence-

processing phenomenon referred to as coercion. Verbs such as “started” and “finished” semantically select for a complement which is an activity or event. In sentences such as “The students started the lectures,” an activity/event selecting verb is paired with an activity/event complement. The subject of the sentence, however, is an unlikely agent for the activity/event. These types of sentences are interpreted through coercion of the activity/event into another, more specific, activity/event. Using an eye-tracker, I tested for lengthier processing for these kinds of sentences. I found that such sentences do involve lengthier processing. The results indicate that there is difficulty in processing (as a result of coercion) sentences with an activity/event selecting verb, an activity/event, and a subject that is an unlikely agent for the activity/event. This study shows that there is a need for enriched, lengthier processing to comprehend a wider range of sentences with activity/event selecting verbs, such as “started,” than previously known.

**Changing Attitudes toward Grammatical Correctness: The Use of Coordinate Noun Phrases**

*Camille Varin, Italian and Linguistics, and English*  
*Sponsor: Dr. Gregory Guy, Linguistics*

Coordinate noun phrases (NPs) contain two (or more) nouns or pronouns joined by a conjunction, such as *John and I* or *me and Mary*. This study examined the use of first person pronouns in coordinate NPs, investigating speakers’ preferences for word order (I and John vs. John and I) and case marking (I vs. me) in different syntactic positions. I collected data by means of a questionnaire focusing on attitudes and preferences. The biggest factors affecting responses were the subject’s age and formality of the context of use. Older respondents appeared more concerned with being prescriptively “correct,” while the middle aged population focused on what was socially acceptable, even favoring “I” in object positions when “me” was prescriptively preferred. Younger generations did not indicate systematic preferences. There was a systematic association, however, between age and word order: younger speakers favored putting the first person reference first in the coordinate NP. For more formal social settings, respondents favored use of “I” over “me,” and preferred that the first person pronoun occur last in the coordinate NP. In addition to presenting a description of the use of coordinate NPs in American English, this also reflects the changing face of prescriptive grammar in American schools.

**Infants' Face Perception Mechanisms: An Exploration of Infants' Recognition of Eye Gaze Direction**

*Ariela Vasserman, Psychology*

*Sponsor: Dr. Scott Johnson, Psychology*

This experiment tested whether five-month-old infants show a preference for the eyes over the mouth when presented with novel faces. Twenty different faces were presented either upright or inverted, static or moving, and showing either a direct or averted eye gaze. The faces were shown on an eye-tracker, which was also used to record dwell time in seconds at the mouth and the eye areas. Overall, infants looked significantly longer at the eyes than the mouth across all conditions. Infants attended significantly more to faces with an averted gaze than to faces with a direct gaze; infants paid significantly more attention, however, to the eyes in the direct gaze condition. Infants also attended significantly more to the eyes than the mouth in the static condition but not in the moving condition. This shows that infants do not have a preference for the eyes when there is a more salient feature on the screen. Infants looked significantly less at the eyes of an inverted face than at the eyes of an upright face, perhaps because more time was needed to locate the eyes. These results were interpreted in the context of theories of innate gaze detectors versus more general perceptual mechanisms.

**Controlled and Automatic Process in Implicitly and Explicitly Activated Goals**

*Chrystal Vergara, Psychology*

*Sponsor: Dr. Peter Gollwitzer, Psychology*

This study investigated differences between controlled and automatic processes in the effects of implicitly and explicitly activated goals in a classic memory task (Jacoby 1998). I observed that estimates of automatic retrieval tended to be stronger when the goal activation occurred during encoding than when it occurred during retrieval. The explicit goal condition yielded higher estimates of conscious retrieval when the goal activation was given before encoding. The implicit condition yielded higher estimates of conscious retrieval when the goal implementation was given before retrieval. These findings support anxiety theory rather than the matching hypothesis. This research will help build a new literature that concentrates on the differences between conscious and unconscious processes.

**Parental Feedback: Associations with Ethnicity and Theory of Intelligence**

*Rebecca Weissman, Psychology*

*Sponsor: Dr. Joshua Aronson, Applied Psychology, Steinhardt School of Education*

Past research has demonstrated that children praised for intelligence tend to develop entity theories of intelligence, believing intelligence is a fixed trait. Children praised for their efforts tend to develop incremental theories of intelligence, believing intelligence is malleable. These children respond constructively to challenge, believing that their efforts and strategies determine success. Recent research has demonstrated that African-Americans tend to be incremental theorists and Caucasians entity theorists. This study examined parental feedback as a probable predictor of theory of intelligence and ethnic differences in students' beliefs about intelligence.

Participants were given a questionnaire assessing the type of feedback they reported having received from their parents, their theory of intelligence, and their ethnicity. Results replicated the finding that African-American participants believe intelligence is more malleable than their Caucasian counterparts. African-Americans also reported receiving more effort feedback, which predicted incremental theories across participants. The results showed similar patterns for other minority groups. These results suggest that parental feedback may play an important role in the formation of students' theories of intelligence. Future research should explore better ways to measure parental feedback, as well as investigate alternative explanations for ethnic differences in beliefs about intelligence.

**Rainfall, Economic Shocks, and Civil Conflicts in the Agrarian Countries of the World**

*Yan Xiao, Economics and Politics*

*Sponsor: Dr. Eric Dickson, Politics*

The two-way relationship between economic shocks and civil war often makes causal inference difficult in studies of political violence. In "Economic Shocks and Civil Conflict: An Instrumental Variables Approach" (*JPE* 2004), Miguel, Satyanath, and Sergenti (MSS) used rainfall, an exogenous variable, to estimate GDP growth unaffected by civil wars. They found that a decrease in GDP growth estimated through rainfall would increase the likelihood of civil conflicts in forty-one Sub-Saharan

African countries during 1981–1999. To generalize their findings, I applied their model to the world. MSS's model can only be applied to countries where agricultural production constitutes a relatively large proportion of GDP and is positively and significantly correlated with rainfall. As a result, I ranked all countries in the world based on their agricultural properties and omitted the bottom ten percent of the sample until I found a significant and positive relationship between rainfall and economic growth. It was impossible to generalize the model since rainfall and economic growth are negatively and weakly related in a world without Sub-Saharan Africa. Unique geographic and agricultural properties make Sub-Saharan Africa the only suitable place for the application of MSS's model. Instrumental variable approaches, by their nature, are subject to more limitations than conventional methods. Ideally, future theoretical or empirical breakthroughs will help conquer the challenge of generalization.

#### **Why Do Self Reports Become Less Negative When Repeated?**

*Xiaomeng Xu, Psychology*

*Sponsor: Dr. Patrick Shrout, Psychology*

Studies have shown that persons who are surveyed often report high levels of negative affect initially, but lower levels in subsequent reports (Robins 1985; Knowles 1996). One explanation is cognitive framing (Schwarz 1999), which refers to how subjects think about and respond to the goals of the particular study. According to the cognitive framing hypothesis, if they believe that the study is about an approaching stressor, participants will be more likely to report higher levels of negative affect. In this study, I manipulated the stated goals of the questionnaire in order to examine whether cognitive framing effects could be observed. Sixty undergraduate students approaching a difficult midterm examination were randomly assigned into one of two

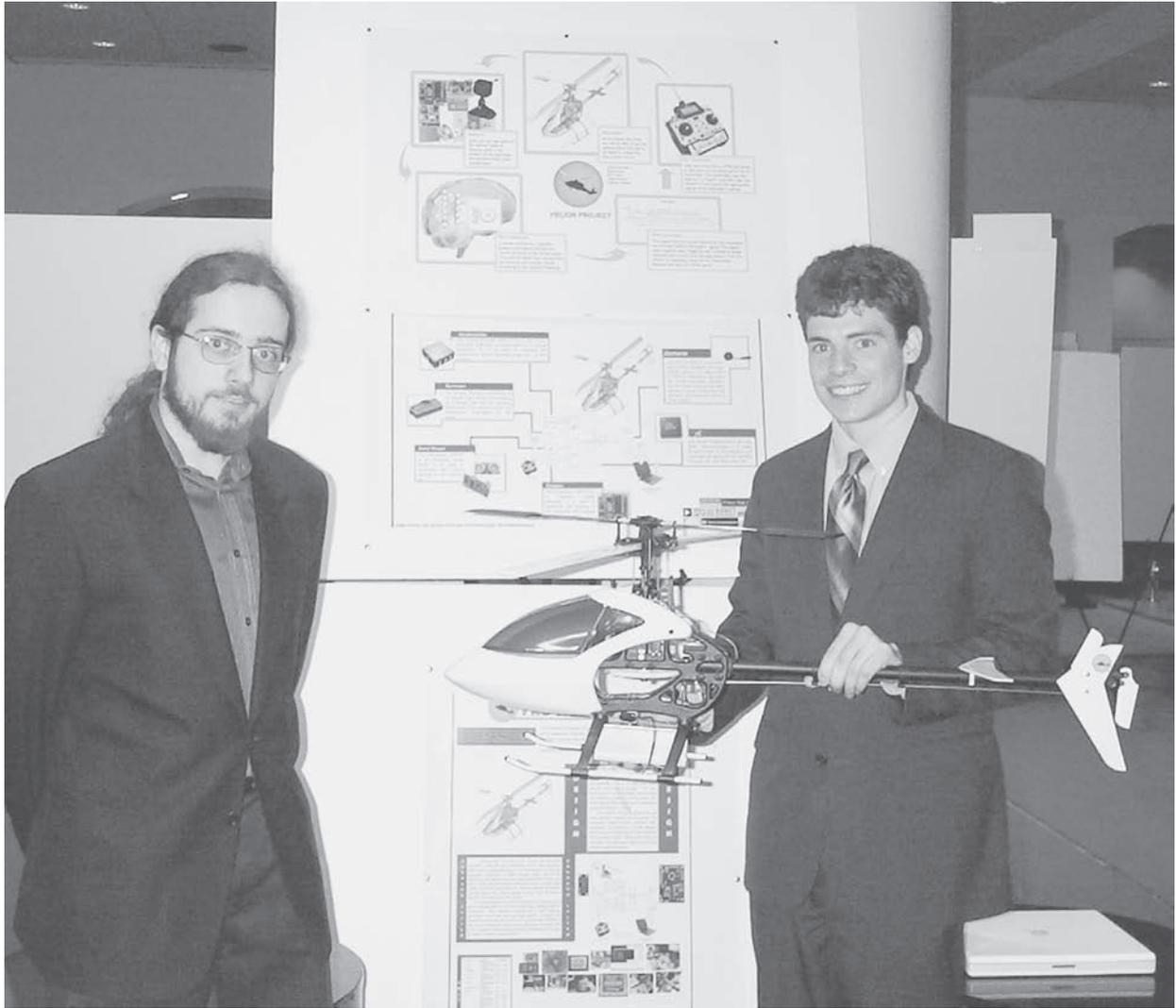
groups. The first group was told that they were in a study about daily college life, while the second was told that they were in a study about the upcoming midterm. Both groups completed daily questionnaires about moods for two weeks (the midterm exam was on day fourteen). Contrary to the hypothesis, the midterm group did not report any more initial distress than had the daily life group. The midterm group, however, did exhibit significantly more distress across all days.

#### **Moral Status and Its Influences on Fear-Learning**

*Jennifer Zeng, Psychology*

*Sponsor: Dr. Elizabeth Phelps, Psychology*

The prepared learning effect is demonstrated in conditioning paradigms as a resistance to extinction of the conditioned response to certain categories of fear-relevant stimuli. A recent study showed that members of racial outgroups can serve as fear-relevant stimuli. In this study, I examined whether this prepared effect extends to social groups based on moral character. Six white male images were divided among three moral categories: cooperator, cheater, and neutral. Each image was presented with a simulated newspaper article describing the individual's moral character. Participants rated these individuals on trustworthiness, approachability, and likeability before and after conditioning. One character from each moral category was paired with a shock (CS+) during the acquisition phase, whereas the other character served as a control stimulus (CS-). During the subsequent extinction phase, no more shocks were presented. Moral status had an effect on the rate of extinction and on the evaluative ratings. Specifically, conditioned responses to cheaters' faces resisted extinction, whereas neutrals' and cooperators' faces did not. Moreover, an overall decrease in post- versus pre-experimental ratings was seen for CSs+ belonging to the cooperator category, with this category also experiencing the greatest drop in ratings.





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, 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

## **Frequency of NY-ESO-1 CT Antigen Expression in Late-Stage Melanoma**

*Tanya Albukh, Biochemistry*

*Sponsor: Dr. Janice Cutler, Chemistry*

Using melanoma as a general model for cancer, this research project studies tumor antigen expression in cancer cells to develop a vaccine for cancer targeting these antigens. Antigens are molecules capable of eliciting the synthesis of specific antibodies and also T cell responses in vertebrates; they are immunogenic. Numerous cancers, specifically melanoma, produce different antigens as gene products during various stages of disease progression. The development of cancer vaccines is focused around different antigen systems such as the cancer/testis (CT) antigens MAGE-3 and NY-ESO-1. Cancer-testis (CT) antigens are expressed in a variety of malignant tumors and in normal adult tissue of testicular germ cells. Owing to this tumor-associated expression pattern, these antigens are of major interest as potential targets for immunotherapy and possibly for diagnostic purposes. NY-ESO-1 is one of the most immunogenic tumor antigens given its capacity to elicit

simultaneous antibody and CD8+ T cell responses in vivo. In this study, immunohistochemical techniques were used to analyze NY-ESO-1 expression in metastatic melanoma to determine whether it is expressed sufficiently to be of use in cancer immunotherapy development. I found NY-ESO-1 to be expressed in 46.7% of the metastatic cases, the higher end of the range found in literature. This indicates that NY-ESO-1 is good target for cancer vaccine development.

## **Variation in the Trauma Patterns of Neanderthal and Anatomically Modern Human Samples**

*Timothy J. Cavaretta, Anthropology*

*Sponsor: Dr. Susan C. Antón, Anthropology*

Researchers have long recognized a high frequency of traumatic lesions in Neanderthal skeletons. In their 1995 study, Berger and Trinkaus found that a gross sample of Neanderthals was similar in its anatomical distribution of trauma to North American rodeo performers, and concluded that this could be explained by a shared habitual proximity to large animals. I question whether the authors' geographically and temporally dis-

persed sample of Neanderthals is comparable to site- and time-specific Anatomically Modern Human (AMH) samples, and whether the zooarchaeological evidence associated with Neanderthals inhabiting the Near East supports the authors' big game hunting conclusion for all Neanderthals. To address these concerns, I have sorted the Neanderthal sample into two regional groups to reflect substrate and subsistence differences, and expanded the AMH samples to include hunter-gatherer skeletal populations from the American Midwest, as well as samples from northern coastal Chile and Alaska. My results show that the trauma distributions of the two Neanderthal regional samples are more differentiated from one another than any pair of AMH samples or any AMH-Neanderthal sample pair. A resampling analysis also shows that the total Neanderthal sample's trauma distribution is not significantly different from random samples of the same number of individuals from the combined AMH forager sample.

#### **GITR Stimulation Enhances Anti-tumor Immune Responses**

*Andrew Chow, Biology*

*Sponsor: Dr. Carol Shoshkes Reiss, Biology*

Glucocorticoid-induced tumor necrosis factor receptor family related gene (GITR) encodes a membrane-bound receptor that upon stimulation inhibits "suppressor" T-cells and activates "effector" T-cells in vivo. To test whether GITR stimulation could be used as an anti-cancer therapy, mice were injected with a renal cell carcinoma line (RENCA) or a melanoma line (B16), and a stimulatory antibody for GITR denominated DTA-1 (1mg/mouse for three doses) or a control antibody was administered. This resulted in 88% tumor rejection in mice treated with DTA-1 compared to control mice. To determine the mechanism for rejection, antibodies were used to deplete various populations of the immune system. It was determined that CD4+ T-cells (helper), CD8+ T-cells (cytotoxic), NK (Natural Killer) cells, and NK T-cells were required for the protection, but each population separately was not sufficient to provide tumor rejection. Splenic cells from DTA-1 treated mice showed a higher percentage of activation and CD8+ cells purified from DTA-1 treated mice showed a ten-fold increase in specificity for melanoma antigens compared to the control group. These results suggest that GITR stimulation in vivo increases anti-tumor activity mediated by T-cells that can lead to tumor rejection. Since there is a human homologue for GITR, this may be a promising treatment for solid cancers.

#### **Timing of Gene Expression and Evolution of Form in Nematodes**

*Hyun J. Chun, Biology and Politics*

*Sponsor: Dr. David Fitch, Biology*

I am interested in understanding how developmental and genetic changes lead to evolutionary changes in morphology. I studied the position of phasmids in rhabditid nematodes. This position changed repeatedly during evolution. Phasmids are paired chemosensory organs in the nematode's tail. In males of *Caenorhabditis elegans* phasmids are posterior of three mechanosensory rays used during mating. In other species, phasmids are anterior to these rays. Phasmids and the three rays are descendents of the same T-cell which divides asymmetrically in the first larva, L1. According to one hypothesis, the change in phasmid position occurs by a polarity change of the T-cell division. In *C. elegans* the polarity of this and other divisions depends on the expression of the Wnt-signaling gene, *lin-44*. A delay in the expression of *lin-44* could lead to reversed polarity of the T-cell division which leads to anterior phasmids. I am developing protocols to test this hypothesis by in situ hybridization with PCR-generated fluorescent probes complementary to mRNA sequence of *lin-44*. The next step will be to trace the expression of *lin-44* in L1 before, during, and after the division of T-cell in *C. elegans* with posterior phasmids and in *Pelodera strongyloides* with anterior phasmids.

#### **Synthesis and Characterization of Ligand Modeling Carbonic Anhydrase**

*Christopher Cooke, Chemistry*

*Sponsor: Dr. James W. Canary, Chemistry*

The goal of this project is to synthesize ligands that model the effect of hydrophobic interactions on the acidity of zinc-bound water. This issue is significant in a number of naturally occurring enzymes including carbonic anhydrase (CA). CA catalyzes the decomposition of carbonic acid and is important in pH modulation in cells. The enzyme presents significant hydrophobic amino acid side chains in proximity to the catalytically active zinc-bound water, which is thought to increase the acidity of this moiety for maximal activity at physiological pH.

This project attempts the synthesis of a water-soluble ligand for zinc ion that encases a zinc-bound water molecule in a hydrophobic environment. Although the synthesis is still in progress, the pKa and other thermodynamic parameters associated with dissociation of a proton from the complex will be determined. The re-

sults will be compared to analogous complexes lacking the hydrophobic environment. Increased acidity of the water molecule in a more hydrophobic environment will support the long-held belief that hydrophobic interactions are used by proteins to influence acidity in these metalloenzymes.

### **Are the Neuroprotective Effects of S100 $\beta$ Mediated by the RAGE Receptor?**

*Peter Czobor, Chemistry and Neural Science*

*Sponsor: Dr. Efrain Azmitia, Biology*

Serotonin (5-HT) has a protective effect on neuronal cells mediated in part by the protein S100 $\beta$ . S100 $\beta$  blocks colchicine-induced apoptosis in cultured cells. Stimulation of the 5HT1A receptor increases brain levels of S100 $\beta$ . S100 $\beta$  is also elevated in neurodegenerative diseases and after acute brain injury. A receptor for S100 $\beta$  is a protein called RAGE (Receptor for Activated Glycated End-products) which mediates some, but not all the actions of S100 $\beta$ . It is important to determine if S100 $\beta$  antiapoptotic activity is mediated through RAGE. To test this hypothesis, our lab has been following RAGE expression after 5-HT1A receptor protection of colchicine-induced apoptosis in rat hippocampus. Rats were treated with the 5HT1A agonist 8-OH-DPAT prior to unilateral microinjection of colchicine into the hippocampus. Animals were perfused 18 to 20 hours later, and their brains were examined for the presence of the preapoptotic marker c-jun as well as for RAGE. To directly test for a RAGE-S100 $\beta$  interaction, experimental groups had their RAGE receptors inactivated through the use of a competitive inhibitor. If the protective effects of 8-OH-DPAT are mediated through the RAGE receptor, animals given a blocker of RAGE/S100 $\beta$  interaction will have more apoptosis. Positive RAGE staining was observed around the injection site in both experimental and control animals. Since diabetics have elevated levels of glycated end-products and are at risk for brain degenerative diseases, this work may have clinical relevance.

### **Equilibrium Structures of Small (H<sub>2</sub>)<sub>n</sub> and (H<sub>2</sub>)<sub>n</sub>CO Clusters**

*Yael Elmatad, Chemistry*

*Sponsor: Dr. Zlatko Bacic, Chemistry*

Equilibrium structures for small clusters of molecular hydrogen and hydrogen clusters doped with carbon monoxide were determined using the method of simulated annealing. The potential energy surfaces (PESs) of the clusters were constructed in the pairwise-addi-

tive fashion, using very high quality 4D (rigid monomer) H<sub>2</sub>-H<sub>2</sub> and CO-H<sub>2</sub> pair potentials. For the pure (H<sub>2</sub>)<sub>n</sub> clusters, the minimum-energy configurations were calculated up to  $n = 13$ . The global minimum for  $n = 13$  corresponds to the regular icosahedron with a H<sub>2</sub> molecule in the center. In the case of the (H<sub>2</sub>)<sub>n</sub>CO clusters, the lowest-energy structures have been determined up to  $n = 13$ , and work is in progress for the larger clusters. The present results already show that the first solvation shell around the CO does not close at  $n = 12$ , and that the solvent cage can accommodate at least sixteen hydrogen molecules; the precise number will be established in the calculations which are under way. This is in contrast with the recently published results by another lab, which predicted that the first solvation shell of the CO is complete at  $n = 12$  and has the icosahedral geometry. This discrepancy will be discussed and shown to be an artifact of the approximation employed in the published study.

### **Studying Gas Kinetics in MATLAB**

*Yael Elmatad, Chemistry, and Michael Zitolo,*

*Chemistry and Physics*

*Sponsor: Dr. Alexej Jerschow, Chemistry*

Kinetic gas theory is a standard component of the physical chemistry undergraduate curriculum. Its central component is frequently the derivation of the Maxwell-Boltzmann speed distribution and the different mean speed averages, such as the mean speed, the root-mean-square speed, and the most probable speed. We describe a student project in which the emergence of this speed distribution can be studied from different starting procedures. We choose MATLAB as the programming environment for its ease of use and graphical capabilities. Since they program their own gas simulation software, the students are able to study many fundamental issues of gas kinetics in detail, which otherwise remain obscure by using a third-party program, or by studying the equations in the course. The final program is provided on our Web page ([homepages.nyu.edu/~yse200/kinetic](http://homepages.nyu.edu/~yse200/kinetic)), along with several examples and statistical calculations.

### **Survey of Genomic Sequences Forming Long RNA Hairpins**

*Daniela Fera, Chemistry*

*Sponsor: Dr. Tamar Schlick, Chemistry*

Palindromes are long RNA sequences that can form long hairpin structures due to complementary base-pairing. They have been found to induce breaks in strands

during meiosis and act as binding sites for regulatory proteins during development. Short palindromes of fewer than thirty-five nucleotides have been found in genomes. The purpose of this study was to determine the distributions and functions of much longer hairpins (forty to two hundred base-pairs).

The distributions of hairpins in the domains of life contrast significantly. Hairpins consisting of more than forty base-pairs were not found in Achaea. Few such hairpins were found in bacteria, and many large hairpins were found in Eukaryota (e.g., *C. elegans*, *Drosophila melanogaster*). Many of these sequences lie in between genes, implying possible functions for sequences in these vast regions. Thus, my searches have provided a systematic description of long palindrome sequences in various domains of life.

The results suggest that such structures are prevalent in more complex organisms. A plausible reason for this is that these hairpins may be involved in regulating transcription, which is more complicated in higher organisms. Furthermore, there is more noncoding RNA in higher organisms, and these are the regions where most of the sequences were found.

#### **Screening New Synthetic Antimicrobial Compounds**

*Tian Gao, Chemistry*

*Sponsor: Dr. Neville Kallenbach, Chemistry*

Numerous antibiotics in wide use are losing their clinical utility. New antibiotic agents are urgently needed due to the rapid rise of multidrug-resistance among the pathogenic bacteria. Previous research from the Kallenbach laboratory has focused on synthesizing antimicrobial peptides, which are homologous to natural antimicrobial peptides synthesized by the mammalian innate immune system. The most successful peptides have been amphipathic containing both positive charge and bulky hydrophobic groups. In this project, I tried to identify if any among a library of eighty tri-substituted 1,3,5-triazin-2-amine compounds synthesized by the Chang group possess antimicrobial properties. These eighty compounds were selected because they mimic features of successful antimicrobial peptides. I screened these compounds for effectiveness against *Bacillus subtilis*, a gram-positive bacterium that is closely related to *Bacillus anthrax*. The assay involved screening each compound with *B. subtilis* by measuring the turbidity (600nm) in Muller-Hinton media. These values were compared to both a positive control values of untreated growth, and negative control, penicillin (mg/

mL) inhibition. Of these eighty compounds tested, ten showed growth inhibition of greater than 90% at 100 $\mu$ M concentration. My results appear to show that there is no clear trend in the efficacy of these compounds against *B. subtilis* growth inhibition.

#### **Texture Perception in Amblyopic Macaque Monkeys**

*Alex Gavlin, Neural Science*

*Sponsor: Dr. Lynne Kiorpes, Neural Science*

Amblyopia is a disorder of visual processing that persists even after optical correction. Previous studies with amblyopes have shown perceptual deficits for higher-order (complex) images that are greater than can be explained by perceptual deficits for first-order (basic) images. To understand complex vision more accurately, I studied the development of normal texture perception and texture perception in amblyopic monkeys. I used modulation of two luminance-defined orthogonal noise gratings to create an orientation defined texture, which served as the higher-order signal. I varied the spatial frequency of the first-order noise components, the spatial frequency of the texture modulator, and the texture modulation depth. Developmental data indicate that modulation sensitivity improves until at least fifty-weeks of age. Additionally, younger animals have a reduced sensitivity to high spatial frequency modulations. With their amblyopic eye, amblyopes showed reduced modulation depth sensitivity and could not detect the orientation of high spatial frequency modulations. They were able, however, to detect the second-order orientation of stimuli whose first-order components were beyond their acuity limit. Fellow eye performance was similar to that of normal subjects. This suggests that first-order perceptual losses in amblyopia do not limit performance on this higher-order texture task, and that additional deficits exist at higher stages of processing.

#### **The Novel and Versatile Synthesis of a Chiroptical Molecular Switch**

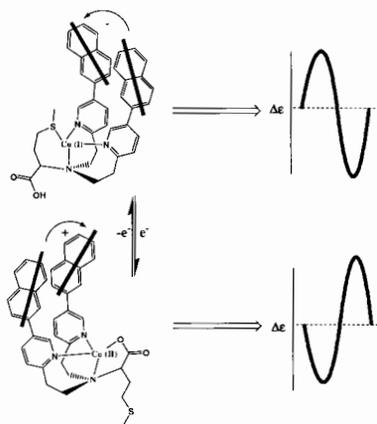
*Brian Gilberti, Chemistry*

*Sponsor: Dr. James W. Canary, Chemistry*

The electronically-triggered motion of chiroptical molecular switches has the potential to open a plethora of possibilities for chirotechnology. The helical chirality of these switches can be inverted with the oxidation and reduction of the copper complex. The subsequent +/- optical signal can advance the frontier of data storage, optical switching devices, and photochromic systems.

Previous switches have lacked air stability, a hurdle that I sought to surmount by using six-membered metallochelate rings rather than five-membered rings used in my previous studies. In the target system, naphthalene chromophores have been included that are expected to give circular dichroism (CD) signals that can be used as spectroscopic handles to report changes in three-dimensional orientation. As shown in the figure, the Cu(I) oxidation state should give a positive couplet in the CD spectrum, while the Cu(II) state should give the opposite.

The synthesis of the target molecule takes advantage of a facilitated reaction involving hydroxylamine to provide an intermediate secondary amine. Another key step in this synthetic route allows the attachment of a variety of chromophores via a carbon-carbon coupling reaction.



### Effects of *Drosophila* Pacemaker Neuron Excitability on Metabolic Activity

Michael Goyfman, *Biology*

Sponsor: Dr. Todd Holmes, *Biology*

Virtually all multicellular organisms, including humans, live under cycles of roughly twenty-four hours called circadian rhythms. The most obvious circadian rhythmic behavior is our sleep/wake cycle. By definition, circadian rhythms persist even in the absence of outside environmental cues. Consequently, when animals such as flies are subjected to complete darkness for extended periods of time, they still maintain rhythms of activity/rest of approximately twenty-four hours. These cycles are controlled by pacemaker neurons in the fly's brain. These neurons are made hyperexcitable by expressing a leaking sodium channel from bacteria, NaChBac, using a *pdf*-GAL4 or *tim*-GAL4 driver. Flies

with the UAS NaChBac/*pdf*-GAL4 genotype have a distinct circadian behavioral phenotype expressed as aberrations in activity/rest patterns, including a greater anticipation of lights "on" and "off" in an LD environment.

I wanted to find out whether the regulation of metabolic activity of the fly was compromised when the pacemaker neurons were constantly depolarized. One indicator of metabolic activity is the level of glycogen in *Drosophila* heads, which remains constant over a twenty-four hour period in wild-type flies. Glycogen levels measured in *Drosophila* heads showed that glycogen levels between mid day and late night appear to differ in NaChBac/*pdf*-GAL4 flies but stay relatively constant in the dORK-NC1/*pdf*-GAL4 controls. These results suggest that pacemaker neurons in *Drosophila* play a role in coordinating metabolic activity of the fly in addition to regulating circadian rhythms.

### The HeliOS Project: A Vision-Based Autonomous Control System for Radio-Controlled Helicopters

Team Members: Steven Hakusa, Oliver Kennedy, Rayad Khan, Eton Kwok, William Lem, Jason Poulos, Christian Pulla, Karl Schmidt, and Hesham Wahbah  
Sponsor: Dr. Ken Perlin, *Computer Science*

Radio-controlled (RC) helicopters are inherently unstable vehicles. This makes flying them difficult, which in turn severely limits their usage. The solution is to have the RC helicopter keep itself stable using an array of sensors and control algorithms. Most existing methods are designed for large, gas-powered RC helicopters and are thus too heavy for newer small electric helicopters. In addition, these systems rely on GPS data for stability, which may not always be available in certain environments.

This project focused on the development of a vision-based autonomous control system that would avoid the use of GPS for position reference. Two wireless cameras mounted on the helicopter transmit images to a laptop computer running machine learning algorithms for image processing and system control. The cameras are accompanied by an inertial measurement unit, whose data is transmitted over the audio channel of the cameras. The output from the control algorithms is sent back to the helicopter using the "buddy box" port on the helicopter transmitter. Since all processing is done on the ground, the on-board system is very light (< 6oz.) and can be mounted on relatively small helicopters. The project goal is to achieve stable hover.

**Effect of Diabetes on Atherosclerosis Regression***Mubashar Khan, Biochemistry**Sponsor: Dr. Nicola Kreglinger, Cardiology, NYU School of Medicine*

Diabetes and coronary heart disease have become a worldwide epidemic. Macrovascular complications are responsible for 80% of the mortality associated with diabetes. Hyperlipidemia, hyperglycemia, and insulin resistance are all factors that contribute to increased risk of coronary artery disease in diabetics. Because these factors typically coexist, it is hard to resolve the contribution of each factor to the vascular pathology. A mouse transplant model has been developed to study lesion regression in different metabolic environments depending on the metabolic profile of the recipient mouse. LDL receptor knockout mice, a mouse model of atherosclerosis, are fed a high fat diet for thirty-two weeks to induce lesion formation. A segment of the aorta with a lesion is transplanted into PDX1<sup>+/-</sup> mice with isolated hyperglycemia or wild-type mice. This allows a rapid change of the metabolic environment to which the lesion is exposed. Four weeks after transplant, recipients are sacrificed and the transplanted segment is analyzed for lesion size and composition. This experiment can give insight into how important aggressive glucose control is in the diabetic patient, in addition to lipid-lowering measures to promote lesion regression.

**Microstrip Resonators for Microwave Spectroscopy of Ferromagnetic and Paramagnetic Spin Systems***Stuart B. Kirschner, Physics**Sponsor: Dr. Andrew Kent, Physics*

The primary objective was to conduct spectroscopy in the microwave frequency range (~10 GHz) of ultrathin films of cobalt (~5 nm thick films) and Diphenylpicryl-Hydrazyl (DPPH). The second objective was to evaluate the capacity of microstrip resonators for this application, including their sensitivity and quality factor. From such spectroscopy, one can determine the total spin of the samples and get insight into their atomic or molecular structure, magnetic interactions, and energy level structure.

The microstrip resonators were lithographically patterned thin film structures of mm dimensions, with an unevenly split strip of gold. At resonance, the length of the smaller strip is half the radiation wavelength. Using these microstrips is advantageous because this AC magnetic field is concentrated near the smaller strip,

where the sample materials are placed, and their resonance frequencies can be designed to be in the range of many magnetic materials.

Magnetic resonance was successfully observed on cobalt films. The dependence on thickness of cobalt was studied. Paramagnetic DPPH was also examined. In addition, information on feasibility and limitations of the use of microstrips for FMR on magnetic materials was investigated.

Initial data demonstrate that microstrip resonators do have the desired capacity, but are sensitive to factors such as background dielectrics and position of sample.

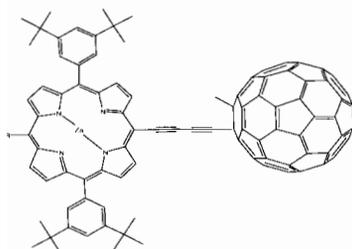
**Evolution of Developmental Traits in Nematode Male Tails***Alena Kolychkina, Biology**Sponsor: Dr. David Fitch, Biology*

To understand morphological evolution, I studied various species related to *Caenorhabditis elegans*. The model used for this study was the male tail, which has conserved features such as positions of the rays, phasmid location, and the number of rays that have changed during evolution. Species *Rhabditoides inermiformis*, *Poikilolaimus oxycerca*, *Brevibucca* sp., *Koerneria* sp., and *Cuticonema vivipara* were chosen because they represent branches diverging earlier than Rhabditidae species studied previously. Profiles of morphological development within each species in terms of ray cell development were determined by indirect immunofluorescence staining with a monoclonal antibody directed towards adherens junctions. These profiles show that cell origins are the same in all the species studied, which allows me to propose homologies between the rays in different species. Furthermore, there may have been a loss of one ray pair in species such as *Brevibucca* sp. or *Cuticonema vivipara* since these species have eight rays as compared to nine exhibited in species that diverged later. My data also suggest that phasmids were in the posterior position in the common ancestor to species studied. The evolution of these and other male tail features can now be traced using my molecular phylogeny.

**Completely Conjugated Porphyrin-Fullerene Molecular Wires***Paul J. Krawczuk, Chemistry**Sponsor: Dr. David Schuster, Chemistry*

Systems that include molecular wires have the property of allowing rapid through-bond electron-transfer in excited-state donor-acceptor structures. I report the

synthesis of novel covalently-linked zinc porphyrin-fullerene hybrids that include fully conjugated linkers. These linkers differ from previously reported ethynyl-linked systems (Yamada et al. 1999, Vail et al. 2004) due to the meso-alkyne connectivity of the linker. This structure allows for the zinc porphyrin  $\pi$ -system to be in direct conjugation with the alkynyl linker up to the fullerene (Screen et al. 2002). This conjugation may show improved electronic communication between the fullerene and porphyrin. The fullerene moiety, synthesized via reaction of  $C_{60}$  with lithium trimethylsilyl acetylene, is joined to the alkynyl porphyrin, synthesized via standard porphyrin condensation, with an oxidative copper-catalyzed coupling reaction. Analogous alkene-linked systems are also currently being investigated for direct comparison of electronic coupling between the porphyrin and fullerene, through alkenes and alkynes by a superexchange mechanism. Electrochemical and photophysical studies are being conducted with these materials to investigate the photochemically-induced electron transfer processes that take place.



### CagA Injection into Epithelial Cells by *Helicobacter pylori* Isolates from African and African-American Patients

Athena Kritharis, Chemistry

Sponsor: Dr. Martin J. Blaser, Medicine, Infectious Diseases, and Immunology, NYU School of Medicine

Studies have shown that nearly all patients infected by the bacterium *Helicobacter pylori* are at higher risk for developing gastroduodenal diseases. What remains unclear is why African-Americans are more predisposed to developing gastroduodenal diseases, such as gastric adenocarcinoma and peptic ulcers, than their African counterparts. Due to a proposed correlation between infection with cagA-positive strains and more serious gastric diseases, experiments were conducted to investigate the cagA gene and CagA protein. The following techniques were used: gel electrophoresis, polymerase chain reaction (PCR), SDS-PAGE, and western blot.

PCR has shown, through reproducible results, that the cagA gene is present for all sampled *H. pylori* strains, which include two African-American strains and five African strains. Western blots of the AGS cells, which help to visualize the CagA protein injected through a type IV secretion system by *H. pylori*, produced more variability, but with a common trend that African-American strains had fewer positives for CagA protein translocation than African strains; one-half of African-American strains and four-fifths of African strains showed positive translocation of CagA. This suggests that the association between CagA and severe gastric diseases is lacking, possibly due to differences in the protein itself or in the fate of the protein in epithelial cells.

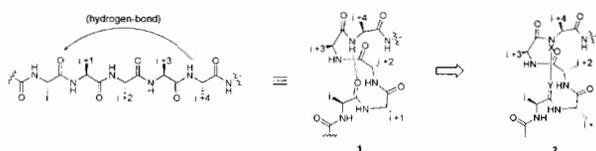
### Synthesis and Biological Evaluation of Hydrogen-Bond Surrogate $\alpha$ -Helices

Tania Lupoli, Chemistry

Sponsor: Dr. Paramjit Arora, Chemistry

The  $\alpha$ -helix, a prominent protein secondary structure (Andrews et al. 1999), is stabilized by a hydrogen bond between the C=O of the  $i^{\text{th}}$  amino acid residue and the NH of the  $i+4^{\text{th}}$  residue (1, figure 1). The laboratory has recently introduced a non-native carbon-carbon constraint into short peptides by inserting modified amino acids into the  $i$  and  $i+4$  positions of a peptide, and forming a covalent bond between these residues (2). I term these artificial peptides hydrogen-bond surrogate (HBS)  $\alpha$ -helices. Circular dichroism (CD) and 2D NMR studies suggest that the constrained peptides form  $\alpha$ -helices in aqueous solution, while their control counterparts do not (Chapman et al. 2004). I am now interested in targeting specific protein-protein interactions utilizing these artificial helices. The well-studied RNase S-protein/S-peptide complex (Kim et al. 1992) is being used to evaluate the ability of an HBS  $\alpha$ -helix to target a protein receptor, and to obtain high-resolution structural data on the HBS  $\alpha$ -helix through X-ray crystallography. Coiled-coil interactions are being investigated by mimicking  $\alpha$ -helices based on the regulatory protein Jun (Akey et al. 2001). Utilizing the lab's established procedure for synthesizing modified amino acids, along with standard solid phase synthesis protocols, constrained peptides have been constructed. CD and 2D NMR studies will be performed to assess the helicity of these HBS  $\alpha$ -helices. Through binding assays, I have found that HBS peptides are capable of interfering with coiled-coil interactions, while the corresponding unconstrained peptides are not. From this preliminary data, I

can conclude that HBS  $\alpha$ -helices are capable of targeting protein-protein interactions.



### Exploring the Binding Interface of Cofilin and Actin

Nicole Maloney, *Biochemistry*

Sponsor: Dr. Neville Kallenbach, *Chemistry*

The dynamic behavior of the actin cytoskeleton facilitates directional motility. Cofilin, an actin regulatory protein, functions primarily to sever polymerized actin filaments. Although the crystal structures of both free cofilin and free actin have been described, difficulty in crystallizing the cofilin/actin complex has led to the use of a technique known as X-ray footprinting to explore the binding interface of cofilin and actin. The technique relies on the X-ray-mediated production of highly reactive hydroxyl radicals and allows for the determination of regions of cofilin that are protected from oxidation when cofilin binds. In vitro studies of the cofilin/actin complex have provided detailed information about the binding interface. These conclusions are consistent with biochemical and genetic data, thus validating the approach. I propose to extend the utility of this technique to study binding interfaces in vivo. Experiments have been undertaken to create mutant yeasts that express cofilin with a poly-histidine tag allowing for retrieval of the protein from other cellular components without interfering with its binding. If successful, these cells will be subjected to X-ray footprinting. This study will potentially create a model system for the utilization of tagged proteins and X-ray footprinting to study binding interactions of large protein complexes in vivo.

### Magnetic Field Structure in Dying Stars

Steven Manley, *Physics*

Sponsor: Dr. Patrick Huggins, *Physics*

This study reports observations that shed light on the detailed structure of magnetic fields in planetary nebulae, the final stage of evolution of ordinary stars. The results are of special interest because magnetic fields

may play a key role in the way planetary nebulae get their complex shapes, providing increased insight into how stars die. The observations were obtained from the archives of the Hubble Space Telescope. They consist of high resolution ( $\sim 0.1$  arcsecond), optical images of three planetary nebulae, NGC 6537, NGC 3132, and IC 418, which were selected on the basis of their morphological characteristics. The images, taken in the emission lines of H alpha, N II, and O III, were processed using an unsharp mask technique to enhance small scale structure. The processed images reveal highly filamentary structures, with kinks and knots, which we interpret as the underlying magnetic field, where the material is trapped by the field lines. I have determined the physical properties of the filaments and used them to estimate field strengths of  $\sim 1$  milli Gauss.

This work makes the novel proposal that the effects of magnetic fields can be directly seen in planetary nebulae, and it provides strong evidence that the magnetic fields have a localized and thread-like geometry. This is of particular interest because our own Sun will become a planetary nebula in about five billion years.

### Daily Oscillation of PERIOD (PER) Protein in the Peripheral Pacemaker Neurons of *Drosophila melanogaster* Brains

Manish Noticewala, *Neural Science*

Sponsor: Dr. Todd Holmes, *Biology*

Metabolic processes in diverse organisms can be governed by an endogenous circadian ( $\approx 24$  hour) clock. In *Drosophila*, circadian rhythmicity of locomotor activity is controlled by oscillations of PERIOD (PER) and TIMELESS (TIM) proteins in pacemaker neurons. Previous studies in the lab show that targeted expression of dORK $\Delta$ -C, an open-rectifier  $K^+$  channel, disrupts circadian locomotor activity and molecular oscillations of PER and TIM in pacemaker neurons.

My project examined the effects of disruption in core pacemaker neurons on peripheral pacemaker neurons. I selectively expressed dORK $\Delta$ -C and dORK $\Delta$ -NC, a nonconducting  $K^+$  control channel, in the pacemaker neurons of *Drosophila*. Using Western blotting, I assayed the levels of PER and TIM in the peripheral oscillators of the *Drosophila* head. During 12:12 hour light/dark cycles, PER and TIM continued to oscillate in the peripheral pacemaker neurons of dORK $\Delta$ -C flies. For dORK $\Delta$ -C flies that remained in constant darkness,

however, PER oscillations were dampened on day two. These results suggest that oscillations of the molecular clock in the peripheral pacemaker neurons are controlled by the electrical activity of core pacemaker neurons. As a follow-up, I will replicate the current experiments and subsequently examine PER and TIM oscillations in the *Drosophila* body.

#### **Molecular Characterization of the Sodium/Monocarboxylate Transporter (SMCT)**

*Monika Paroder, Biochemistry*

*Sponsors: Dr. Nancy Carrasco, Molecular Pharmacology, Albert Einstein School of Medicine, and Dr. Janice Cutler, Chemistry*

This report presents an extensive characterization of the human sodium/monocarboxylate transporter (SMCT), a plasma membrane protein that mediates the active transport of short-chain fatty acids (SCFA). SMCT is the product of the SLC5A8 gene and is 70% homologous to the sodium/iodide symporter (NIS). NIS expression in the thyroid is TSH-dependent and basolateral, whereas I observed that SMCT expression is TSH-independent and apical in the thyroid. I show for the first time that SMCT protein is expressed not only in the thyroid, but also in the kidney, colon, salivary glands, uterus, liver, lung, and brain. To characterize SCFA uptake in FRTL-5 cells, I used  $^{14}\text{C}$ -labeled propionate, a SCFA that was shown by electrophysiology experiments to be very well transported by SMCT. FRTL-5 cells exhibit sodium-dependent, ibuprofen-sensitive ( $K_i=73\mu\text{M}$ ) uptake of  $^{14}\text{C}$ -propionate. SMCT was proposed to be a tumor suppressor in colon cancer. Strikingly, I have shown that SMCT protein expression was abolished or markedly downregulated in 14/15 (93%) of human colorectal cancers examined. This suggests that SMCT expression is a potentially valuable new marker for early detection of colon cancer.

#### **Fetal Nutritional Stress and Mitochondrial DNA**

*Mykie Pidor, Anthropology*

*Sponsor: Dr. Todd Disotell, Anthropology*

Programming is the process through which the environment encountered during a phase of rapid growth and development shapes the long-term control of tissue physiology. Nutritional stress during pregnancy (e.g., starvation or undernourishment) has been associated with the onset of various diseases in adult life, such as

hypertension and diabetes. These diseases are also associated with mutational changes in the mitochondrial DNA, since mtDNA codes for proteins important in cellular energy production. It has been hypothesized that the mechanism by which nutritional stress during pregnancy affects long-term physiology is the induction of mutations in the mitochondrial DNA of the fetus. In this experiment, the mitochondrial genomes from liver tissue of fifteen baboons (*Papio anubis*) that were nutritionally stressed or non-stressed during pregnancy were sequenced to determine whether a nutrient-poor fetal environment induced mutations. The sequenced mitochondrial genomes of liver tissue in stressed individuals did not show any pattern of mutation significantly different from those of non-stressed individuals. While this does not completely rule out the possibility of mitochondrial mutation as a mechanism for nutritional stress action, it does suggest that the programming roots of these adult-onset diseases are found elsewhere.

#### **Sticky-Ended Assembly of $\alpha$ -Helical Coiled Coils**

*Danielle Pier, Chemistry*

*Sponsor: Dr. Neville Kallenbach, Chemistry*

The development of peptide adhesive strategies to generate macromolecular structures from multiunit synthetic peptides would be a major advance in nanotechnology. The Kallenbach lab has previously generated a branched trimeric coiled-coil employing  $\alpha$ -helical peptides (Kalinina et al. 2004). I wished to increase the complexity of such units by incorporating a peptide nucleic acid (PNA) (Nielsen et al. 1991) sequence into a heterodimeric peptide. This dimer was formed using an acidic peptide (Acid) and a basic peptide (Base) previously shown to heterodimerize (O'Shea et al. 1993) into which a PNA sequence was incorporated into the N-terminus of the basic peptide ("Base-PNA"). The mixture of Acid+Base-PNA had 57.1% less overall helix content than Acid+Base. The relative increase in helix content for Base-PNA, however, was 722.7% versus an increase of 413.3% for Base when each was mixed with Acid. It appears the Acid+Base-PNA mixture had a lower overall helical content than Acid+Base, thus the PNA must be destabilizing the oligomer, possibly by coiling in the opposite direction of the coiled-coil. Modifications incorporating glycines between the  $\alpha$ -helix and PNA may alleviate this steric hindrance and stabilize the structure.

### **Does Hypermutation Occur in Zebrafish Antibodies?**

*Nicolas Pulham, Biochemistry*

*Sponsors: Dr. Janice Cutler, Chemistry, and Dr. Ellen Hsu, Physiology/Pharmacology, SUNY Downstate Medical Center*

The adaptive immune system must be able to produce antibodies that recognize a vast number of antigens. B-lymphocytes, stimulated by pathogen, produce antibodies that bind antigen more effectively with time. Somatic hypermutation (SHM) is the mechanism that introduces point mutations into immunoglobulin variable region genes, leading to antibodies with higher antigen affinity. While hypermutation has been well studied in the mouse and human models, little has been done in cold-blooded vertebrate models, and no one has studied the bony fish, or *teleost*, model. Because bony fish descend from the earliest vertebrates, they may yield additional insight into SHM and how it evolved with the immune system. My project attempts to determine whether an immunoglobulin light chain variable region in zebrafish undergoes SHM. I have evaluated the three kinds of antibody light chain isotypes by genomic Southern blotting and analyzing sequences from the zebrafish genome database in order to determine the smallest family of genes. What might be unique, single-copy genes are selected as candidate sequences for cloning from genomic DNA of an individual fish and for comparison to the expressed mRNA sequences from lymphocytes in the liver and kidney of the same fish.

### **Ultraviolet-Irradiated DNA: Major Photoproduct Formation and Complexation with Photolyase**

*Doris Pun, Chemistry*

*Sponsor: Dr. Hans Schelvis, Chemistry*

Exposure of DNA to UV radiation results in harmful photoproducts. The photoproducts that form most readily are between adjacent thymines: the *cis, syn* cyclobutane dimer and the 6–4 photoproduct. Since such bulky distortions on the DNA strands inhibit DNA replication and transcription, it is important to understand the formation and the repair of these photoproducts.

To understand the process of DNA photoproduct formation, I examined rudimentary, single-stranded DNA. These strands of different base sequences—varying the position of the adjacent thymines—were investigated to determine how thymine position affects for-

mation of the dominating photoproducts. Photoproduct formation was monitored as a function of damage time by high performance liquid chromatography (HPLC), and I found that thymines dimerize more readily at the terminal ends than at the central position.

Additionally, it has been known for decades that DNA photolyase has the ability to repair thymine dimers by monomerization through light-driven electron-transfer. Since there is a correlation between photolyase's affinity for damaged DNA and its repair efficiency, I used UV-vis spectroscopy to investigate the binding of the enzyme to dimers at different positions along the strand. I determined that photolyase possesses a stronger affinity to hexamers with CPD located at the second position from the 5' end.

### **Circadian Locomotor Behavior and Immunocytochemical Changes in *Drosophila* Expressing Mutant Huntingtin Protein**

*Saima Rashid, Biology and Middle Eastern and Islamic Studies*

*Sponsor: Dr. Todd Holmes, Biology*

Huntington's chorea is a dominantly-inherited progressive neurodegenerative disease characterized by motor skill degeneration, cognitive deficits, psychiatric symptoms, and ultimately premature death. Mutant huntingtin protein (Htt) contains a poly-glutamine expansion that renders it neurotoxic. While it has been established that a resulting protein misfolding phenomenon leads to the formation of aggregates of Htt, the mechanism by which this leads to neurodegeneration is, as of now, still unknown.

Using selective drivers, I have specifically expressed this protein in the circadian pacemaker neurons in *Drosophila*. I am comparing Htt-induced changes observed in these transgenic flies in circadian locomotor behavior assays and immunocytochemical assays to follow the progression of a neurodegenerative process in real-time. In addition, I am measuring the accumulation of the huntingtin protein and examining the health of pacemaker neurons using an antibody for a neuropeptide expressed by these neurons called PDF.

*Drosophila* expressing mutant Htt in the circadian pacemaker neurons appear arrhythmic in the absence of external light cues. This is a result similar to what is seen in *Drosophila* with electrically-silenced pacemaker neurons. Flies expressing wild-type Htt appear to have

normal activity patterns. Larval immunocytochemical assays indicate the formation of detectable aggregates in mutant Htt-expressing flies, whereas controls exhibited diffuse staining in the same neurons.

### **Mapping of a Gene Involved in Male Tail Morphogenesis in *C. elegans***

*Yevgeniy Raynes, Biology*

*Sponsor: Dr. David Fitch, Biology*

I used the male tail of *C. elegans* as a model to study genetic components of morphogenesis, a developmental process of fundamental biological importance, in which cells coordinately change shape in the production of tissue or organ. Rhabditid nematodes (such as *C. elegans*) have two different types of male tails (specialized structures required for copulation)—the rounded *peloderan* and the pointed *leptoderan* form. During morphogenesis of the *peloderan* male tail of *C. elegans*, the cells that make up the tail tip fuse and retract anteriorly. In species with *leptoderan* male tails, retraction does not occur and the pointed larval shape is maintained. In the *C. elegans* mutants isolated in the lab, the normal *peloderan* morphogenesis fails, resulting in pointed tails resembling the *leptoderan* tails of other species.

The goal of the present study was to identify the gene corresponding to one of these mutants, called *ny4*. To accomplish this aim, I used both forward and reverse genetic approaches. In the forward approach, I employed three-factor crosses with phenotypic and molecular markers, as well as complementation tests with deletions and other mutations to delineate a 2.2-map-unit region within which *ny4* is located. In the reverse approach, I used RNA interference (RNAi) to analyze the mutant phenotypes of all the open reading frames from this region. RNAi phenotypes that disrupted tail morphogenesis were used to identify candidate genes. Currently, these candidate genes are being sequenced to locate the mutation.

### **The Effects of Visual Adaptation on Latencies in Striate Cortex and LGN of the Macaque Monkey**

*Sarah Read, Neural Science*

*Sponsor: Dr. Peter Lennie, Neural Science*

In the visual pathway of the brain, a neuron responds to stimuli presented in a specific place in the visual field. These neurons fire at a higher rate when presented with

higher contrast (stronger stimuli). When presented with a high contrast stimulus over a long period of time, however, a neuron will respond less to all contrasts. This phenomenon is called contrast adaptation, but it is unknown whether this is caused by the cell responding as if to a lower contrast stimulus. One way to examine this is to measure latency, defined as the time between a stimulus presentation and the neuron's response. Higher contrasts generally result in responses with shorter latencies. If adaptation is equivalent to a loss of contrast, it should result in longer latencies. Single cell recordings from visual neurons in the macaque monkey were taken before and after adaptation. Latencies were determined using methods from Raiguel (1999) and analyzed across contrasts. After a neuron was adapted, it was determined if the latency changed. If these latencies are lengthened by contrast adaptation, then it suggests an underlying mechanism for adaptation in which the cell is responding as though to a lower contrast stimulus.

### **Understanding the Maturation of Recognition Memory Functions**

*Suma Sangisetty, Neural Science*

*Sponsor: Dr. Lynne Kiorpes, Neural Science*

The capacity for memory develops after birth, and very little is known about the developmental process. Two basic probes have been used to study visual recognition memory: Visual Paired Comparisons (VPC) and the Delayed-Nonmatch-to-Sample (DNMS) task. Both involve similar cognitive processes for performance, but conflicts in the literature suggest that the two tasks exploit processes other than just visual recognition, e.g., the ability to reach for objects and to inhibit attention distractions. I developed variants of the VPC and DNMS paradigms to control for such immaturities. I tested six young monkeys on two tests of recognition memory using a range of delay periods to assess memory. Using the VPC task, memory was elicited as early as two-and-a-half weeks and capacity for longer delays arose at four weeks. Using a variant Delayed-Match-to-Sample (DMS) task, memory over delays up to twenty seconds was apparent at eleven weeks. Under operant test conditions beyond ten weeks of age, subjects performed above 80% correct at all delays. This indicates that previous low scores on the original DNMS task were due to a procedural defect and not a memory deficit and that the elimination of the gross motor component had a positive effect on performance.

### **A Novel Output Pathway of the *Drosophila* Molecular Clock**

*Faraaz Ali Shah, Biology*

*Sponsor: Dr. Justin Blau, Biology*

In both mammals and *Drosophila*, the cycling of key proteins in specific clock neurons (pacemaker neurons in *Drosophila*) is necessary in maintaining twenty-four hour circadian cycles, such as sleep-wake cycles. Disruption of core clock genes typically leads to altered rhythms or a total loss of rhythms in flies, and can cause sleep disorders in humans. In mammals, these clock proteins include the transcription factors REV-ERB $\alpha$  and ROR $\alpha$ . The *Drosophila* E75 and DHR3 proteins are homologous to REV-ERB $\alpha$  and ROR $\alpha$ . Here, I investigated the role of E75 and DHR3 in generating circadian rhythms in *Drosophila*. I examined the circadian rhythms of flies with disruptions in E75 and *Dhr3* and found strains that were arrhythmic. I also found that *Dhr3* loss of function mutants were hyperactive. Some flies didn't sleep for a week. Restoring expression of *Dhr3* to pacemaker neurons restores wild-type activity levels, suggesting that *Dhr3* is normally expressed in clock neurons and is crucial in regulating behavior. A double mutant of E75, which I found is expressed in pacemaker neurons, and *Dhr3* also exhibits wild-type activity levels. This supports the hypothesis that DHR3 and E75 play opposing roles in circadian rhythms of rest and activity. I am currently testing this idea and plan to identify the target genes of the E75 and DHR3 transcription factors to uncover how they regulate behavioral rhythmicity.

### **Identification of Prostatic Epithelial Stem Cells in Mice**

*James Shin, Chemistry*

*Sponsors: Dr. Sohyun Ahn and Dr. Alexandra Joyner, Developmental Genetics, NYU School of Medicine*

The presence of cell populations able to regenerate tissue in response to environmental stimuli has been demonstrated in many adult tissues. In several organs, these "adult stem cells" have been shown to respond to sonic hedgehog (Shh) signaling. Shh is a secreted glycoprotein that activates an intracellular signal transduction cascade through its receptor patched (Ptc). The transcription factor *Gli1* is expressed in response to Shh signaling, and thus can be used as a readout of activity. Using mice with  $\beta$ -galactosidase (lacZ) reporter gene knocked in at the *Gli1* locus, Shh-responding cells in

mouse prostate can be visualized. I found that Shh-responding cells in prostate epithelium were confined proximally to the urethra; this compliments earlier reports that prostate stem cells are located in the proximal portion of the gland. I therefore believe that *Gli1* expression marks prostate stem cells. My goal is to investigate the role of these stem cells in prostate cancer and metastasis. It has been postulated that tumor cells with metastatic potential arise in stem cells. To investigate this phenomenon, I will cross genetic prostate cancer model mice with Shh reporter-mice. The resulting model will allow me to visualize stem cells in metastatic tumors.

### **Large-Scale Neural Network Simulations Using Parallel, Distributed Architecture**

*Jason Snell, Neural Science*

*Sponsor: Dr. Alex Reyes, Neural Science*

Recent efforts to characterize the behavior of small networks of cortical pyramidal cells have produced an enormous wealth of information. While previous research focused primarily on single cells, new recording techniques have enabled data collection from multiple cells in vitro. These experiments have provided information about the connectional organization of local neural networks within the cortex. By incorporating experimentally-measured parameters into simulations, we can begin to understand the behavior of much larger networks.

A common problem with simulations, however, is the sheer amount of computing power necessary. To alleviate this problem, the simulation was compartmentalized and distributed across many computers. Each computer hosts a small block of cortical tissue meshed at its borders with a neighboring block of tissue on another computer. This architecture allows segments of the network to run in parallel, much like biological networks, and to run in real-time. I plan to interface the simulation with real neurons in the in vitro brain slice preparation.

### **A Neuroeconomical Approach to the Ellsberg Paradox**

*Jason Snell, Neural Science*

*Sponsor: Dr. Paul Glimcher, Neural Science*

Humans have an extraordinary capacity for logical reasoning and reduction, features that establish the basic foundation for modern economic theory. Reason-

ing, however, is not always sound and often exhibits gross irrationality in certain situations. One classic example of human irrationality is the Ellsberg Paradox. In this paradox, participants chose between a lottery with clear probabilities, termed risky (a fair coin toss, for example), and one with unclear probabilities, termed ambiguous (a weighted coin toss). Even though the outcome is completely dependant upon a participant's final choice of heads or tails, and not the coin, aversion to the ambiguous lottery is quite prevalent.

In my experiment, participants choose between a risky lottery and an ambiguous lottery. If the lotteries have equal rewards, participants invariably choose the risky lottery. Increasing the reward associated with the ambiguous lottery, however, causes most to eventually choose it. The ambiguity premium, or the cost of ambiguity, is the magnitude of this increase over the reward for the risky lottery. My model also allows for varying levels of ambiguity and establishes a trade-off between ambiguity and the ambiguity premium. I am currently scanning participants in NYU's 3T fMRI scanner as they perform this task in an effort to localize the neurocorrelate of the ambiguity premium. Initial results implicate areas in the posterior parietal cortex, as well as several frontal area, in the processing of ambiguity.

#### **Identification of Sites for Novel Antibiotics by Computational Analysis**

*Joseph Sofaer, Biochemistry and Computer Science*  
Sponsor: Dr. Hin Hark Gan, Chemistry

Current experimental methods for searching for new antibiotics consume a great deal of time and resources due to their random and expansive nature. By examining functional ribosomal RNA (rRNA) regions in pathogenic bacteria I hope to identify computationally, through comparative and mutational analyses, the most promising novel target sites for antibiotics. My method consists of the following steps: choosing an initial pool of target sites from experimentally identified deleterious mutation sites; screening for regions that incorporate these sites and are perfectly conserved among bacteria but not well-conserved in eukaryotes; and finally, using antisense oligonucleotides to assess the binding strength to the target sites.

Oligonucleotide-ribosome binding can mimic the drug-ribosome interaction, allowing efficient computational identification of novel sites. My preliminary study yielded two candidate *T.thermophilus* 16S rRNA sites: one is targeted by an existing antibiotic; in the other,

antisense fragments have been shown to disable ribosomal function. These two sites offer strong reinforcement of my method. Continuing work involves calculating ideal RNA fragment lengths and a comprehensive search on the ribosome to identify more novel target sites.

#### **Amide-Ligand Hydrogen Bonding in Reverse Micelles**

*Pamela Tadross, Chemistry*  
Sponsor: Dr. Marc Walters, Chemistry

In a novel approach to modeling the second coordination shell of metalloproteins in solution phase systems, a surfactant counterion has been designed to sustain hydrogen bonds with metal complexes in solution. This new cationic surfactant, called CDA-Cl, contains a primary amido group that acts as a hydrogen bond donor. In apolar media, CDA-Cl forms reverse micelle structures that can accommodate metal complexes in their polar cores. Through hydrogen bonding interactions with the ligands of the encapsulated metal complexes, the reverse micelles act as models of the second coordination sphere of the active sites of metalloenzymes. In this study, the metal complexes iron (III) ferricyanide and cobalt (II) tetra(benzenethiolate) were examined within the cores of CDA-Cl reverse micelles by <sup>1</sup>H-NMR techniques to evaluate the extent to which the amide-ligand hydrogen bonding is sustained in solution. For the iron (III) ferricyanide salt of CDA<sup>+</sup>, hydrogen bonding in the solid state has been observed in the single crystal x-ray structure, which reveals a bilayer structure with interdigitated alkyl chains and an extensive network of hydrogen bonds that link amide groups to the cyanide ligands and to neighboring headgroups.

#### **Detection of LMP-10 by Neuroblastoma Cells after IFN- $\gamma$ Treatment**

*Derin Tugal, Biology*  
Sponsor: Dr. Carol Shoshkes Reiss, Biology

Interferon-gamma (IFN- $\gamma$ ) is a critical antiviral mediator in the elimination of viruses from the central nervous system (CNS). Treatment of cells of the reticuloendothelial system with IFN- $\gamma$  induces the expression of a set of low molecular weight MHC-encoded proteins (LMPs) that replace the  $\beta$ -subunit of the proteasome complex during proteasome neosynthesis, resulting in a complex termed the immunoproteasome. The immunoproteasome cleaves polypeptides more efficiently than the proteasome, which produces much of the peptide

ligands presented by MHC I molecules. The immunoproteasome, therefore, is critical for recognition of viral particles and consequent virus elimination. Two IFN- $\gamma$  inducible subunits LMP-2 and LMP-7, expressed from the MHC II locus, replace the constitutive subunits  $\beta 1i$ ,  $\beta 2i$ , respectively. The LMP-10 subunit, mapped outside of the MHC locus, replaces the  $\beta 5i$  subunit of the 20S proteasome. IFN- $\gamma$  has been demonstrated to induce the expression of the LMP-2, LMP-7 in neuronal cells, while levels of LMP-10 have not been examined in these cells. My results show that IFN- $\gamma$  also induces LMP-10 expression in neuroblastoma cells resulting in generation of the immunoproteasome complex.

### Role of Kir2.2 in Determining Atrial Function

Nickolas Tyriss, Chemistry

Sponsors: Dr. Glenn Fishman and Dr. Greg Morley, Cardiology, NYU School of Medicine, and Dr. Henry Brenner, Chemistry

Inward rectifying potassium current ( $I_{K1}$ ) is important in the late phase of action potential repolarization and in stabilizing resting membrane potential in atrial myocytes. Members of the Kir2 subfamily, which include Kir2.1, Kir2.2, and Kir2.3, have been identified as the main contributors of the cardiac  $I_{K1}$ . Normally, sinus nodal pacemaker cells express lower levels of  $I_{K1}$  resulting in a less negative resting membrane potential, and a lower membrane conductance, both of which facilitate slow diastolic depolarization. A loss of  $I_{K1}$ , however, has been implicated in sinoatrial (SA) node dysfunction. Using a Kir2.2 knockout (KO) line of mice, I studied the role of  $I_{K1}$  in sinus node function. Langendorff-perfused Kir2.2 KO adult hearts (two to six months) were optically mapped using voltage fluorescence to determine SA activation patterns. Volume conducted ECG parameters including heart rate, PR interval, QRS duration and QT intervals of control, and Kir2.2 KO hearts were not significantly different. Activation maps of KO and control animals demonstrated that the location and conduction velocities (CVs;  $0.88 \pm 0.13$  mm/msec and  $0.99 \pm 0.23$  mm/msec, respectively) within the SA node were not significantly different. Pacing experiments revealed no significant differences in atrial CVs or effective refractory periods of the left and right atrial appendages between control and KO animals ( $21.7 \pm 1.6$ ,  $23.3 \pm 6.0$ ,  $25.0 \pm 1.5$ ,  $20.8 \pm 3.0$

(in msec), respectively). Thus, my study has demonstrated that a lack of Kir2.2 does not significantly impact the SA node or atrial function. Future studies using Kir2.x deficient mice will reveal the impact of  $I_{K1}$  in defining the SA node function.

### High-Information Content Analysis of Gonadogenesis Defects in *Caenorhabditis elegans* Using RNA-Mediated Interference

Krishna Vijayendran, Biology and Philosophy

Sponsor: Dr. Jane Hubbard, Biology

Gonadogenesis is the process by which the gonad and germ line are formed. This process is essential for successful reproduction. Many genes are involved in gonadogenesis, and a mutation in any one of them can result in gonad defects that can impair fertility. In order to understand this process fully, it is important to understand the specific molecular functions of the genes that underlie it. The nematode worm *C. elegans* has many characteristics that make it attractive for studying gonadogenesis: it is transparent, has a simple anatomy, and its genome has been fully sequenced. I am using a method of gene inactivation called RNAi to inactivate systematically gene function and evaluate the subsequent gonad defects under high-power magnification (400x). I have studied a set of 147 genes that, when inactivated in the mother, were previously known to cause the production of sterile progeny, but for which the specific anatomical defects underlying sterility were not previously known. These data allow me to correlate the phenotypic effect of the removal of a given gene's activity and the gene's sequence identity. Taken together, inferences can be drawn regarding the specific function of many genes required for fertility.

### ICE: Identification, Classification, and Encapsulation of Alien Programs

Nicholas West, Computer Science

Sponsor: Dr. Benjamin Goldberg, Computer Science

Widespread use of the internet has greatly increased the ease at which programs and data can be shared between computers; it has also increased, however, the ability for malicious programs to be transmitted and executed on unsuspecting users' machines. Current security mechanisms fall short of providing adequate protection for two main reasons: either they are too com-

plicated to configure or they only provide the binary option of “allowed” or “blocked.” The former results in poorly written and out-of-date security policies being used to determine access rights for alien programs and the later potentially prevents useful programs from running. ICE presents a simple process which allows untrusted programs to be run safely: 1) the user provides simple access rules for common program types (such as “photo editors” and “email clients”); 2) the user specifies a trusted “program classifier” to provide classifications of programs (much like Norton is used to make the binary classification of “virus” or “not virus”). These third party classifications are then mapped to program groups which map to the local permissions granted to the program—modulating the amount of access a program has. Although benchmarking is not complete at this time, it is expected that the use of ICE will have a minimal impact on overall runtime efficiency.

#### **Are Tracy and Widom in Your Local Telephone Directory?**

*Ryan Witko, Mathematics*

*Sponsor: Dr. Percy Deift, Mathematics*

It has been proven recently that the longest increasing subsequence of a random permutation of  $N$  numbers behaves (as  $N \rightarrow \infty$ ) like the largest eigenvalue of a random matrix. The distribution of this eigenvalue is described in turn by the so-called Tracy-Widom distribution. More generally, the longest increasing subsequence problem can be interpreted as a problem of random one-to-one mappings from one finite ordered set into a second finite ordered set. For example, as individuals are identified in a telephone directory by two different orderings (e.g., their names and their telephone numbers), these two orderings should show the kind of correlations that one expects from random matrix theory.

The project is a numerical study to determine if this phenomenon is indeed present in the New York City telephone directory. Using computer programs written for this project and data analysis tools such as Mathematica, I have produced striking evidence that the distribution obtained from the Manhattan telephone directory is indeed the same one arising from random matrix theory. Such results open the door to finding Tracy-Widom eigenvalue statistics in the most unexpected of places.

#### **PHARMACEUTICAL DRUGS, ETHICS, AND CULTURE**

*Colloquium Sponsors: Dr. David Scicchitano, Biology, and Dr. Andrea McKenzie, Expository Writing*

#### **How Does the United States Influence Foreign Drug Policies?**

*Team Members: Agnes Isabel Heine, Marc Rodriguez, Scott Sebastien, Ariel Solaski, and Rachel Wilke*

The United States has an extensive history of involvement concerning international drug policies. Most recently, the U.S. has become actively interested in Canada’s marijuana production. Marijuana has become Canada’s most valuable agricultural product, ahead of wheat, cattle, and timber. A more potent strain of marijuana, dubbed “BC Bud,” has sparked the new interest in this controversy. Along with this new potent strain has come increased medical concern and increased violence along the Canadian border and within certain communities. Canada is in the process of considering marijuana policy reform, and the U.S. is becoming increasingly outspoken about their opinion on this change. The new legislation, which would result in marijuana possession being a minor offense, is highly opposed by the U.S. This is a direct conflict of interest between the two countries. Our research analyzed government sources and articles from mainstream and academic publications. It is imperative that the U.S. addresses this issue with great sensitivity for Canada’s drug policy and arrives at an effective understanding that respects both countries’ guiding principles. The U.S. must work together with Canada to establish cross-border cooperation.

#### **Ethical Implications of Pharmacogenomics**

*Team Members: Diana Chan, Michael Gregory, Mary Kah, and Jun Tashiro*

Pharmacogenomics, which allows the use of genome information to improve drug safety and efficacy for individual patients, is a developing technology that introduces important ethical concerns. Our objective was to evaluate the ethical implications of pharmacogenomics and recommend regulatory measures for global consideration. Issues we analyzed included the pri-

vacy of genomic information, possible psychological effects of genetic predispositions, and the technology's global distribution. Our results show that, due to concerns over the confidentiality of genome information, current employment and insurance regulations must be modified to include genetic discrimination. Knowledge of a genetic predisposition to certain conditions could result in the perception that genetic influence is the only causal factor in general health. We therefore encourage public awareness that genetic information is not the only factor that contributes to health. Individual pharmacogenomic diagnostics requires extensive resources that may be inaccessible to some developing nations and underprivileged socioeconomic groups. While tax incentives and public perception should motivate foreign companies to increase the accessibility of this new technology, ultimately educational programs must be implemented to ensure that these countries develop self-reliant healthcare systems. Implementing these regulatory measures will ensure that pharmacogenomics is applied ethically to the situations in which it is used.

#### **Implementing HIV/AIDS Treatment in Developing Countries**

*Team Members: Hirra Ali, Eric Cioe, Jing Li Huang, Francie Mercer, and Dan Siconolfi*

Providing greater accessibility to HIV/AIDS treatment has become an increasingly pertinent goal to the forty million people worldwide living with Human Immunodeficiency Virus (HIV). In December 2003, the World Health Organization developed the Three-By-Five Initiative, intended to treat three million infected people in developing countries by the end of 2005. The Global Fund seeks to raise funds to make previously unavailable highly active antiretroviral treatment (HAART) a reality, providing hope to a previously abysmal future. The program, however, is not expected to meet its goal,

with only 12% of the current treatment need being met; a number totaling only 23.3% of the WHO's goal for 2005. With the majority of the developing countries not meeting their Three-By-Five goals, there needs to be a two billion dollar deficit in funding to scale up the treatment to the requisite 2.3 million people. Additionally, the community mobilization and strong cooperative collaboration between public and private community programs, as illustrated in the eight countries which are anticipated to meet their Three-By-Five goals, should serve as a paradigm for the remainder of the developing world.

#### **Pharmacogenomics: Potential for the Targeted Treatment of Disease**

*Team Members: Paul Myoung, Steve Nowicki, Josh Russell, Christopher Ryan, and Rick Slifkin*

Pharmacogenomics, the application of genomics to pharmaceutical drug development, holds the promise of reducing morbidity and mortality in a wide variety of diseases. Significant advances have been made in our understanding of the genetic makeup of disease-causing organisms. In conjunction with knowledge of the complete human genome, this information can be used to develop new drugs that work more effectively to combat disease while reducing the risk of adverse side effects in patients. An analysis of scientific publications reveals the successes and failures of pharmacogenomics to date and the current progress being made. It is clear that understanding the pathways involved in altering drug function and drug metabolism will impact drug development and promote cost effectiveness. Currently, pharmacogenomics is not mature enough to be applied to the treatment of endemic diseases of the developing world and will not be in the near future without entrepreneurship, an influx of capital, and international cooperation.