Binyamin Blum  
**Presidential Fellow, Law**  
My research explores legal reform in the League of Nations mandates of Iraq and Palestine after these territories came under British rule following World War I. Focusing on criminal trial procedures, I compare the law implemented in these territories to the rules promulgated by the British in other colonies, as well as those applied in the English metropole itself. I explore the ways that law was adapted to meet local circumstances and how it was received by the indigenous population. I ask what the imposition and transplantation of law by an imperial power can teach us about the universality or particularism of legal rules and about British perceptions of colonized populations; law’s role as an expression of identity and as a distinction between self and other; and law’s use by both colonizer and colonized to exert or subvert new authority or existing hierarchy, and the multifaceted relationship between law and power. Finally, I consider the complex legacies of imposed foreign law.

Melinda Cromie  
**Paul Berg Interdisciplinary Biomedical Graduate Fellow**  
**Bio-X SIGF**  
**Mechanical Engineering**  
My goal is to understand the fundamental behavior of muscle by imaging sarcomeres, the smallest units of muscle tissue that contract to generate force. Sarcomeres have never been imaged in humans because they are smaller than the resolution of current clinical imaging modalities. Using a novel microendoscopy system, we imaged sarcomeres in humans for the first time. My current work uses this newly developed system to quantify muscle contractile behavior in healthy humans and in individuals with spinal cord injury to improve surgical treatments that restore muscle function.
Deep brain stimulation (DBS) is a powerful therapeutic option for intractable movement and affective disorders (Parkinson’s disease, tremor, depression). However, due to the nonspecificity of electrical stimulation, DBS has variable efficacy and can lead to serious side effects, such as speech impairment or paresis.

My research under the joint mentorship of Karl Deisseroth and Jaimie Henderson is using precise bioengineering tools to address a critical question in the neurosurgery field: how does DBS exert its therapeutic effects? By using a cell-type specific optical deep brain stimulator developed in the Deisseroth lab, my research aims to provide the first investigation of the role of specific cell types in Parkinson’s disease pathology. These findings could be used to improve the parameters for electrode placement and stimulation in patients.

The purpose of my dissertation project is to explore the relationships among choice, responsibility, moral judgment, and discrimination. Specifically, it aims at investigating whether the belief that individuals can choose to acquire a certain status affects the ways in which people of this status are then treated, and whether the discrimination against them is legitimized. Research suggests that we assign responsibility and moral judgments to undesirable events that are believed to be within the control of the person to whom that event happened. That is, if we perceive that people have chosen a path that has led to unfortunate life circumstances (such as illness, poverty, etc.), then we are more likely to view them as responsible for their condition, and thus to judge them and treat them negatively. But what are the consequences of assigned responsibility, moral judgment, and stigma for the social structure? Do they affect discrimination and inequality? Are homosexuals discriminated against more when homosexuality is perceived to be a “lifestyle choice” rather than biologically based? Are obese people less discriminated against when obesity is believed to be biologically based and therefore not controllable? These are some of the questions I plan to explore in further detail.
Kapa Lenkov
Presidential Fellow, Biology
The evolutionary success of organisms depends on interactions with their social and physical environment. My research is focused on the cellular and molecular consequences of socially induced status change in the African cichlid fish Astatotilapia burtoni. Specifically, I am interested in determining whether epigenetic change, which is the molecular modulation of genome function without direct changes to the DNA code itself, plays a role in the regulation of an animal’s social and reproductive state. This work will add to the understanding of the mechanisms through which social interactions influence the genomic machinery that have been conserved in vertebrates through evolutionary time.

Katharine Mach
Presidential Fellow, Biology
Imagine the roar of ocean waves smashing onshore during a storm. Even the smallest of these waves strikes shore with the force of hurricane winds. Nonetheless, nearshore environments brim with life packed as densely as in a rainforest. In many coastal ecosystems, seaweeds, like rainforest canopy, provide vital habitat and food. My research combines engineering theory with marine ecology to determine how seaweeds break when repeatedly hit by pounding surf. By creating engineering models of seaweed breakage, I determine how waves limit where seaweeds can grow. Then, incorporating changing oceanic conditions into my models, I can assess patterns of breakage and survival, and ultimately the sustainability of marine habitats, in future oceans.

Jonathan Shemwell
Presidential Fellow, Education
I study cognitive barriers to learning in science, technology, engineering, and mathematics (STEM) disciplines. These barriers are fundamental ideas and ways of thinking that are crucial for success in STEM, yet very difficult for many students to learn. They cause students to lose heart and teachers to lose hope. I research what the barriers are and how to overcome them. Working primarily in physical science and in the overlap between physical science and mathematics, I bring to light important ways of thinking that are difficult for students, and I design and test methods of instruction that make them better at thinking in those ways. This work spans the physical sciences, mathematics, cognitive psychology, and education theory and practice.
Matthew Simonton,
Presidential Fellow, Classics

I am interested in the performance and internal dynamics of the governments of ancient Greece, which represent some of the first instances of constitutional, republican polities. In particular, I plan in my dissertation to examine the political institutions of ancient oligarchies with the aid of modern approaches drawn from sociology, political theory, and political science. My goal is to better understand this type of regime and to be able to compare it more accurately with the best documented government of ancient Greece, democratic Athens. It is my hope that working toward a fuller picture of politics in the ancient world, which has often served as a model, both positive and negative, for the modern era, can aid us in understanding the origins, development, and future trajectory of democracy.

Michael St. Clair
Presidential Fellow, Drama

Play, games, and sports have traditionally received little attention in academia outside of a functional developmental interest on children’s play. In recent years, this has begun to change, primarily driven by a growing interest in video games. However, contributions tend to remain highly focused on a particular mode of play (generally, and increasingly, video games) and on relatively narrow media studies, educational, sociological, or design approaches to said mode. My work looks to merge a variety of these approaches to play at the disciplinary nexus of performance studies with the aim of developing general critical frames that are relevant to a variety of play genres and serve both to effectively elucidate play and offer useful insights for design practice.
Abhay Sukumaran  
**Presidential Fellow, Communication**

Information technologies can transform the lives of rural people in developing countries, who often lack access to basic information about health care, agriculture, and employment. However, social and cultural factors that strongly influence usage and adoption of such technologies are poorly understood; research in human-computer interaction remains largely rooted in models of technology for the developed world. Based on fieldwork conducted in India during 2006–07, I propose that methods of quantitative experimentation, grounded in psychological and communication theory, can be applied in developing countries to address locally relevant problems through the design of socially appropriate information technologies.

Jessica Tsang  
**Presidential Fellow, Education**

Facility with integers is a basic skill for elementary school students and an important conceptual jump from concrete to abstract quantities. Considering the abstract nature of integers, how do humans represent them? My research uses neuroimaging and behavioral techniques to study the mental representation of integers in adults and children. I am exploring the possibility that the representation develops over time with the help of existing perceptual skills, specifically the ability to detect symmetry. This study is the first step in a program of research that will carry implications for both neuroimaging researchers and educators, bringing together two fields with substantial but separate histories.

Austin Zeiderman  
**Presidential Fellow, Anthropology**

I study new ways of understanding and governing the uncertain future of cities and urban life in the 21st century. In particular, I ask how and to what effect the city of Bogotá, Colombia, is being planned and governed according to predictive calculations of “risk.” Using ethnographic and historical methodologies, I trace both the recent emergence and contemporary workings of governmental efforts to protect poor and otherwise vulnerable populations from potential hazards, such as landslides and floods. This requires applying anthropology to topics traditionally outside the purview of the discipline as well as engaging in interdisciplinary dialogue across the humanities and sciences. Ultimately, my research aims to shed light upon the limits and possibilities of “risk” as a technique for governing the social and environmental problems of cities and to examine “certainty” as a model for knowing and acting upon the human and nonhuman world.