ORDER OF EVENTS

12:30 – 1:30 p.m. SYMPOSIUM TALKS

Engineering and Mathematics Goergen Hall 109
Humanities Meliora Hall 221
Natural Sciences Lattimore Hall 201
Social Sciences Bausch & Lomb Hall 106

Abstracts available in final pages

2:00 – 3:00 p.m. POSTER SESSION

Flaum Atrium, School of Medicine and Dentistry

3:10 p.m. AWARD CEREMONY

Opening remarks Professor Joan Saab

President's Awards for Outstanding Symposium Presentations Vice President Paul Burgett

Deans' Awards for Symposium Presentations Dean Alan Czaplicki

Professor's Choice Awards for Outstanding Poster Presentations Professor Joan Saab

College Award for Undergraduate Teaching and Research Mentorship Dean Jeffrey Runner

Student Association Professor of the Year Awards SA Academic Affairs Committee Chair Leif Johansen

Closing remarks Professor Joan Saab

Flaum Atrium, School of Medicine and Dentistry
College Award for Undergraduate Teaching and Research Mentorship

David McCamant
Chemistry

Student Association Professors of the Year

Humanities
Nicholas Gresens
Religion and Classics

Social Sciences
Carolina Caetano
Economics

Natural Sciences and Engineering
John Kessler
Earth and Environmental Sciences
ENGINEERING AND MATH

SYMPOSIUM PRESENTATIONS | Goergen Hall 109
Abstracts available in final pages

12:30 p.m.  Ellison Etnier, '18
Chemical Engineering
Mentor: Professor Wyatt Tenhaeff
"Development of Thin-Film Polymer Electrolytes for Safe Lithium Ion Batteries"

12:50 p.m.  Harrah Newman, '18
Biomedical Engineering
Mentor: Professor Mark Buckley
"Viscoelastic Heating of Bovine Intervertebral Disc"

1:10 p.m.  Sue Zhang, '18
Biomedical Engineering
Mentor: Professor Hooman Sadri Ardekani
"Optimization and Characterization of 3D Human Prepubertal Testis Organoid System"

POSTER EXHIBITION PARTICIPANTS | Flaum Atrium

Ekam Gill, '19
Chemical Engineering
Mentor: Professor David McCamant
"A study of 'Organic Dyes' binding to TiO₂ for Solar Hydrogen Production"

Ben Gleed, '18
Chemical Engineering
Mentor: Professor David Foster
"Interactive Modeling of Vorticity for the Enhancement of Undergraduate Curriculum"
Brian He, '19
Statistics
Mentor: Professor Danielle Benoit
"Characterizing the Interaction Between Myricetin and Cationic Nanoparticles Through Spectroscopic Methods"

Lucinda Inez Hinojosa, '19
Neuroscience
Mentor: Professor Laurel H. Carney
"Detecting an Increment in Level of One Tone in a Harmonic Complex: Effect of Phase in Birds"

Haberly Kahn, '18
Chemical Engineering
Mentor: Professor David Foster
"Analyzing the Catalyst Layer of a PEMFC using ANSYS Fluent"

Chris Kjellqvist, '20
Computer Science
Mentor: Professor Michael Scott
"Security Provisioning for Kernel Features"

Huiyan Li, '19
Optics
Mentor: Professor Chunlei Guo
"Structural and Compositional Control of Copper Selenide Nanocrystals for Light-Induced Self-Repairable Electrodes"

Amanda Mietus, '19
Optical Engineering
Mentor: Professor Jannick P. Rolland
"Quantitative Assessment of Donor Cornea Endothelium with GD-OCM"

Jacob Niebloom, '18
Computer Science, Business
Mentor: Professor Ted Pawlicki
"Software Affecting Education"
Gregory Sheppard, '18
Chemical Engineering
Mentor: Professor David Foster
"Computational Fluid Dynamics in Liquid Metal Batteries"

Qiuyue Sun, '20, Sifan Ye, '20, and Junhan Duan, '20
Computer Science
Mentor: Professor Ted Pawlicki
"Computer Vision Controlled Autonomous Robot"
HUMANITIES

SYMPOSIUM PRESENTATIONS | Meliora Hall 221
Abstracts available in final pages

12:30 p.m.  Erin Dong, '18
Dance Studies, Biology
Mentor: Professor Anne Harris Wilcox
"The Beautiful Awful: Experiencing Grief Through Movement"

12:45 p.m.  Perry DeMarche, '18
Anthropology
Mentor: Professor Daniel Reichman
"'Not-so-Nomadic' Nomads: Cultural Commodification and Authenticity Among Former Nomads in Morocco"

1:00 p.m.   Courtney Otto, '19
History, International Relations
Mentor: Professor Matthew Lenoe
"Meiji Ishin—Revolution Viewed through the Lens of Classical Marxism"

1:15 p.m.   Teddy E. Scheuerman, '18
History, English, Art History
Mentor: Professor Ezra Tawil
"Confronting the Preinvented World: Angels in America, Wojnarowicz's Close to the Knives, AIDS Literature, and Literary Style"
SYMPOSIUM PRESENTATIONS | Lattimore Hall 201
Abstracts available in final pages

12:30 p.m. Zach Bunnell, '18
Geological Science
Mentor: Professor Marlon Jean
"Metal Analysis of the Novosibirsk Meteorite and Early Solar System Implications"

12:50 p.m. Yiyun Huang, '18
Brain & Cognitive Sciences, Math
Mentors: Professor Jessica Cantlon and Stephen Ferrigno
"Reasoning Through the Disjunctive Syllogism in Non-Human Primates"

1:10 p.m. Fiona Nichols-Fleming, '19
Physics & Astronomy
Mentor: Professor Eric Blackman
"Constraining Spot Coverage as a Function of Age in Main-Sequence Stars"

POSTER EXHIBITION PARTICIPANTS | Flaum Atrium

Anmol Almast, '18
Biochemistry
Mentor: Professor Sina Ghaemmaghami
"Knockout of the Pyruvate Dehydrogenase Complex Increases the Growth Rate of Mouse Cancer Cells"

Shuyi Chen, '20
Brain & Cognitive Sciences
Mentor: Professor Duje Tadin
"Social Effects on Visual Perception: Crowd Gaze Facilitates Visual Search"
Erica Cornell, '18  
Biochemistry  
Mentor: Professor Dmitri Ermolenko  
"Ensemble FRET Measurement of mRNA End-to-End Distance"

Quinn Fitzpatrick, '19  
Biochemistry  
Mentor: Professor Michael Zuscik  
"Direct Activation of Chondrocyte CREB Signaling by Extracts from Commensal Gut Microbes: A Novel Connection Between the Gut and the Joint"

Bethany Gardner, '18, and Madeline Clark, '18  
Brain & Cognitive Sciences (Gardner); Linguistics, Japanese (Clark)  
Mentors: Professor Chigusa Kurumada and Amanda Pogue  
"Real-time Pragmatic Processing with an Artificial Language"

Audrey Goldfarb, '19  
Biology  
Mentor: Professor Richard Festenstein, Imperial College London  
"HP1γ in Sexual Dimorphism and Telomere Maintenance"

Sabrina Goyal, '19  
Brain & Cognitive Sciences  
Mentor: Professor Vankee Lin  
"A Systematic Review: The Potential Neuroplastic Mechanisms Underlying Music Therapy in Cognitively Impaired Older Adults"

Lily Guo, '18  
Neuroscience  
Mentor: Professor Robin Adair  
"URMC NICU Neurobehavioral Consultation: Correlation with and Impact on Neurodevelopmental Outcomes in High-Risk and Intermediate-Risk Infants"

Kevin Hayes, '18  
Molecular Genetics  
Mentor: Professor Vera Gorbunova  
"Characterizing the Intestinal Stem Cell of the Naked Mole Rat"
Ryan Hecht, '18
Microbiology
Mentor: Professor Jacques Robert
"Investigating the Ontogeny of Innate-like T cells in the Amphibian Xenopus by CRISPR/Cas9-mediated Genome Editing Technology"

Emily Ivey, '18
Microbiology
Mentor: Professor Brian Ward
"Investigation of Vaccinia Protein F15 function"

Arushi Jain, '18
Biomedical Engineering
Mentor: Professor Ruchira Singh
"The Role of Matrix Metalloproteases (MMP) Dysfunction in Macular Degeneration"

Nadine Javier, '18
Neuroscience
Mentor: Professor Suzanne Haber
"Organization of Prefrontal Cortex Fiber Pathways Through the Corpus Callosum in Nonhuman Primates"

Mahir Khan, '18
Neuroscience
Mentor: Professor Madalina Tivarus
"Measuring Cerebrovascular Reactivity in Patients with Brain Disease Using Resting State fMRI"

Timothy Kwan '18, T5 '19
Microbiology
Mentors: Professor Jacques Robert and Maureen Banach
"The Evolution and Role of Interleukin-12 Genes in Xenopus Tumor Immunity"

Ally Lee, '19
Brain & Cognitive Sciences
Mentor: Professor Celeste Kidd and Shirlene Wade
"What Drives Curiosity? Information Speed Predicts Children's Video Preferences in a Touchscreen Task"
Herman Li, '18  
Neuroscience, Psychology  
Mentors: Professors Matthew J. Bellizzi and Harris A. Gelbard  
"Role of Prion Protein in Subacute Inflammatory Model of Multiple Sclerosis, Experimental Autoimmune Encephalomyelitis (EAE)"

Sarely Licona, '19, Joseph Fong, '18, and Emily Ballou, '20  
Brain & Cognitive Sciences (Licona and Ballou), Neuroscience (Fong)  
Mentors: Professors Loisa Bennetto, Duje Tadin, and Kim Schauder  
"Associations Between Autistic Traits, Motion Prediction, and Visual Sensation"

Colleen Maille, '20  
Computational Biology  
Mentor: Professor Dan Bergstralh  
"Cell Reintegration: The Connection Between Adhesion Proteins and Cytoskeletal Membrane in Drosophila"

Gauri Patil, '19  
Brain & Cognitive Sciences  
Mentor: Professor Bradford Z. Mahon, Colleen Schneider  
"Determining the Importance of Randomizing Functional Magnetic Resonance Imaging (fMRI) Stimuli for Stroke Patients"

Krista Pipho, '18  
Biochemistry  
Mentor: Professor Andrei Seluanov  
"Does Lifespan Have a Positive Correlation with Cellular Resistance to Stress?"

Yuhua Qin, '19  
Molecular Genetics  
Mentor: Professor Xin Bi  
"Functions of Fun30 and Tel1 in Regulating DNA Damage Response"

Kayla Scinto, '19 and Ania Stolarczyk, '19  
Computational Biology, Political Science (Scinto); Microbiology (Stolarczyk)  
Mentor: Professor Michael J. Zuscik  
"Oral Hydrolyzed Type 2 Collagen Protects Against the OA of Obesity and Mitigates Obese Gut Microbiome Dysbiosis"
Nicola Wiseman, '18
Environmental Sciences
Mentor: Professor Tom Weber
"Global Oceanic Methane Emissions Estimated from Neural Network Mapping"

Clara Wolfe, '18
Biochemistry
Mentor: Professor Sina Ghaemmaghami
"Genome Wide Screen for Novel Human Autophagy Genes"

Qidi Yang, '19
Biochemistry
Mentor: Professor Elizabeth Grayhack
"Factors Involved in Reading Frame Maintenance During Translation in Yeast"
**SYMPOSIUM PRESENTATIONS | Bausch & Lomb Hall 106**

Abstracts available in final pages

12:30 p.m. Megan Kibler, '18
Psychology, Music
Mentors: Professors Betsy Marvin and Lisa Starr
"The Effects of Live Music Participation on Social Bonding and Quality of Life in Psychiatric Geriatric Patients"

12:50 p.m. Lauren Oey, '18
Brain & Cognitive Sciences, Statistics, Linguistics
Mentor: Professor Steven Piantadosi
"Concepts are like Rules but Gradient: Preserving Gradience in a Logical Model of Mental Representation"

1:10 p.m. Margaret Thurston, '18
Global Sustainable Development
Mentors: Professors Cynthia Durán Azurduy and Daniel Reichman
"Deforestation, Forest Degradation, and Conservation in Concepción, Bolivia"

**POSTER EXHIBITION PARTICIPANTS | Flaum Atrium**

Oluwatobi Abubakare, '18
Linguistics
Mentor: Professor Jeffrey Runner
"Did T'Challa's Dad Kill Himself or Kill T'Challa? Exploring Pronominal Processing in Autistic Populations"
Talia Cohavi, '19
Brain & Cognitive Sciences, Psychology
Mentor: Professor Jeremy Jamieson
"The Effects of Negative Expectancy Violations During Social Interactions"

Xin Chen, '18
International Relations, Economics
Mentor: Professor G. Bingham Powell
"The Republic at a Crossroads: Transformations of French Politics"

Laura Duntley, '18
Psychology
Mentor: Professor Jeremy Jamieson
"A Meta-Theoretical Approach to SOC Training for Low Resource Settings"

Maia Homsi, '19
Neuroscience
Mentor: Professor Thomas O'Connor
"Relationship Between Maternal Obesity and its Adverse Effects on Mother and Fetus"

Lorna Krabill, '18
Epidemiology, Microbiology
Mentor: Professor Scott McIntosh
"The Safe Sex Express: Evaluation of a Safe Sex Product Delivery Service"

Jenna Macri, '20
Psychology, Brain & Cognitive Sciences
Mentors: Jennifer Daks and Professor Ronald D. Rogge
"Examining the Mediating Role of Relationship Talk Between Perceived Partner Responsiveness and Couple Satisfaction"

Emily Scarpulla, '18
Psychology
Mentor: Professor Lisa Starr
"Negative Appraisal Bias Correlates with Co-rumination and Depression Among Adolescents"
Kyle Smith, '18
Economics
Mentor: Professor Mary Politi
"Access is Necessary but Not Sufficient: Factors Influencing Delay and Avoidance of Healthcare Services"

Bailey Speck, '19 and Dasia Martinez, '18
Psychology
Mentor: Professor Jeremy Jamieson
"Perceptions of Lifetime Adversity and Unrealistic Optimism"

Oliver K. Stabbe, '18
Psychology, American Sign Language
Mentor: Professor Ronald D. Rogge
"Flexibly and / or Inflexibly Embracing Life: Identifying Fundamental Approaches to Life Across a Spectrum of Flexible and Rigid Behaviors"

Shelley Verma, '19
Psychology
Mentor: Professor Diane S. Morse and Addie Bardin
"FOCUS on Women Clients: Process Evaluation of a Pilot Probation-Medical Collaboration Program"

Bailey Walters, '19
Neuroscience, Psychology
Mentor: Professor Tom O'Connor
"Effects of Prenatal Depression on Birth and Postnatal Outcomes"

Xinzi Wang '18
Psychology, Economics
Mentor: Professor Harry Reis
"Culture Differences in the Effect of Capitalization on Relationship Well-Being"
Ellison Etnier, '18
"Development of Thin-Film Polymer Electrolytes for Safe Lithium Ion Batteries"

Today's lithium ion batteries are critically limited by low energy density. Traditional batteries rely on a graphite-based anode to store electrode, which cycles stably but has a low capacity compared with other anode materials. One such material to address low capacity is silicon, which has a theoretical specific capacity (4200 mAh/g) more than ten times greater than graphite (372 mAh/g). However, continual electrochemical degradation on silicon and electrode volume changes during cycling prevents successful implementation in lithium ion batteries. This work seeks to improve the viability of thin film silicon anodes by covalently grafting poly(diethylene glycol methyl ether methacrylate) (DEGMA) brushes directly on silicon electrodes via surface-initiated atom transfer radical polymerization. This polymer film is intended to act as an artificial solid-electrolyte interfacial layer, which is partially lithium ion conductive and can passivate the silicon surface despite large volume changes. The growth rate of DEGMA brushes by ATRP on silicon was determined to be 20 nm/hr at room temperature. Lithium infiltration of this polymer layer was performed in an aqueous solution of lithium bis(trifluoromethane-sulfonyl)imide (LiTFSI) to increase availability of lithium ions. Initial half-cell cycling of silicon indicates capacity retention from the first to second cycle improves from 76.2% with no treatment to 82.4% with treatment of 80 nm polymer. In addition, lithium infiltration was demonstrated to increase polymer conductivity from $6.66 \times 10^{-8}$ S/cm to $3.32 \times 10^{-6}$ S/cm at 22ºC, a 50X improvement. This work will guide future development of surface-tethered polymeric artificial solid electrolyte interfaces for safe, high-capacity lithium ion battery electrodes.
Back pain is the leading cause of disability globally and the second most common cause of doctors' visit. Despite extensive research efforts, the underlying mechanism of back pain has not been fully elucidated. The intervertebral disc (IVD) is a viscoelastic tissue that provides flexibility to the spinal column and acts as a shock absorber in the spine. When viscoelastic materials like the IVD are cyclically loaded, they dissipate energy as heat. Thus, diurnal, regular movements of the vertebral column that deform the IVD could increase disc temperature through viscoelastic heating. This temperature rise has the potential to influence cell function, drive cell death and induce nociception in innervating nociceptive neurons within the IVD. The present study was conducted to investigate the capacity of IVD to increase in temperature due to viscoelastic heating. Insulated caudal bovine IVD were subjected to physiological cyclic uniaxial compression over a range of frequencies (0.1-15 Hz) and loading durations (1-10 minutes) ex vivo, and the temperature rise in the tissue was recorded. According to our findings, the IVD can experience a temperature rise of up to 2.5°C under cyclic loading. Furthermore, under similar conditions, the inner nucleus pulposus (NP) exhibits more viscoelastic heating than the outer annulus fibrosis (AF), likely due to its more viscous composition. The measured temperature rise of the disc has physiological relevance as degenerative IVD tissue has been shown to produce a sensitization of nociceptive neurons that spontaneously fire at 37°C, with a T50 response at 37.3°C and a maximum response at 38°C. Our results suggest that viscoelastic heating of IVD could interact with sensitized nociceptive neurons in the degenerative IVD to play a role in back pain.
Recent advances in cancer treatments have increased the childhood cancer survival rate, creating urgency for strategies which address fertility preservation in prepubertal males undergoing gonadotoxic treatments such as chemotherapy. Cryopreservation of immature testicular tissue can be a potential option, from which spermatogonial stems cells (SSC) can be isolated and propagated in vitro. Using SSCs, along with Leydig, Sertoli, and peritubular cells of adult (mature) human testicle, we developed a 3-dimensional (3D) testis organoid culture system. This study optimizes the 3D testis organoid culture system and assess its feasibility for prepubertal (immature) human testis organoids. We showed that organoids maintained their structure, viability, metabolic activity and produced testosterone over 3 weeks of culture. Furthermore, we confirmed the presence of spermatogonia, Leydig, Sertoli and peritubular cells throughout 3 weeks of culture. Up-regulation of specific post-meiotic germ cell marker (PRM1) confirmed the formation of spermatid-like cells in this system.
Erin Dong, '18
"The Beautiful Awful: Experiencing Grief Through Movement"

Grief is a universal emotion that resonates with individuals regardless of cultural background, sexual preference, economic status etc. An incredibly complex emotion, grief is often pushed aside and left unprocessed. Without a safe and/or healthy outlet, we react to grief in less than pleasurable ways. So, what would happen if we were provided a way for its expression? What if we allowed ourselves to feel shock, loss, sadness and other grief-associated emotions? In "The Beautiful Awful" I explore this concept of grieving through movement. This piece is a choreographic work that mirrors the body's psychological (emotional numbness, depression etc.) and physiological (increased blood pressure, muscle tension etc.) response to loss, specifically death. "The Beautiful Awful" ushers the audience through the grief adjustment stages, creating a medium for individuals to live with their emotions. To tap into the audience's kinesthetic empathy and kinesthetic sympathy, I blur the lines of the traditionally defined "performance space" by having the dancers enter and perform amongst the audience members. This interdisciplinary performance utilizes dance, spoken text and lighting design to create not just a dance that is observed from afar, but a multi-faceted experience that brings individuals face-to-face with the physicality of grief.

Perry Colette DeMarche, '18
"'Not-so-Nomadic' Nomads: Cultural Commodification and Authenticity Among Former Nomads in Morocco"

This research focuses on the cultural impacts of climate change for nomadic groups in the Sahara Desert in southern Morocco. Many Imazighen (or Berber) nomads have stopped being nomadic due to worsening droughts and heat extremes associated with climate change, as well as the construction of a hydraulic dam that has dried up the Draa River. Based on fieldwork in a Moroccan village near the Sahara Desert, my research examines how former nomads are now working in tourism. Many lead camel treks for foreign tourists by advertising their nomadic identity. My research analyzes tourism as a process of cultural commodification in the wake of significant environmental and cultural change. I argue that climate change and
tourism complicate previous anthropological understandings of nomadism and sedentarization.

Courtney Otto, '19
"Meiji Ishin—Revolution Viewed through the Lens of Classical Marxism"

This presentation provides a cross-historical analysis of the Japanese Meiji Ishin, which marked the transition of power from the Tokugawa shogunate to imperial rule under Emperor Meiji. The official demarcation of the Meiji Ishin was in 1868 with the passage of the Meiji Constitution. However, the shift from decentralized military rule to imperial oversight was a gradual process that involved significant social, economic and political transitions. In using the framework of Classical Marxist ideology, I address elements of the conversion to Meiji imperial rule in terms of (1) socioeconomic divisions, (2) political apportionment, (3) industrialization, and (4) nationalism and imperialism. In particular, through concentration upon socio-political changes in the daimyō (feudal warlord), samurai, and chūnin (merchant) classes, each of these subtopics provides context and evidence for the events of the Meiji Ishin as a Marxist-type revolution.

Teddy E. Scheuerman, '18
"Confronting the Preinvented World: Angels in America, Wojnarowicz's Close to the Knives, AIDS Literature, and Literary Style"

My presentation examines Wojnarowicz's book Close to the Knives: A Memoir of Disintegration and how his use of literary style allows the work to explore themes and ideas very differently than most other pieces of AIDS literature from the mid 1980s and early 1990s. Through comparison with other pieces of American AIDS literature from that time—primarily Tony Kushner's Angels in America—I discuss how Wojnarowicz explores notions of spirituality, historical legacy, movement and progress, and the nature of America. Additionally, I will examine how these explorations allow him to provide media representation for queer people and People With AIDS and to create an avenue for activist messages. Through flouting the expectation of how to function within the frame of AIDS literature, Wojnarowicz's atypical stylistic choices greatly influence not only how his themes are showcased but also how his readers receive them.
Chondritic meteorites provide snap-shots of the primordial solar nebul and through geochemical analysis, they can be used to shed unique insights on early solar system processes. The trace-element concentrations of FeNi metals, such as kamacite, taenite, and troilite, are particularly useful and standard quantitative tools to determine the region in which a meteorite originated in. Accordingly, we have analyzed FeNi metals in the Novosibirsk chondritic meteorite; a unique meteorite from Novosibirsk, Russia that was witnessed as it fell in the mid-1970s. A laser ablation-inductively coupled plasma-mass spectrometer (LA-ICP-MS) analyzed various elements (e.g. V, Cr, Fe, Co, Ni, Cu, Ga, Ge, As, Mo, Sb, Ag, Al, and Zn) in the FeNi metals. Our goal was to collect the elemental concentrations of various metallic grains in Novosibirsk and compare them to other well-known celestial bodies in order to determine where the Novosibirsk meteorite was created within the solar system. After which, we compared the trace-element content of our meteorite with other types of meteorites, such as CV, CR, and CH, among others, to see if it originated from a recorded parent body. Upon determination of Novosibirsk's origins, a petrographic analysis of metamorphic and shock textures was used to interpret extreme events this meteorite may have experienced. Metamorphic and shock textures within meteorite grains are strong pieces of evidence in explaining regionalized events within the solar system. This analysis of Novosibirsk opens the door for future work aimed at finding the relative or absolute age of the meteorite and its unique textures.
Humans readily combine logical concepts to help us construct arguments and make decisions. We frequently make inferences based on premises we already know, which is formally termed as deductive reasoning. This flexible ability to combine logical thoughts is often seen as exclusively human and language-dependent. However, a recent body of work done on animal cognition has provided evidence that some non-human animals are capable of reasoning through simple logical constructs such as the equivalence relation, as well as making logical inference based on given pieces of information. One well-studied logical inference in animals is the disjunctive syllogism, which refers to the statement "A or B, not A, therefore B." This logical inference requires not only the understanding of negation, but also the ability to update one's belief about B based on what is known about A. In a traditional two-cup task, when a treat is hidden in one of two cups and one cup is shown to be empty, many animals will search for the treat in the other cup, which seems to be consistent with the disjunctive syllogism. However, successful performance in this task can reflect non-deductive strategies such as avoidance of the empty location instead of true reasoning through the disjunctive syllogism. In this study, we employed a new four-cup design to help us tease true reasoning apart from non-deductive strategies. We introduced two distinctive baiting sets, each containing two cups, where one reward was hidden in each baiting set. We also gave subjects two chances to make a choice and provided information on their first choice. Therefore, we could effectively examine whether subjects flexibly integrated the piece of information they received and updated their belief on the reward location. We found that olive baboons (*Papio anubis*) are capable of making logical responses using disjunctive syllogism. This suggests that non-human primates may have the ability to flexibly combine abstract thoughts, even in the absence of language. Furthermore, our logical abilities may have deeper evolutionary roots than what we previously thought.
The numbers of star spots and the rotation periods of stars are closely related with the magnetic fields of stars; therefore, a relationship should exist between the star spot coverage and rotation period of stars. Additionally, the age of a star is proportional to the square of its rotation period, so we can relate the star spot coverage instead to the age of the star or the rotation period squared. We create 100 star bins based on stellar mass for a previously existing data set of 3203 Kepler stars and fit this relationship with a simple power law of the form $a_{spt} = A t^\beta$ in each bin as well as for the whole data set. These functions allow us to constrain the star spot coverage as a function of age of Main-Sequence stars which has strong implications for different theories in stellar astrophysics. These implications include the relationship between spot coverage and the coronal activity of stars, constraining parameters in models of stellar evolution, and the apparent saturation of rotation periods of stars older than the sun (they appear to have rotation periods larger than the square root of their age would suggest). In the future we plan to investigate other means of binning these stars such as stellar metallicity, as well as to further study the theoretical implications of our results.
Social bonding is a concept created by fostering a sense of social connectedness within a group setting. According to past research, participating in live singing interventions causes an accelerated process of social bonding to occur among a group (Pearce, Launay, MacCarron and Dunbar, 2016), and specifically fosters psychological and social benefits for the elderly (Sarkamo et al., 2014). However, there has been little research conducted examining the benefits of live singing with geriatric patients with additional psychiatric diagnoses in a recreational therapy setting. The current study is being conducted at the Rochester Psychiatric Center, examining social bonding with geriatric patients. One group will participate in a live sing along intervention lead by a recreational therapist, and another group will participate in a recreational tea time group for an eight-week period. We will be measuring self-perception of group inclusion and also factors of Quality of Life, including mood, energy level, memory, and interpersonal relationships. A therapy aide will also be interviewed, asking for their perception of different domains of behavior pertaining to the patients participating in the intervention.

Lauren Oey, '18
"Concepts are like Rules but Gradient: Preserving Gradience in a Logical Model of Mental Representation"

Traditionally, research on concepts has examined two kinds of representations (Hahn and Chater, 1998): (1) a similarity-based system, in which concepts are considered in relation to other instances (e.g. looks like X) (e.g. Shepard, 1980; Newell and Simon, 1990), and (2) a rule-based system, in which concepts are stored compositionally as a collection of logical rules over discrete features (e.g., has feature Y) (e.g., Feldman, 2000). Hybrid theories of shifts between the systems have been proposed but there remains an open question of whether both systems can be used simultaneously to represent components of a single concept. A simple example that suggests this combination is possible would be a concept like ZEBRA, which could be represented as looks like a horse but striped, where
looks like a horse captures similarity and striped is a rule over a discrete feature. To test this research question, I used an online crowdsourcing platform to test how people represent concepts when learning a novel artificial category of concepts (feps). The objects varied along a binary feature (white vs. black fill) and a gradient feature (blob-like shape). Critically, the binary features have labels that exist in language, but the gradient feature do not, meaning that participants were unable to rely on a linguistic cue to distinguish one shape from another, instead relying on a similarity-based system. I hypothesized that people are capable of preserving similarity-like gradient information when composed in a discrete rule-based system to represent single concepts during concept learning. By testing this question in a controlled experimental task, we will have a richer understanding of conceptual representation and the factors motivating the use of each system.

Margaret Thurston, '18
"Deforestation, Forest Degradation, and Conservation in Concepción, Bolivia"

This short video study focuses on deforestation, forest degradation, and forest conservation in the municipality of Concepción, Santa Cruz, Bolivia. My research questions were: What are the principal causes of deforestation and forest degradation in Concepción? What efforts or phenomena result in forest conservation? What are the main challenges in reducing deforestation and forest degradation? To learn about these themes, I lived in Limoncito, an indigenous community the municipality, for 3.5 weeks, learning from community members in Limoncito, organizations and residents in the town of Concepción, and secondary sources such as laws and statistics. Although my conclusions are quite preliminary, it seems that new agricultural communities and changing land use regulations are responsible for a large part of the deforestation, while logging and forest fires cause much of the forest degradation. I explore the political, economic, and social background of these factors. In addition, although protected areas, an indigenous territory, and efforts by organizations and government agencies were cited by interviewees as promoting forest conservation, it seems that these efforts are inadequate to conserve forests in the area.
The Office of Undergraduate Research would like to give special thanks to:

**Judges**
Laura Elenbaas
Kathryn Knowles
Asen Kochov
Anne Merideth
Jong-Hoon Nam
John Nichol
Will Renninger

*and*

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