Committee on Research Special Research Grants 2006 - 2007

Pranav Anand, Linguistics
Donka Farkas, Linguistics

Propositional Attitudes & Scope: An Experimental Approach

Work in formal linguistics typically proceeds through informal experiments regarding speakers' judgments of well-formedness or appropriateness of linguistic tokens. While these somewhat crude methods are surprisingly effective, they have limitations, especially as the complexity of the stimuli grows. One particularly thorny area is the study of the context dependence of linguistic meaning; whether a speaker would assent to the truth of the sentence [That mouse is big.] depends greatly on the comparison classes implicit in the discourse context.

The aim of this project is to develop novel methodologies for presenting stimuli in context, and thus embark on a more experimental study of meaning. We propose to link computer animation (to present contexts) with the method of magnitude-estimation (to track appropriateness) and Internet-based presentation (to enlarge the potential pool of subjects). During the period of the grant, we will consider two specific experimental subjects: how accurate reports of another's belief or desire must be in comparison to reports of what they say and the presence or absence of ambiguities in sentences with quantifiers (e.g., some, every, most, etc.). However, the novelty of this research suggests that the tools developed could themselves have wider impact within the field.

Nicholas Brummell, Applied Mathematics and Statistics
The AMS Department

Computing Cluster for AMS Research and Supercomputing Education

We propose to set up a computing cluster for the Department of Applied Mathematics and Statistics (AMS). The cluster will be financed from funding from grants held by the AMS faculty with hopefully some matching funds from this proposal. The purpose of the cluster is two-fold. Firstly, the machine will function as a research platform, providing a much-needed fast, large-memory machine for computing applied mathematical and statistical models and performing analysis and post-processing of data. Secondly, the machine will operate as a teaching platform, enabling proposed new courses on supercomputing, and in particular parallel computing, to be taught from the AMS pool of expertise. AMS researchers will be able either to use the fast processors individually or in true parallel mode depending on the diverse applications of the department. It is the
intention to buy a scaleable machine that is easily extensible so that future funds can be used to enhance the computing power of the department.

Heather Bullock, Psychology

*Pathways In and Out of Homelessness: Women, Families, Hardship, and Hope*

Homelessness is among the most pressing problems in the United States and Santa Cruz County is no exception. Single parent families, especially those headed by women are particularly vulnerable to poverty and homelessness. This study provides a deeper understanding of women's experiences of homelessness by focusing on the following four areas: (1) the factors that contribute to the movement of female-headed households in and out of homelessness; (2) the impact of homelessness on women's family relations (e.g. how mothers talk to their children about poverty and homelessness; rejection/support from family members; caregiver stress); (3) women's perceptions of the stigma associated with homelessness and treatment by service providers and other professionals (e.g., health providers, children’s teachers) and; (4) beliefs about upward mobility and future aspirations. In Phase 1 of this study, 80 mothers living in shelters for homeless families will complete a comprehensive set of questionnaires as well as a semi-structured interview about their experiences and perceptions. A diverse subset of these respondents will be selected to participate in a follow-up three months after leaving the shelter. The knowledge gained from this study will contribute to theories of cumulative disadvantage and women's homelessness. Recommendations for reducing homelessness among female-headed households will be offered.

Maureen Callanan, Psychology

*How Children Think About Science: Studying Family Conversations in a New Museum Exhibit on Fossil Mammoth Bones*

Children demonstrate curiosity about scientific topics from the age of 3 years, yet using evidence to reason in science is challenging for older children and even adults. This study is a unique collaboration with Children's Discovery Museum of San Jose and UC Museum of Paleontology. Research on children's understanding of evidence in science will be conducted in the context of the development of a new museum exhibition focused on a set of juvenile fossil mammoth bones found in San Jose. The bones of this animal dubbed "Lupe" will be exhibited along with a full-scale model of a mammoth, as well as a number of hands-on activities designed to introduce 4-10 year old children to the processes of using evidence to test questions in a science domain. The research component will focus on how children from different backgrounds learn about and use evidence - both investigating family conversations as a setting where learning occurs, and
using the museum exhibit as a natural laboratory for testing hypotheses about the conditions under which children of different ages are able to use and understand evidence. The COR project will fund preliminary research that sets the stage for obtaining external funding for the full-scale study.

---

**Benjamin Carson, Music**

*Intercompositional Rhythm*

"Intercompositional Rhythm" is a set of compositions, and a lecture-recital, to be produced with U.C. and University of Maryland performers. It will be featured in Santa Cruz, Davis, and (with external funding) elsewhere. It includes a projection of images and texts; we will also produce DVD audio and video documentation of the project. A website will draw on our recordings to facilitate an animation-realized experiment in listener-guided musical experience, which will also be the subject of studies in music perception and performativity. A Faculty COR Special Research Grant will encourage additional funding from CMA (Chamber Music America), and from the host institutions of our collaborating performers.

This project uniquely combines Carson's theoretical approaches to the composition of irregular rhythm, with a new algorithmic performance process that compels a variety of compositions to combine provocatively. The notion of "algorithm" invoked here builds on classic techniques of John Cage, Tony Conrad, and Roger Reynolds, but this is the first such practice informed by psychological principles of memory and attention, or by philosophical concepts of pure difference.

---

**Alan Christy, History**

**Alice Yang Murray, History**

*Interactive Website and Digital Research Archive on Memories of World War II in the Pacific*

We're applying for GSR assistance to help us develop an innovative interactive website and digital research archive on memories of World War II in the Pacific. These digital tools will promote international collaborative research analyzing relationships between war experiences and memories, contexts shaping memory construction by different groups within countries, memory circulation between countries, and the impact of different mediums on memory transmission. All the research will be conducted by teams of scholars from several countries in the Pacific region, addressing local memories in a specifically transnational and comparative frame. Professor Christy and Professor Yang Murray have used earlier COR funding to cultivate contacts with scholars, museum curators, and communal organizations interested in collaborating with us. We also have
developed a preliminary database of on-line resources, organizations, bibliographies, digital photographs, videos, primary and secondary documents, oral histories, and memory/commemoration sites. The GSR will help us digitize more research resources, redesign our website and develop on-line transnational conversations among scholars. These sources will be evaluated by reviewing use of the tools by member organizations and individuals. We will also examine user comments on the accessibility and utility of the site on a feedback page.

James Davis, Computer Science

3D Sensors for Human Motion Measurement

This proposal addresses the technology necessary to teach machines to measure and analyze human shape and motion. These measurements will allow teaching, learning, and understanding about the human body that is not currently possible. Technology for reliable and accurate measurement of humans will ultimately enable new applications in ergonomics, smart spaces, fashion, surveillance, surgery, security, health, user interfaces, and art.

Specifically, this proposal seeks to measure human motion using cameras and 3D sensors combined with new computer graphics algorithms. The PI believes that the most innovative research will occur using 3D sensors, and this proposal seeks funds to buy two commercial 3D cameras. It is important to note that Intel has funded similar research using standard cameras, but *explicitly* declined to fund research using 3D cameras as being too far removed from current needs. The PI believes this is shortsighted and seeks campus SRG funds to buy the needed equipment, and thus engage in risky innovative research that industry will not fund.

Laurel Fox, Ecology and Evolutionary Biology

Nitrogen Dynamics in Maritime Chaparral

Biological interactions affect individual plants, shape the structure of plant communities and determine how plants interact with nutrients that they obtain from, or add to, the soil. My work, at UCSC’s Fort Ord Natural Reserve, focuses on how plant/herbivore interactions affect both plants and the nutrient-poor soils, particularly soil nitrogen (N). Using field experiments, I have shown that deer browsing reduces the ability of Ceanothus shrubs to fix atmospheric N, but consequences for soil N dynamics remain unclear, probably because such effects take years to develop and demand long-term assessments.
The proposed work will initiate a more complete assessment of soil-N dynamics and will explore causes of variation in previous analyses of soil N. The work will be done 12 yrs after N-fixation in Ceanothus was increased by removing deer browsing on some plants; based on estimates of leaf longevity and decomposition rates, this longer-time frame is necessary to detect changes in soil-N due to the plants’ enhanced N-fixing capacity.

In the experimental plots I will measure: 1) the flux of N ions (nitrate and ammonium) over the entire rainy/growing season (Nov. to April); and 2) the total pool sizes of these N ions and total soil N. These detailed soil-N assessments are needed to understand broad-scale spatial and temporal effects of biotic interactions on the dynamics of key plant resources. These results are applicable to N-deficient soils in general, and these analyses will form the basis for new collaborations that will expand my work into other systems.

 Patricia Gallagher, Theater Arts

Two Catalogues for Exhibition

I have been invited by the Rogue Ensemble Theatre of Tucson Arizona to serve as Artist in Residence for the 2007-2008 season. I have been asked to perform in and/or choreograph three works: Chekhov's "The Cherry Orchard," Peter Barnes "Red Noses" and a World Premiere adaptation of Dante's "Purgatorio."

 Mary-Kay Gamel, Literature

Production of a New Play Based on Euripides’ HELEN

Euripides’ rarely performed HELEN is one of the strangest plays from ancient Greece. In this strange play, Helen never went with Paris to Troy! Instead, the gods sent an image of her there while she remained in Egypt, trying to remain faithful to her husband. Or so she says . . . The idea of a Western army invading a Middle Eastern country for a phantom is certainly timely, and the play's portrayal of Egypt, a very different civilization from Greece, is controversial. Not least, HELEN shows that Greek drama can raise both serious issues and rollicking laughter. I propose to stage a new version which puts this play’s provocative questions about appearance and reality, ethnocentrism, militarism, and gender roles into a theatrical form which can bring its strangeness, seriousness, and wit to contemporary audiences.
Matthew Guthaus, Computer Engineering  
Jose Renau, Computer Engineering

*Multi-project IC for Variability, Reliability and Skew Tolerant Clocking*

This collaborative proposal, between Prof. Guthaus and Prof. Renau, asks for support to manufacture a test integrated circuit (IC) in a 65nm, commercial, silicon technology. IC, or chip, manufacturing is a costly process and this proposal asks to support the fabrication and packaging costs. Since 65nm is a relatively new technology, it has a high cost premium. Therefore, we propose to share the same chip fabrication for several projects. It is necessary to use a new technology to consider modern technology-influenced problems and their impact on design decisions. This has the advantage of promoting collaborative research, producing new publications with significant impact, and obtaining preliminary data for future proposals.

Minghui Hu, History

*Science, Civility, and Politics: Dai Zhen’s Reconstruction of Ancient Cosmopolis and the Dawn of Modern Chinese Thought*

The goal of this book project is to put Chinese intellectual history in global contexts. I am writing an intellectual biography of Dai Zhen (1724-1777) who was an intellectual giant and accommodated a large amount of foreign science and technology into the classical studies in eighteenth-century China. This significant shift foreshadows the development of modern Chinese thought in nineteenth-century China. No one, however, has written a comprehensive biography about Dai Zhen in any Western, Chinese, or Japanese languages. My work will fill this gap and contribute to the growing fields in world history, history of science and technology in China, as well as Chinese cultural and intellectual history.

Paul Koch, Earth & Planetary Sciences

*Modern, Historical, and Future Carnivore Communities in Sub-Saharan Africa: Implications for Conservation and Climate Change*

Sub-Saharan African ecosystems are distinguished by relatively large numbers of co-occurring carnivores. Traditional observational techniques, although vital for a detailed understanding of carnivore ecology, are typically expensive, fraught with observer bias, and site-specific, and they do not allow for quantitative temporal and spatial comparisons. Stable isotope analysis is poised to elucidate aspects of large-scale carnivore community
structure through space and time, thereby allowing comparative relationships between species to be analyzed quantitatively. First, we aim to investigate resource partitioning by carnivores within a number of modern East African sites. These data will be compared to a comprehensive isotopic examination of predators and co-occurring fauna collected by the 1909 Roosevelt/Rainey British East Africa Expedition. Differences in foraging strategies will likely be a function of environment shifts due to escalating human pressures and urbanization during the twentieth century. Secondly, the effects of ongoing climate change are predicted to further desiccate many open environments in Africa, undoubtedly affecting carnivore populations. We aim to compare modern East African communities to those in xeric southern African regions to assess - and in turn predict - the effects of climate change-induced aridification on modern top-level carnivore community interactions.

Jimin Lee, Art

Spanish Photogravure Portfolio Print Project

I have the opportunity to produce a new portfolio containing 12 images of photogravure prints in October 2007. This project will be co-published by me, Jimin Lee, the artist, and Antonio Ortega, the publisher, director of Ediciones De Arte Archeles in Madrid Spain. We will hire the world’s finest photogravure print production studio, Ediciones Benveniste to assist my project.

The production of plates and prints will be created by the artist who will be assisted by the master printers at Ediciones Benveniste in Spain followed by the construction of portfolio cases which will be produced by a professional book binder whose production studio is in Emeryville CA.

The publisher will fund the production expenses which includes a press/studio fee and compensation for the master printer. The artist will be working as an artist-in-residency during the production at Ediciones Benveniste and cover the cost of the materials including copper plates, digital transparencies, printmaking paper, travel and lodging. The production cost for the clam shell style print portfolio cases will be split 50-50 between the artist and the publisher.

J. Cameron Monroe, Anthropology

The Abomey Plateau Archaeological Project

West African kingdoms in the era of European contact have been long examined by both historians and anthropologists interested in non-western political systems. Due to the concerted effort of a few archaeologists, the polities of this region have recently emerged
as ideal contexts in which to explore the dynamics of social complexity and political organization from an archaeological perspective. The Abomey Plateau Archaeological Project will examine the process of urbanism in the Atlantic West African Kingdom of Dahomey. I am applying for funds to launch an archaeological pilot project in the summer of 2007 in the Republic of Benin. The data collected during this pilot project will be used to evaluate the effectiveness of a number of archaeological strategies for assessing urban transformation in Cana, a pre-colonial Dahomean administrative center and an extremely rich archaeological site. This project will substantially advance our understanding of urbanism and political organization in West Africa in the era of the slave trade. Additionally, it will contribute to broader anthropological dialogues on the origins of cities worldwide, a research focus which rests at the heart of anthropological archaeology and remains hotly debated today.

---

**Francis Nimmo, Earth and Planetary Sciences**  
**Erik Asphaug, Earth and Planetary Sciences**

**Dedicated Mars Data Analysis Computer System**

The newly-arrived Mars Reconnaissance Orbiter (MRO) is taking images of the surface at a resolution ten times higher than previous cameras, and is revolutionizing Mars science in the process.

This proposal is to provide partial support for equipment which will allow us to analyze this flood of data and test specific hypotheses regarding the origin of three new landforms (polygonal terrain, fingerprint terrain and lobate flows) identified by the MRO. We propose to use a combination of image analysis and quantitative modeling to investigate whether near-surface ice and/or subsurface liquid water are required to make these landforms. A requirement for either ice or water will place novel constraints on the recent evolution of the Martian climate. The work we are proposing will be partially supported by existing grants, and will form the basis of one or more larger proposals to NASA.

---

**Eleonora Pasotti, Politics**

**New Strategies Adopted by Mayors to Mobilize Support in the Post-machine Politics of Naples, Bogata, and Chicago**

In many cities around the globe, over the past twenty years, fiscal constraints have cut the resources available for patronage, and parties have offered much less organizational and ideological resources. In these challenging contexts, what strategies have mayors developed to mobilize support, both at elections and during their mandates? In order to answer this question, this project develops a comparison of politics in Naples, Bogota and Chicago in the 1990s. These three most different cases, varying in socio-economic,
cultural, and institutional factors, share a past as cases of patronage politics have transitioned to public opinion politics. Yet, they have transitioned to a new form of public opinion politics. In all three, successful mayoral candidates have adopted a novel strategic approach, which I call ‘brand politics’. This project unpacks the mechanisms of brand politics at the electoral and government stages. With its cross-regional analysis of transition from patronage to public opinion politics at the local level, this project sets a new research agenda in political science, that of comparative urban politics. (Within the discipline of political science, currently only American urban politics enjoys a significant research agenda.)

---

**Eric Porter, American Studies**  
**Lewis Watts, Art**

**Jazz After Katrina**

Jazz after Katrina is a collaborative project documenting the jazz and cultural scene in New Orleans following Hurricane Katrina. We are interested in the impact Katrina has had on the lives of individual musicians, performance spaces across the city, and the future of New Orleans’ vibrant musical culture. We are also analyzing the politics of music and reconstruction in the city. We believe this project will serve a valuable documentary function by archiving the survival and transformation of an important, local musical culture. Yet we are also interested in the broader political implications of the story of jazz in New Orleans after Katrina. For embedded in the celebrations and marketing of jazz in New Orleans after Katrina are a series of questions pertaining to the future of the city’s black residents and, by extension, to the place of black people in the national imagination. An SRG would allow us to continue our research by taking three trips to New Orleans during the 2007-08 academic year. We believe that by the end of the year (after ten post-Katrina visits to New Orleans between us) we would have sufficient data to begin assembling a planned book project consisting of Watts’ photographs and Porter’s written analysis and start talking to cultural institutions about the showing of a related exhibit.

---

**Seth Rubin, Chemistry and Biochemistry**  
**Doug Kellogg, MCD Biology**

**Molecular Mechanisms that Control Cell Growth**

Control of cell growth is essential for cell proliferation and for generating cells of diverse sizes and shapes that carry out specific functions in the human body. An understanding of the mechanisms that control cell growth is relevant to cancer, as these mechanisms represent potential targets for new drugs aimed at blocking the growth of tumor cells. The focus of this proposal is to use an interdisciplinary approach to understand the molecular
interaction between two cell cycle regulatory proteins and how this interaction is controlled by a biochemical modification known as phosphorylation. This proposal marks a collaboration between two laboratories that will apply complimentary techniques and expertise towards answering several important structural and mechanistic questions regarding this important protein complex. The proposal requests seed funds needed to generate initial results that will enable pursuit of external funding.

Vanita Seth, Politics

*Tailoring Individuality: The Making of the Modern Subject*

This book-length project is concerned to trace the different historical sites (in England between the 16th and 19th century) through which modern conceptions of individuality, understood in terms of interiority, uniqueness, judicial culpability, economic rationality and authenticity, has come to find expression. Rather than narrating a linear history mapping the gradual emergence of the individual, this work approaches the historicity of individuality within the context of specific material practices. This work in other words, is organized thematically with each chapter focusing on a particular historical site. Thus, one chapter is concerned to trace the history from the seal to the signature, another chapter is focused on the increasingly detailed descriptions of the face in nineteenth century novels (with particular reference to the blush as a literary convention), yet another chapter turns to the historical correlation between authorship, copy-right laws and originality, the rise of statistics is the focus of another chapter, the development of policing techniques such as fingerprinting in the nineteenth century is the subject of a fifth chapter and, the colonial juxtaposition between western individuals and non-western (most specifically Indian) ‘tribes’, and ‘castes’ is the basis of a final chapter. These various historical sites offer the medium through which to explore different aspects of what we have come to recognize as individuality.

William Sullivan, Molecular, Cell, and Developmental Biology

*Developing Anti-Filarial Drugs through Genomic Approaches*

Wolbachia is an intracellular bacterium that infects arthropods (many of them disease-bearing vectors) and filariasis-causing nematodes (Elephantiasis and Onchocerciasis). Anti-filarial drugs had only limited success in combating these diseases. Exciting recent discoveries showed that parasitic nematodes require Wolbachia for survival and that bacteria are causally involved in disease manifestation. Antibiotics are used to improve anti-filarial drug treatments, but they require month-long treatments, and development of antibiotic resistance is of great concern.
We propose a pilot study to dramatically improve research into combating Wolbachia-related filarial diseases that we will expand in future proposals. We intend to optimize two coordinated screens targeting Wolbachia-host interactions: one screen of a small-molecule library to find inhibitors of Wolbachia proliferation in host cells. In parallel, we will develop a dsRNA library screen. Uptake of dsRNA by host cells silences the particular genes and is used to determine host targets that are essential for Wolbachia maintenance. The initial experiments will be conducted in Wolbachia-infected Drosophila melanogaster cells, a natural host of Wolbachia that is amenable for such screens. Filarial cell lines are short lived and impractical to use, but candidate drugs and host genes can be verified with the more labor intense RNAi analysis in filarial nematodes.

John Tamkun, Molecular, Cell, and Developmental Biology

*Characterization of CHD7 Expression in Human Stem Cells*

The long-term goal of the proposed research is to understand the mechanisms that regulate human stem cell differentiation. Recent studies have suggested that the human chromatin-remodeling factor CHD7 acts as a developmental switch that promotes the differentiation of stem cells into specialized cell types. The long-term goal of our research is to test this hypothesis and clarify the role of CHD7 in human development. As a first step toward this goal, we will raise antibodies against CHD7 and monitor its expression in human stem cells induced to undergo differentiation in culture. Changes in the expression of the CHD7 during the course of differentiation will provide clues concerning its role in stem cell development. These experiments will also clarify how mutations in CHD7 cause CHARGE syndrome, a serious developmental disorder that affects 1 in 8,000 births. Seed funding from COR will facilitate our entry into the field of stem cell biology and allow us to generate the preliminary data necessary to be competitive for extramural funding from NIH and other sources.

Nina Treadwell, Music

*Women, Music, and Performance in 16\textsuperscript{th} Century Italy*

I am developing a second book project that documents the performance traditions of female singers, musicians, and dancers in sixteenth-century Italy. The book takes a case study approach, examining women’s activities in a variety of performance contexts that relate to their social standing and class. I am currently processing materials pertaining to noblewomen, courtiers, (musical) actresses, and so-called professional musicians that I obtained in Florence and Modena. I am now requesting funding to visit archives in Reggio Emilia, Ostellato, and Naples, which will enable me to flesh out the performance traditions of female musicians associated with these cities. Women’s musical activities
during the sixteenth century have remained largely neglected in the secondary literature, partly because their achievements (or apparent lack thereof) have been assessed in relation to the clear-cut model of the professional male musician. In addition, it is more difficult to document women’s accomplishments because their lack of so-called professional status means that references to their activities cannot be found in sources that can be consulted in a more routine fashion (i.e. payment records, etc.). I therefore anticipate that this monograph will make a significant contribution to the fields of musicology, gender and women’s studies, and Italian studies.

Christopher Wilmers, Environmental Studies
Terrie Williams, Ecology and Evolutionary Biology

*Pilot Study on the Ecological and Physiological Performance of a Large Ambush Predator*

Large predators play a keystone role in structuring ecological communities by suppressing the abundance and altering the behavior of herbivores. In terrestrial systems, however, little is known about the energetic performance of large predators in killing prey, particularly by cryptic species such as felids. Here, we propose a pilot study to develop and deploy combined accelerometer/Global Positioning Satellite (GPS) collars on 3-5 mountain lions that will collect continuous movement and hourly location data from each animal. GPS locations, combined with field reconnaissance, will be used to match accelerometer data to known kills in order to find the unique signature of predation events in accelerometer output. This novel technology will allow us answer important physiological and ecological questions that have so far evaded science regarding the success rate, effort and community level consequences of predation. The system we develop will be adaptable to the study of other species and may therefore lead to a cottage industry of the use of combined accelerometer/GPS collars in wildlife research. The study is to be a collaborative effort between an ecologist from Environmental Studies (C. Wilmers) and a physiologist from Ecology and Evolutionary biology (T. Williams). The lead PI (Wilmers) is a first year faculty who has not previously received COR funding.