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POSTER PRESENTATIONS

Humanities

A Quantitative Approach to 17th-Century French Theater

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 ADVISOR: *Cassandra W. Pattanayak, Quantitative Reasoning*
 COLLABORATORS: *Hélène E. Bilis, French; Jenifer J. Bartle, Digital Scholarship Initiative; Elizabeth M. Loxterkamp '18, French*

What can a statistical lens reveal about 17th-century French plays vying for spots in the French canon? This collaborative project applies statistical and visualization tools to provide new insights about structure within and across plays. By quantifying patterns of speech, such as calculating the proportion of a play spoken by each character, we can categorize character types and visualize changes in character use across an author's career. The frequency at which a specific character's name is mentioned by other characters measures the importance of a character within the play, and we can compare this measure across plays for characters in similar roles. These and other quantitative summaries can provide insight into the reasons that some plays joined the literary canon and others did not, especially when rival playwrights used parallel plots. This project demonstrates the potential power of connections between humanistic and quantitative methods.

Science and Technology

Characterizing and Assessing the Function of the Cardiac Voltage-Gated Potassium Channel Protein hERG in Mammalian Cell Lines

Myfanwy C. Adams '17, Biochemistry; Tala Nashawati '17, Middle Eastern Studies
 ADVISORS: *John Cameron, Biological Sciences; Louise Darling, Biological Sciences*

It is of paramount importance to ensure that a biological system created in a laboratory setting functions and behaves as it would in its natural environment. Our lab used a whole cell patch-clamp technique to examine the fast-activating current IKr, which helps to control cardiac repolarization in the heart in vivo by contributing to and appropriately terminating the action potential in cardiac muscle. This current is conducted by the potassium ion channel hERG, which was

artificially introduced and exogenously expressed into human embryonic kidney cells via a plasmid construct tagged with GFP. We showed that the concatenation of these proteins did not affect normal IKr channel activity. The next goal of our research is to assess hERG function in a newly created stable cell line relative to that in transiently transfected cells to ensure that we can confidently adopt the stable line as our baseline for further experiments.

Earthquake-Induced Deformation of Sediment in Sluice Pond, Lynn, MA

Emma R Howey '16, Geosciences
 ADVISOR: *Katrin Monecke, Geosciences*

In 1755, New Englanders were rocked by a magnitude 5.9 earthquake with an epicenter 50 km east of Cape Ann, Massachusetts. This earthquake toppled chimneys, frightened locals, and disturbed local sediment. We conducted grain size analysis on a sediment core from Sluice Pond in Lynn, MA. Lake sediments like these form a comprehensive geologic archive, recording subaqueous slides, shore collapses, and soft sediment deformation. By measuring the distribution of grain sizes throughout the sediment core, we can look for changes in average size, indicating larger environmental changes. Following an intense process to remove organic matter and biogenic silicates, the samples were grain-size analyzed using a laser diffraction particle size analyzer. Correlating these grain sizes with our age model for the sediment core, we found a significant peak in larger grains around 1755, which points to earthquake-induced deformation.

Estradiol Alters the Gut Microbial Composition of Female Mice

Melody Gao '17, Neuroscience; Noor Adra '18, Neuroscience
 ADVISOR: *Marc J. Tétel, Neuroscience*

Estrogens are a class of steroid hormones that have profound effects on behavior and physiology, including metabolism. When estrogen levels decline, as in postmenopausal women, weight gain occurs, which results in an increased risk for heart disease, cancer, and Type II diabetes. Previous studies from our lab have shown that estradiol (E2), an estrogen, protects against high-fat diet-induced obesity in female mice. Studies have also shown that obesity alters the gut

microbiome, the community of microbes that reside within the gut. The mechanism by which E2 changes the gut microbiome to prevent obesity is not well understood. In this ongoing study, we address the protective role of E2 and how it alters the gut microbiome by analyzing the gut microbial composition and weight of female mice treated with and without E2, during a high-fat and a standard diet.

Geoengineering Solutions to Climate Change Problems

Emily K. Bader '18, International Relations; Lara L. Brennan '18, English; Danielle H. Black '18, Geosciences; Diana Cruz '19, Undeclared; Elizabeth M. Engel '18, English; Samantha M. English '19, Undeclared; Catherine H. Gooding '19, Undeclared; Caitlin L. Hardwick '18, Mathematics; Dana L. Hsiao '18, Computer Science; Melissa Marcial '19, Undeclared; Hailey C. McAfee '19, Undeclared; Ilana Z. Meeker '18, Cinema and Media Studies; Melanie T. Passeretti '18, Geosciences; Nerlande Philius '19, Undeclared; Edith Y. Rodriguez '19, Undeclared; Chanel Silva '19, Undeclared; Nbia M. Solari '19, Undeclared; Linda W. Zhou '18, Political Science
 ADVISORS: *Daniel J. Brabander, Geosciences; Kim K. McLeod, Astronomy*

Can we save the planet? How and when? Students in ASTR 120/GEOS 120: Planetary Habitability—Past, Present, and Future will present the results of their investigations into geoengineering solutions to our current global warming trend. Options considered include iron fertilization of the oceans, carbon capture and sequestration, atmospheric aerosol injection, and a flotilla of space mirrors. These collaborative projects use a systems approach to model outcomes of these interventions on a global scale and consider timescales over which we might be able to make a difference.

Herbicides and Women's Health: Analysis of Three Tampon Brands for Chemical Contamination

Alexis M. Corcoran '18, Biological Sciences; Amanda B. Hernandez '18, Environmental Studies
 ADVISOR: *Dan Brabander, Geosciences and Environmental Studies*

Glyphosate, commercially known as Roundup, is one of the most ubiquitous pesticides in modern agriculture. However, there exists a marked lack of information about toxicity in tampons stemming from

glyphosate or other materials. Thus, this study, which is a continuation of an ES/GEOS 201 project, seeks to understand the relationship between glyphosate and manufactured cotton products such as tampons. Through this study we also hope to address the gender gap in public health research. We analyzed the nitrogen composition of three brands of tampons as an indicator for the presence of glyphosate. Additional tests have demonstrated to us similarities within each brand but variability between brands, including uniquely high traces of titanium in store-brand tampons and phosphorus in organic tampon brands.

Investigation of the Barrier Cap Beneath Wellesley's Athletic Fields: Metal Analysis of Soil Transects

Taylor Fortnam '18, Mathematics; Clare Salerno '18, Sociology; Ginger Simms '18, Environmental Studies
 ADVISOR: *Dan Brabander, Geosciences and Environmental Studies*

The Paintshop Pond reconstruction project, part of Wellesley College's 1998 Landscape Master Plan, necessitated the removal of contaminated sediments from beneath the pond. These sediments were then placed on top of a barrier cap beneath Wellesley's nearby athletic fields. This mini-study, carried out as a final project for ES/GEOS 201: Environmental Health and Sustainability Sciences, seeks to examine the efficacy of the barrier cap in containing contaminated sediments from entering the stream that feeds Lake Waban from Paintshop Pond. Two transects of soil samples were taken, and analysis of the presence of Pb, Cr, Zn, and Fe show levels safely within EPA and Massachusetts State benchmarks.

Revisiting Tar Creek: Transport and Speciation of Heavy Metals in Floodplain Soil Trenches

Hayley Jewett '16, Environmental Studies; Hannah Oettgen '17, Geosciences; Emma Van Scoy '18, Undeclared
 ADVISOR: *Dan Brabander, Geosciences and Environmental Studies*

In the 1970s, the Tri-State Mining District in northeastern Oklahoma was shut down, leaving behind contaminated mine waste piles containing high heavy-metal concentrations. The extent of the

contamination led to the classification of this area as a Superfund site on the first National Priorities List in 1983 due to its proximity to residential communities. Building off a decade of Wellesley research, our work focuses on soil samples from trenches in the floodplains of Tar Creek, which flow through contaminated areas into the Neosho River, acting as transport pathways for lead, zinc, and cadmium. Using multiple analytical methods (XRD, XRF, SEM), we aim to characterize transport mechanisms and mineral speciation of the contaminants. We hope to further this work by integrating principles of participatory action research, as there are many stakeholders involved in working toward more successful remediation strategies. These research efforts will refine risk exposure modeling within the communities on the floodplain.

Social Sciences

An Evaluation of Leaders and Scientists Through a Gender-Race Lens

Kily A. Wong '16, Psychology & English; Michelle M. Wang '17, Psychology & Mathematics
 ADVISOR: *Linda Carli, Psychology*

Past studies have revealed that people perceive women to lack the qualities needed to be successful leaders and scientists: Good scientists and leaders are perceived as having traits that are more similar to men's traits than women's. However, no study has examined the interaction of gender and race or ethnicity on stereotypes about scientists and leaders. This study integrates gender, race, and ethnicity, examining whether people perceive men and women of different ethnic or racial groups to have the qualities needed to be good leaders or scientists. We propose that while people are more likely to associate masculine-typed qualities with success in science and leadership, the effect of including gender, race, and ethnicity together will reveal unique outcomes and provide potential explanations for why some individuals are more likely to become successful leaders or scientists than others.

Insurance Market With Interdependent Risks

Wing Yan Shiao '16, Economics and Mathematics
 ADVISOR: *Casey G. Rothschild, Economics*

It is very likely to observe interdependent risks in an insurance market, e.g., the automobile insurance market. An individual's insurance coverage will affect her choice of self-protection, which influences the ambient level of risk. Depending on how risky the environment is, other people will make their choices of self-protection accordingly. My senior thesis investigates the optimal contracts in a monopoly and a competitive insurance market with interdependent risks, respectively, and studies the welfare implications. I show that since a monopolist considers the externality of the contracts offered, it is possible that the average level of risk is lower; on the contrary, due to a small market share in a competitive market, an insurer does not take the interdependence of risks into account and the average level of risk will be too high.

Observed Political Causes and Consequences of Gentrification Among Racial and Ethnic Minorities in the U.S.

Tiffany Kinh Lam '16, Political Science and Comparative Literature
 ADVISOR: *Miya Woolfalk, Political Science*

Based on extensive review of scholarly literature on gentrification, I ask two streamlined questions: (1) What is gentrification?, and (2) What are the causes and consequences of gentrification? Since the term was first devised in the 1960s, most definitions of gentrification continue to omit explicit reference to race and ethnicity.

However, growing scholarship implies a racial dynamic in which the people moving into a gentrifying area are usually white, and the residents who move out are typically of color (Kennedy and

Leonard, 2001; Bostic and Martin, 2003). My review of the literature initially attempts to synthesize and assess how gentrification affects U.S. minorities. Ultimately, I discover gentrification is a growing phenomenon associated with increased political engagement and decreased political empowerment. Also, in my poster

presentation, I highlight specific causes of gentrification including housing and urban policy, economic changes, and demographic changes, as well as address gentrification as “the new colonialism.”

Socioeconomic Status and Empathic Accuracy

Hannah B Schmidt '18, Chemistry; Valerie R. Zhao '18, Neuroscience

ADVISORS: *Stephen H. Chen, Department of Psychology; Christen M. Deveney, Department of Psychology; Jeremy B. Wilmer, Department of Psychology*

Previous literature shows that individuals lower in objectively measured socioeconomic status (SES) exhibit greater empathic accuracy; moreover, experimentally lowering one's subjective evaluation of their SES increases their empathic accuracy. Our research examines the experimental manipulation of SES to determine why it impacts empathic accuracy in this way. In one study, we will analyze the

influence of general demographics on emotion perception. In a second study, we will examine the thought process of individuals during an SES manipulation. The results of these studies may support the role of subjective SES in emotion perception, or they may point to stronger influences by other factors. These results will offer insight regarding the importance of SES on empathic accuracy, and the effect of socioeconomic imbalance on psychological processes

The Broad Autism Phenotype: Evaluating Autistic Traits and Their Effects on Social Functioning in a College Population

Desiree R. Jones '16, Neuroscience and Psychology

ADVISOR: *Jonathan M. Cheek, Psychology*

Although autism was once viewed as a rigidly defined developmental disorder, research now suggests that autistic traits are also found in the general population.

In people with autism suffering from autism, these traits can lead to difficulties in social interactions, including problems understanding the beliefs, intentions, and desires of others. This study investigates the presence of autistic traits in a general college population college population. The relationship between these traits and emotional intelligence, as well as interpersonal interactions, is also explored.