

TAKE THE LEAD IN YOUR EDUCATION!

THE OFFICE OF UNDERGRADUATE RESEARCH OFFERS MANY OPPORTUNITIES TO GET INVOLVED:



UndergradResearch.Northwestern.edu/OUR

Northwestern UNDERGRADUATE RESEARCH

Northwestern University Provost 633 Clark Street Evanston, Illinois 60208

nu-provost@northwestern.edu Office 847. 491. 5117 Fax 847. 467. 1630

Dear Members of the Northwestern Community:

We are excited that this year marked the opening of the new Office of Undergraduate Research. The space on the second floor of 1801 Hinman provides offices for the increasing staff of advisors, and a flexible space for student workshops, information sessions, and social events. As we seek to further develop a community of undergraduate researchers, this space will provide an important home base for students.

This year we were also honored to receive the Beckman Scholars Program Award from the Arnold and Mabel Beckman Foundation. The program focuses on providing training and opportunities to students who we feel will be leaders in scientific innovation. Our inaugural class is WCAS sophomore Biology and Science in Human Culture double-major Emily Zaniker who will be working in the lab of Dr. Teresa Woodruff, and McCormick junior Chemical Engineering major Sam Davidson who will be working in the lab of Dr. Mike Jewett. We are proud of these outstanding students and their dedicated mentors, and we look forward to seeing what they accomplish over their 15 months as Beckman Scholars.

Undergraduate research opportunities at Northwestern continue to expand. The Office of Undergraduate Research awarded record numbers of Academic Year Undergraduate Research Grants for students doing independent research projects across all fields, and an increase of more than 100% over the past four years. We have more than tripled the number of students receiving Conference Travel Grants to present their work at major national and international conferences. We have also funded more than \$100,000 in creative arts projects with students making films, writing scripts, and creating visual arts. We seek to be a leader in supporting research-based arts experiences, and many of these projects can be seen in our Creative Arts Festival this evening.

We firmly believe that research experiences help our students prepare for the world outside of our University. Students learn how to situate their ideas within existing literature and resources, how to develop a project that is both viable and compelling, how to write a successful grant proposal, and how to deal with the uncertainty and unpredictability of research. They do this work under the guidance and tutelage of dedicated faculty and staff who teach them how to explore the unknown. Northwestern is dedicated to providing resources and support for students to challenge themselves, to think critically and carefully about the world, and to devise and complete projects that will change the world for the better.

We are proud to showcase student discoveries through the Undergraduate Research and Arts Exposition and Creative Arts Festival. Compared to last year, 35% more students are presenting their work in poster sessions, oral presentation panels, or in the Creative Arts Festival. We are immensely proud of the students presenting and performing today; their talents make us optimistic for our future.

Sincerely,

Daniel Linzer Provost

2017 Program Front Cover Design By Isabella Jiao Medill School of Journalism, Class of 2019 Journalism, Economics

The 2017 Undergraduate Research and Arts Exposition

Northwestern University's fifteenth annual celebration of undergraduate research and creativity

In conjunction with Chicago Area High School students and teachers participating in the NU High School Project Showcase

Wednesday May 31, 2017

Norris University Center and Mussetter-Struble Theater

ହ୍ୟ

So Contents

Program of Events	 11
Office of Undergraduate Research Advisory Council	 111
Exposition Planning & Organization	iv
Guide to Undergraduate Research Programs at Northwestern	v-vi
Next Steps for your Research	vii
Directory of Northwestern University Student Presenters	1-5
Poster Presentations	7
Guide to Poster Presentations	8-12
Faculty Judges for Undergraduate Poster Sessions	13-14
Poster Presentation Abstracts	15-68
Oral Presentations	69
Guide to Oral Presentations	70-73
Oral Presentation Judges	74
Oral Presentation Abstracts	75-97
Creative Arts Festival Exposition	99
Creative Arts Festival Abstracts in Order of Appearance	100-104
Creative Arts Festival Jury	105
NU High School Project Showcase	107
Guide to NU High School Poster Presentations	108-111
NU High School Poster Judges	112
NU High School Poster Planning & Organization	113

80 Program of Events

Wednesday May 31, 2017

10:00-11:30 AM	Northwestern University Poster Session One Louis Room (205)
11:00-12:30 AM	Northwestern University Oral Presentation Session One Lake Room (203), Arch Room (206), Rock Room (207), Armadillo Room (208)
1:00-2:30 PM	Art Theory and Practice Thesis Exhibition Dittmar Gallery
1:00-2:30 PM	Northwestern University Oral Presentation Session Two Lake Room (203), Arch Room (206), Rock Room (207), Armadillo Room (208)
1:30-2:40 PM	NU High School Project Showcase Poster Session Wildcat Room (101), Big Ten Room (104)
2:30-4:00 PM	Northwestern University Poster Session Two Louis Room (205)
8:00-9:30 PM	Creative Arts Festival Mussetter-Struble Theater
9:30-10:30 PM	Post-Show Reception, Open to all presenters and attendees Mussetter-Struble Lobby

So Office of Undergraduate Research Advisory Council

Neal Blair, Professor, McCormick School of Engineering and Applied Science, Chair of the Undergraduate Research Grant committee Ron Braeutigam, Associate Provost for Undergraduate Education Emily Comstock, Student representative, Arts and Humanities Ryan Dohoney, Assistant Professor, Bienen School of Music Renee Engeln, Professor of Instruction, Weinberg College of Arts and Sciences **Bill Haarlow,** Director, Weinberg College – Admission Relations Jenny Halpern, Student Representative, Social Sciences Sean Hu, Student Representative, Northwestern University Associated Student Government Jiaxing Huang, Associate Professor, McCormick School of Engineering and Applied Science Michelle Jorwic-Carr, Advisor, Athletics Elizabeth Lance, Research Administrator, NU-Q Patrick Liu, Student Representative, Chicago Area Undergraduate Research Symposium Daniel MacKenzie, Assistant Director for Student Life, Medill School of Journalism Marina Micari, Associate Director, Undergraduate Programs, Searle Center for Advancing Learning and Teaching Beth Osterlund, Program Coordinator, Office of Global Safety and Security Beth Pardoe, Director, Office of Fellowships Eric Patrick, Associate Professor, School of Communication Megan Powell, Program Coordinator, School of Professional Studies Ken Powers, Advisor, School of Education and Social Policy Monica Prasad, Professor, Department of Sociology Jane Rankin, Associate Dean, School of Communication Sarah Rappaport, Student Representative, Natural Sciences Joshua Shi, Editor in Chief, Northwestern Undergraduate Research Journal Ashley Wood, Student Representative, Northwestern University Associated Student Government Lee West, Director of Undergraduate Education, Office of the Provost

ഇന്ദ

So Exposition Planning & Organization

Office of Undergraduate Research

Peter Civetta, Director

Mary Leighton, Assistant Director

Rebecca Way, Advisor & Student Outreach

Bryce O'Tierney, Administration

Evangeline Su, Advisor

ନ୍ଧର

So Guide to Undergraduate Research Programs at Northwestern University

Below is a partial listing of current Northwestern programs supporting undergraduate research and creative projects. More are available on the Office of Undergraduate Research web site. You can also search for research opportunities from across the university through the Global Research Opportunities database (gro.northwestern.edu). Many departments and programs have other opportunities that are not widely advertised. External agencies fund a number of programs, such as the National Science Foundation or the Fulbright IIE government grants. The Office of Fellowships (northwestern.edu/fellowships) can help students identify these external opportunities.

Office of Undergraduate Research Programs

Academic Year Undergraduate Research Grants (AY URG): undergradresearch.northwestern.edu/ayurg Summer Undergraduate Research Grants (Summer URG): undergradresearch.northwestern.edu/summerurg Undergraduate Research Assistant Program (Academic Year and Summer): undergradresearch.northwestern.edu/urap Conference Travel Grants: undergradresearch.northwestern.edu/ctg Undergraduate Language Grants: undergradresearch.northwestern.edu/ulg Circumnavigators Travel-Study Grant: undergradresearch.northwestern.edu/circumnavigators

Other University-Wide Programs and Resources

Center for Global Engagement: gesi.northwestern.edu/apply/application Global Research Opportunities: gro.northwestern.edu Institute for Policy Research: northwestern.edu/ipr/ugradresearch.html Northwestern Scholars: scholars.northwestern.edu Office of International Program Development: ipd.northwestern.edu/fellowships/index.html

Weinberg College of Arts and Sciences

 African Studies: africanstudies.northwestern.edu/undergraduate/funding.html
Anthropology: anthropology.northwestern.edu/about/labs.html
Astrophysics: ciera.northwestern.edu/Education/REU
Biochemistry-Morimoto Laboratory Undergraduate Research Seminars: groups.molbiosci.northwestern.edu/morimoto/morimotolab/murs.html

So Guide to Undergraduate Research Programs at Northwestern University, continued

Biological Sciences: biosci.northwestern.edu/undergraduate/research.html Chemistry: chemistry.northwestern.edu/undergraduate/programs/index.html Chicago Field Studies Program: wcas.northwestern.edu/cfs History: Leopold Fellows of the Center for Historical Studies: historicalstudies.northwestern.edu/leopold-fellows Mathematics: math.northwestern.edu/undergraduate/research-internships-study-abroad

Physics and Astronomy: physics.northwestern.edu/undergraduate/research.html Political Science: polisci.northwestern.edu/undergraduate/research-opportunities Psychology: psychology.northwestern.edu/undergraduate/research

School of Communications

Film & Theatre Projects: Rick Morris (r-morris@northwestern.edu) Undergraduate Research Grants and Fellowships: Jane Rankin (j-rankin@northwestern.edu)

School for Education and Social Policy

Research in SESP: sesp.northwestern.edu/ugrad/opportunities/research.html

McCormick School of Engineering and Applied Science

Biomedical Engineering: mccormick.northwestern.edu/biomedical/undergraduate/researchopportunities/index.html Chemical & Biological Engineering: chem-biol-eng.northwestern.edu/undergraduate/current/research/index.html Electrical Engineering and Computer Science: eecs.northwestern.edu/2013-09-03-20-01-56/undergraduate-research International Institute For Nanotechnology: iinano.org/northwestern-universitynanotechnology-reu Materials Research Science and Engineering Center: mrsec.northwestern.edu/undergraduateopportunities McCormick Office of Corporate Relations, Corporate Partner Undergraduate Research Grants: mccormick.northwestern.edu/companies/index.html McCormick Opportunities: mccormick.northwestern.edu/undergraduates/research/index.html

So Next Steps for your Research

The most important step in research, and often the most over-looked for undergraduate researchers, is sharing research findings. This final step allows for the vital process of peer review and contributes to the ongoing development of our knowledge about the world. Moreover, research is a cumulative process that grows from one project to another. It is also important to think about how your research can be transformed into new and related projects. Below are some examples of programs that have been developed at both Northwestern and nationally to help undergraduate researchers participate in and learn from the final step in the research process.

Present Your Research

Northwestern's Annual Undergraduate Research and Arts Exposition: undergradresearch.northwestern.edu/expo

Chicago Area Undergraduate Research Symposium: caurs.com

Academic Conferences. Consult with your advisor for major conferences in your field and apply for funding through the Conference Travel Grant program: undergradresearch.northwestern.edu/ctg

Undergraduate Awards: undergraduateawards.com

Publish Your Research

Northwestern Undergraduate Research Journal: thenurj.com

Nanoscape (Journal of Undergraduate Research in Nanoscience): nanoscape.northwestern.edu

Directory of Undergraduate Research Journals (UNC Office for Undergraduate Research): our.unc.edu/students/conducting-research/get-published/

Transform Your Research

Apply for National & International Research Grants: northwestern.edu/fellowships

Apply for Graduate School. Consult with your advisor for the best programs in your field and apply for funding through the Office of Fellowships: northwestern.edu/fellowships/fellowships-by-award-type/tuition-support/index.html

So Directory of Northwestern Student Presenters

Last Name	First Name	Session	Time	Location
A	William		1 00 2 20	D 1
Antone	Brennan	Oral Presentation Session Two	1:00-2:30pm	KOCK
Asa	Imogene	Afternoon Poster Session	2:30-4pm	Louis
Asrar	Shakeeb	Oral Presentation Session One	11:00-12:30pm	Armadillo
Axford	Yarrow	Oral Presentation Session One	11:00-12:30pm	Lake
Azmi	Urooj	Afternoon Poster Session	2:30-4pm	Louis
Azmi	Basmah	Morning Poster Session	10-11:30am	Louis
Bae	Katherine	Morning Poster Session	10-11:30am	Louis
Baliutaviciute	Vilte	Morning Poster Session	10-11:30am	Louis
Barmore	Lauren	Morning Poster Session	10-11:30am	Louis
Batky	Blair	Afternoon Poster Session	2:30-4pm	Louis
Bennett	Steven	Morning Poster Session	10-11:30am	Louis
Benton	Sarah	Afternoon Poster Session	2:30-4pm	Louis
Berman	Karalyn	Oral Presentation Session One	11:00-12:30pm	Lake
Berrizbeitia	Gustavo	Oral Presentation Session One	11:00-12:30pm	Rock
Blim	Emily	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Bold	Emily	Oral Presentation Session Two	1:00-2:30pm	Lake
Boyle	Kevin	Oral Presentation Session One	11:00-12:30pm	Rock
Branch	Katie	Oral Presentation Session Two	1:00-2:30pm	Arch
Brown	Taylor	Afternoon Poster Session	2:30-4pm	Louis
Brunel	Lucia	Morning Poster Session	10-11:30am	Louis
Bruyere	Sarah	Oral Presentation Session One	11:00-12:30pm	Arch
Burton	Megan	Morning Poster Session	10-11:30am	Louis
Bustamante	Fabian	Oral Presentation Session One	11:00-12:30pm	Lake
Campbell	Kristen	Afternoon Poster Session	2:30-4pm	Louis
Carr	Gabriela	Afternoon Poster Session	2:30-4pm	Louis
Castro	Patsy	Morning Poster Session	10-11:30am	Louis
Chatrathi	Arjuna	Morning Poster Session	10-11:30am	Louis
Chen	Anthony	Oral Presentation Session Two	1:00-2:30pm	Arch
Chen	Chen	Morning Poster Session	10-11:30am	Louis
Chen	Tuofei	Morning Poster Session	10-11:30am	Louis
Chu	Ross	Oral Presentation Session Two	1:00-2:30pm	Rock
Crowe	Samantha	Afternoon Poster Session	2:30-4pm	Louis
Daftary	Karishma	Morning Poster Session	10-11:30am	Louis
Dai	Raymond	Morning Poster Session	10-11:30am	Louis
Davis	Phillip	Oral Presentation Session One	11:00-12:30pm	Arch

Demir	Huseyin	Afternoon Poster Session	2:30-4pm	Louis
Deng	Yue	Morning Poster Session	10-11:30am	Louis
Diesing	Rebecca	Oral Presentation Session Two	1:00-2:30pm	Lake
Dogruol	Yasemin	Afternoon Poster Session	2:30-4pm	Louis
Dominguez	Jaime	Oral Presentation Session One	11:00-12:30pm	Rock
Douglas	Deborah	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Doyle	Esteban	Oral Presentation Session Two	1:00-2:30pm	Lake
Eckland	Amy	Afternoon Poster Session	2:30-4pm	Louis
Eisenstein	Amy	Oral Presentation Session One	11:00-12:30pm	Armadillo
Fang	Tiffany	Morning Poster Session	10-11:30am	Louis
Fantozzi	Maria	Afternoon Poster Session	2:30-4pm	Louis
Farsheed	Adam	Morning Poster Session	10-11:30am	Louis
Figlio	David	Oral Presentation Session Two	1:00-2:30pm	Rock
Ford	Meredith	Oral Presentation Session Two	1:00-2:30pm	Arch
Frankel	Jeffrey	Afternoon Poster Session	2:30-4pm	Louis
Fu	Diana	Creative Arts Festival	8-9:30pm	Struble Theater
Fudge	Rebecca	Morning Poster Session	10-11:30am	Louis
Gao	Jing	Oral Presentation Session One	11:00-12:30pm	Lake
Garcia	Samuel	Creative Arts Festival	8-9:30pm	Struble Theater
Gau	Isabella	Morning Poster Session	10-11:30am	Louis
Gawin	Basia	Afternoon Poster Session	2:30-4pm	Louis
Gerez	Julian	Morning Poster Session	10-11:30am	Louis
Goehring	Garrett	Oral Presentation Session Two	1:00-2:30pm	Rock
Goktan	Ayla	Morning Poster Session	10-11:30am	Louis
Gold	Caroline	Afternoon Poster Session	2:30-4pm	Louis
Goldberg	Gideon	Morning Poster Session	10-11:30am	Louis
Grasse	Margaret	Afternoon Poster Session	2:30-4pm	Louis
Green	Jeremy	Afternoon Poster Session	2:30-4pm	Louis
Greene	Meredith	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Griffiths	Nicholas	Afternoon Poster Session	2:30-4pm	Louis
Grubbe	William	Morning Poster Session	10-11:30am	Louis
Guo	Michelle	Afternoon Poster Session	2:30-4pm	Louis
На	Sun	Morning Poster Session	10-11:30am	Louis
Halpern	Jennifer	Afternoon Poster Session	2:30-4pm	Louis
Harrison	Jordan	Morning Poster Session	10-11:30am	Louis
Hauw	Celia	Morning Poster Session	10-11:30am	Louis
Hegedus	Landon	Creative Arts Festival	8-9:30pm	Struble Theater
Heggestad	Jacob	Oral Presentation Session Two	1:00-2:30pm	Lake
Herz	Alexander	Creative Arts Festival	8-9:30pm	Struble Theater

Hirami	Rita	Oral Presentation Session Two	1:00-2:30pm	Rock
Но	Ann	Oral Presentation Session One	11:00-12:30pm	Arch
Howard	Tanner	Afternoon Poster Session	2:30-4pm	Louis
Hu	Yue	Afternoon Poster Session	2:30-4pm	Louis
Huang	David	Morning Poster Session	10-11:30am	Louis
Huffman	Alexandra	Afternoon Poster Session	2:30-4pm	Louis
Hughes	Rachel	Creative Arts Festival	8-9:30pm	Struble Theater
Hung	Justine	Morning Poster Session	10-11:30am	Louis
Hwang	Inje	Oral Presentation Session One	11:00-12:30pm	Arch
Hynes	Stephen	Morning Poster Session	10-11:30am	Louis
Imundo	Megan	Morning Poster Session	10-11:30am	Louis
Jackson	Brennan	Oral Presentation Session One	11:00-12:30pm	Lake
Je	Mable	Morning Poster Session	10-11:30am	Louis
Johnson	Sarah	Afternoon Poster Session	2:30-4pm	Louis
Kearney	Lauren	Oral Presentation Session One	11:00-12:30pm	Lake
Kelemu	Finote	Afternoon Poster Session	2:30-4pm	Louis
Kramlich	Tyler	Morning Poster Session	10-11:30am	Louis
Kwok	Dashia	Morning Poster Session	10-11:30am	Louis
Legaspi	Jemina	Oral Presentation Session Two	1:00-2:30pm	Rock
Leung	Amanda	Afternoon Poster Session	2:30-4pm	Louis
Levey	Benjamin	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Levin	Tess	Oral Presentation Session Two	1:00-2:30pm	Arch
Lieberman	Amy	Afternoon Poster Session	2:30-4pm	Louis
Lin	Angela	Oral Presentation Session One	11:00-12:30pm	Armadillo
Lin	Rachel	Afternoon Poster Session	2:30-4pm	Louis
Liu	Yingchong	Afternoon Poster Session	2:30-4pm	Louis
Liu	Patrick	Afternoon Poster Session	2:30-4pm	Louis
Locke	Peter	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Lynch	Colin	Afternoon Poster Session	2:30-4pm	Louis
Machesky	Jo	Morning Poster Session	10-11:30am	Louis
Martin	Ryan	Oral Presentation Session Two	1:00-2:30pm	Arch
McClendon	Bomani	Morning Poster Session	10-11:30am	Louis
Mehtab	Meher	Morning Poster Session	10-11:30am	Louis
Mercadante	Eric	Morning Poster Session	10-11:30am	Louis
Merchant	Tazim	Oral Presentation Session Two	1:00-2:30pm	Lake
Mulderink	Gregory	Morning Poster Session	10-11:30am	Louis
Murphy	Kathryn	Creative Arts Festival	8-9:30pm	Struble Theater
Noronha	Katelyn	Morning Poster Session	10-11:30am	Louis
Oberman	Samantha	Morning Poster Session	10-11:30am	Louis

Obgbuefi	Nonye	Morning Poster Session	10-11:30am	Louis
Ogwumike	Onyinyechi	Creative Arts Festival	8-9:30pm	Struble Theater
Pachicano	Jaclyn	Morning Poster Session	10-11:30am	Louis
Park	Jay	Morning Poster Session	10-11:30am	Louis
Park	David	Afternoon Poster Session	2:30-4pm	Louis
Pelczar	Ali	Afternoon Poster Session	2:30-4pm	Louis
Perkins	Noah	Creative Arts Festival	8-9:30pm	Struble Theater
Persaud	Udita	Oral Presentation Session One	11:00-12:30pm	Rock
Petito	Gabrielle	Morning Poster Session	10-11:30am	Louis
Petry	Carl	Oral Presentation Session One	11:00-12:30pm	Arch
Popham	Julia	Oral Presentation Session One	11:00-12:30pm	Arch
Powderly	Kelly	Oral Presentation Session One	11:00-12:30pm	Lake
Preston	Anna	Oral Presentation Session Two	1:00-2:30pm	Lake
Pukelis	Kelsey	Afternoon Poster Session	2:30-4pm	Louis
Quandt	Bryan	Morning Poster Session	10-11:30am	Louis
Radee	Ashley	Afternoon Poster Session	2:30-4pm	Louis
Rim	Katie	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Rios	Eva	Morning Poster Session	10-11:30am	Louis
Robertson	Isabel	Oral Presentation Session One	11:00-12:30pm	Rock
Robertson	Alexandra	Afternoon Poster Session	2:30-4pm	Louis
Rogers	Ceci	Oral Presentation Session Two	1:00-2:30pm	Lake
Roll	Juliet	Morning Poster Session	10-11:30am	Louis
Roney	Emily	Morning Poster Session	10-11:30am	Louis
Rosenbloom	Alana	Creative Arts Festival	8-9:30pm	Struble Theater
Rosenblum	Jacob	Oral Presentation Session One	11:00-12:30pm	Rock
Rothstein	Jake	Oral Presentation Session One	11:00-12:30pm	Armadillo
Salamanca	Paul	Afternoon Poster Session	2:30-4pm	Louis
Samanci	Ozge	Oral Presentation Session Two	1:00-2:30pm	Arch
Sarette	Rachael	Afternoon Poster Session	2:30-4pm	Louis
Schofer	Joseph	Oral Presentation Session Two	1:00-2:30pm	Lake
Seawright	Jason	Oral Presentation Session One	11:00-12:30pm	Armadillo
Seddiq	Oma	Morning Poster Session	10-11:30am	Louis
Sennott	Tara	Creative Arts Festival	8-9:30pm	Struble Theater
Sennott	Tara	Morning Poster Session	10-11:30am	Louis
Sevilla	Laura	Morning Poster Session	10-11:30am	Louis
Shakir	Muhammad	Afternoon Poster Session	2:30-4pm	Louis
Shapiro	Shoshana	Afternoon Poster Session	2:30-4pm	Louis
Shay	Olivia	Morning Poster Session	10-11:30am	Louis
Shen	Рорру	Creative Arts Festival	8-9:30pm	Struble Theater

Shepard	Andrea	Afternoon Poster Session	2:30-4pm	Louis
Sherin	Miriam	Oral Presentation Session Two	1:00-2:30pm	Rock
Shin	Heiwon	Oral Presentation Session One	11:00-12:30pm	Armadillo
Silver	Jamilah	Morning Poster Session	10-11:30am	Louis
Slack	Kevin	Oral Presentation Session One	11:00-12:30pm	Rock
Sobhani	Mahalia	Creative Arts Festival	8-9:30pm	Struble Theater
Srivastava	Sameer	Morning Poster Session	10-11:30am	Louis
Sun	Allison	Afternoon Poster Session	2:30-4pm	Louis
Sutton	Bailey	Afternoon Poster Session	2:30-4pm	Louis
Teng	Tiffany	Morning Poster Session	10-11:30am	Louis
Thelen	Julia	Afternoon Poster Session	2:30-4pm	Louis
Thomas	Shon	Morning Poster Session	10-11:30am	Louis
Thurston	Chloe	Oral Presentation Session One	11:00-12:30pm	Armadillo
Tsai	Stacy	Afternoon Poster Session	2:30-4pm	Louis
Tsutsumi	Kotaro	Morning Poster Session	10-11:30am	Louis
Wang	Yixian	Afternoon Poster Session	2:30-4pm	Louis
Wang	Yilan	Afternoon Poster Session	2:30-4pm	Louis
Weber	De'Sean	Oral Presentation Session Two	1:00-2:30pm	Armadillo
Wee	Victoria	Afternoon Poster Session	2:30-4pm	Louis
Young	Harvey	Oral Presentation Session One	11:00-12:30pm	Arch
Young	Jonathan	Morning Poster Session	10-11:30am	Louis
Yu	Jiaqi	Morning Poster Session	10-11:30am	Louis
Zhou	Nina	Afternoon Poster Session	2:30-4pm	Louis
Zimmerman	Arielle	Oral Presentation Session Two	1:00-2:30pm	Arch

Son Guide to Poster Presentations

80 Poster Session One

10:00-11:30, Louis Room (205)

Humanities, Social Sciences, & Journalism

- 1. **Katherine Bae,** "Positive Emotions and Marital Satisfaction: A Laboratory-Based Study of Genuine and Non-genuine Smiles in Married Couples"
- 2. **Vilte Baliutaviciute,** "Awareness of and Attitudes Toward Anti-Weight Stigma Movements"
- 3. **Steven Bennett,** "Against Jeremy Bentham: Human Rights Will Not Cause Anarchy; or Pandora's Box Closed"
- 4. **Patsy Castro,** "Personality Correlates of Health Factors"
- 5. Karishma Daftary, "Perceived Parent Instrumental Support and Child Asthma Health"
- 6. **Tiffany Fang,** "Child personality moderates associations between parenting strategies and psychopathology"
- 7. **Julian Gerez,** "Civil resistance; armed insurgencies; and government dependence on nontax revenue"
- 8. **Ayla Goktan,** "Do Personality Traits Predict Mental Health Care Utilization? Longitudinal Findings from the MIDUS"
- 9. Gideon Goldberg, "A Case For Secession"
- 10. **David Huang,** "Positive Emotions in Response to an Affiliation Film Clip: Associations with Well-Being"
- 11. **Megan Imundo,** "College Students' Imagined Lives: Gender Differences in Emphasis on Life Domains"
- 12. **Tyler Kramlich,** "The survival; transmission and adaptation of Lan Na music in Northern Thailand; in spite of surrounding cultural shifts."
- 13. **Dashia Kwok,** "Calories in your Console? A Content Analysis of Food and Other Marketing in Children's Video Games"
- 14. **Eric Mercadante,** "Social Dominance and the 5-Factor Model: Do different measures lead to different results?"
- 15. Samantha Oberman, "Teacher Quality Assessment Across the Academic Year"
- 16. **Jaclyn Pachicano,** "Associations between Relational Pronouns during Marital Conflict and Marital Satisfaction"
- 17. Jay Park, "Social Identity Complexity and Intergroup Attitude"
- 18. **Eva Rios,** "Rethinking the Categorization of Prison Gangs: the Primeiro Comando da Capital; Numbers Gang; and the Mexican Mafia"
- 19. **Oma Seddiq, Shageaa Naqvi, and Ifath Arwah Sayed,** "Trust in news media and media credibility as predictors of news consumption behaviors in six Arab countries"
- 20. Tara Sennott, "Senior Thesis Project"
- 21. Laura Sevilla and Julia Thelen, "Stressful life events and power motivation: A laboratorybased study"
- 22. Jamilah Silver, "Developing Stronger Constructs for the Evaluation of Neighborhoods"
- 23. Jiaqi Yu, "Cultural Influence on Brand Identification and Brand Defense"

So Poster Session One, continued

Natural Sciences & Engineering

- 24. **Lauren Barmore,** "Determining the grain size of polycrystalline diamond for high energy density experiments"
- 25. **Lucia Brunel,** "Glass Transition Temperature Broadening of Syrene/n-Butyl Acrylate Copolymer and Polyphenylene Oxide Blends"
- 26. Megan Burton, "A New Assay for Profiling Endogenous Phosphatase Activity"
- 27. **Arjuna Chatrathi,** "An Investigation of ALFF as a method of Improving the Estimation of Grey Matter Voxel Locations"
- 28. **Chen Chen,** "Evaluating cardiomyocytes metabolic and maturation effect on hiPSC-CM drug response modeling"
- 29. Tuofei Chen, "RGB-D SLAM for MAV Autonomous Navigation"
- 30. **Raymond Dai,** "Self-Assembled Monolayer Arrays for the Discovery of Novel Cell Adhesion Ligands"
- 31. Yue Deng, "Characterizing Metalloenzyme Interactions in Biological Methane Oxidation"
- 32. Adam Farsheed, "3D Printing High-Resolution Bioresorbable Vascular Stents"
- 33. **Rebecca Fudge,** "Investigation of Notch Ligand-Receptor Interactions in Ovarian Granulosa Cells"
- 34. **Isabella Gau,** "The Roles of Hrd1 and Smad7 and Hrd1 and Parp1 Interactions in Immunosuppression"
- 35. **William Grubbe,** "High-yield E. Coli Cell-Free Protein Synthesis and Site-Specific Labeling in Human Tyrosine Kinases"
- 36. Sun Ha, "A study of solution conformation of chiral tertiary amines"
- 37. **Jordan Harrison,** "CRIPSR Capsules: Engineering pathways for incorporating functional Cas9 protein into outer membrane vesicles"
- 38. **Celia Hauw and Nonye Ogbuefi,** "Neural correlates of the link between language and thought in young infants."
- 39. **Justine Hung,** "Differences in Substrate Cleavage Efficiency by Ancient versus Modern Yersinia pestis"
- 40. **Stephen Hynes,** "Quantitative Network Analysis of Seventeenth and Eighteenth Century Diplomatic Networks"
- 41. **Mable Je and Olivia Shay,** "Negative Emotions during Martial Conflict and Child Problem Behaviors"
- 42. Jo Machesky, "Alteration of membrane compositional asymmetry by LiCoO₂ nanosheets"
- 43. **Bomani McClendon and Sameer Srivastava,** "Scaffolding Research Training and Skill-Development in Design-Based Undergraduate Research with Computer-based Guidance Systems"
- 44. Gregory Mulderink, "Nitrogen Doping of Few-Layer Black Phosphorus Flakes"
- 45. **Katelyn Noronha,** "Melanopsin expression is dynamically regulated during retinal development"
- 46. Gabrielle Petito, "Stereotactic Laser Ablation: A Single Center Report"
- 47. Bryan Quandt, "Reducing waste in maker spaces"
- 48. Juliet Roll, "An Enzymatic Microfluidic Reactor System"
- 49. **Emily Roney,** "Enabling Ribosome Evolution for Sequence-defined Polymerization: Optimization of bMet-tRNA Synthesis"

80 Poster Session One, continued

- 50. Tiffany Teng, "Deorphanizing olfactory receptors in vivo"
- 51. Shon Thomas, "Effect of CD1b and CD1c on Atherosclerotic Plaque Formation"
- 52. **Kotaro Tsutsumi,** "R-SNARE Protein Ykt6 Restores Lysosomal Function in Parkinson's Disease Cell Model"
- 53. **Jonathan Young,** "Temperature Dependence of Porous Structure in a Freeze-casted Titanium Oxide and Water System"

50 Poster Session Two

2:30-4:00, Louis Room (205)

Humanities, Social Sciences, & Journalism

- 1. Urooj Azmi, "Bedari: The awakening of Pakistani patriotism through melodramatic cinema"
- 2. Blair Batky, "Personality Accounts for Associations Between Problem Behaviors and Academic Performance"
- 3. Kristen Campbell, "Bohemian Masks: Identity and Belonging in Towertown; 1917-1933"
- 4. **Yasemin Dogruol,** "Ego Depletion Replication Study"
- 5. **Maria Fantozzi,** "Bienvenidos a St. Francis of Assisi: Making Chicago's Mexican-American Community; 1945-1961"
- 6. **Jeffrey Frankel,** "Resistance and Sensitivity of the Nonhuman Primate Gut Microbiome to a Captive Environment"
- 7. **Caroline Gold,** "An Ethnographic Review of Excel Academy"
- 8. Jennifer Halpern, ""It is Who I am" -- Dancers & The Formation of Identity"
- 9. **Tanner Howard,** "Sustainability in Freetown Christiania"
- 10. **Sarah Johnson,** "Function Over Form: A Novel Body Image Program Focused on Body Functionality"
- 11. Amy Lieberman, "Voice-pitch Perturbation in Non-clinical Psychosis Population"
- 12. **Yingchong Liu,** "Roman imperium and Chinese tianxia: a Cross-Cultural Approach to Roman Studies"
- 13. **Ali Pelczar,** "The Relationship Between Career Identity and Persistence in Postsecondary Education Among Low-Income Mothers"
- 14. **Kelsey Pukelis,** "The effects of fair trade on livelihood diversification and food security: a study of Peruvian coffee farmers"
- 15. Ashley Radee, "Asian Americans and Stereotypes of Femininity"
- 16. **Alexandra Robertson,** "George Washington Gómez and the Political Consequences of Bilingualism"
- 17. **Paul Salamanca,** ""No chocolate, no rice"—An Investigation of Racial/Ethnic Homophily on Grindr"
- 18. Muhammad Shakir, "The Emergence of Alternative Media in Yemen"
- 19. Shoshana Shapiro, "Facilitation in Informal Makerspaces"

So Poster Session Two, continued

- 20. **Bailey Sutton,** "The Evolution of Sexism Under Gorbachev: An Analysis of Abortion; Population Growth; and Societal Expectations Under Perestroika"
- 21. Julia Thelen, "Stressful life events and power motivation: A laboratory-based study"
- 22. Victoria Wee, "The Role of Language in Toddlers' Relational Learning"

Natural Sciences & Engineering

- 23. **Imogene Asa,** "A biogeographical analysis of the lichenized fungus Pseudocyphellaria glabra"
- 24. **Sarah Benton,** "A Spectroscopic Analysis of Barium- and Zinc-Containing Ceramic Glazes"
- 25. **Taylor Brown, Huseyin Demir, Michelle Guo, and David Park,** "Testing Cultivated Microbes from Indoor Dust for Antibiotic Resistance"
- 26. **Gabriela Carr,** "Effects of elevated CO2 on encapsulated development in 14 gastropod species"
- 27. **Samantha Crowe,** "Developing a Modular; Two-Pot Cell-Free System for Expression of Metabolic Pathways and Natural Product Discovery"
- 28. Amy Eckland, "Antimicrobial resistance in the dust microbiome"
- 29. **Basia Gawin,** "The Holocene Sedimentary Record of Lake T3 in Southwest Greenland: Timing of Isostatic Emergence and Evidence of Upstream Glacier Fluctuations."
- 30. **Margaret Grasse,** "Improved Nightclub Experiences with CALASC (Crowd And Load Aware SmartClub)"
- 31. **Jeremy Green,** "Serotonin Receptor Regulation of Eosinophil Transendothelial Migration During the Allergic Response"
- 32. **Nicholas Griffiths,** "dachsous restricts brain cell density during regeneration in the planarian Schmidtea mediterranea"
- 33. Yue Hu, "Fluid Approximations and Limit Theorems for Polling Systems with Non-Zero Switch-Over Time"
- 34. **Alexandra Huffman,** "The influence of SLCO1B1 functional variants on the uptake of simvastatin"
- 35. **Finote Kelemu,** "Lifetime Fitness Analysis of Threatened Cirsium pitcheri in Larinus planus Infected Environments"
- 36. **Amanda Leung,** "Visual acuity of GABAergic retinal ganglion cells"
- 37. **Rachel Lin,** "Data Analytics in a Marathon Setting: Medical Volunteer Recruitment and Corral Assignment"
- 38. **Patrick Liu,** "Nuclear blebbing solely as a function of chromatin compaction state"
- 39. **Colin Lynch,** "Development of Gd(III)-Based Magnetic Resonance Agents for Molecular Imaging of Hydrogen Peroxide and Hypoxic Tumor Conditions"
- 40. **Rachael Sarette,** "Neotropical edge effects: a study of Phoridae and Atta cephalotes interactions"
- 41. **Andrea Shepard,** "Developing a Method to Increase Farnesyl Pyrophosphate in E. coli via Induction"
- 42. Allison Sun and Jennie Werner, "Collective Experiences API"

80 Poster Session Two, continued

- 43. Stacy Tsai, "Regulation of Hypoxic Response in CRISPR-generated Mouse Myotubes"
- 44. Yixian Wang, "Observations; Research; and Thoughts about Networks in Gitter.im"
- 45. **Yilan Wang,** "A High-copy Suppressor Screen for Mitochondrial Inheritance Mechanisms in Budding Yeast"
- 46. Nina Zhou, "Analysis of the Contribution of Agricultural Use on Organic Carbon"

So Faculty Judges of Undergraduate Posters

Katherine Amato, Anthropology Elisa Baena, Spanish and Portuguese Henry Binford, History Sara Broaders, Psychology Umayyah Cable, Asian American Studies Steve Carr, Materials Science and Engineering Bernard Dobroski, Music Jillana Enteen, Gender Studies Elzbieta Foeller-Pituch, History Adam Goodman, Center for Leadership Benjamin Gorvine, Psychology Tina Grieco-Calub, Communication Sciences and Disorders Claudia Haase, Human Development and Social Policy Shelby Hatch, Chemistry; Weinberg Advisor Stephen Hill, Anthropology; Office of Fellowships Philip Hockberger, Physiology; Feinberg School of Medicine Laura Lackner, Biological Sciences Joan Linsenmeier, Psychology Amanda Mathew, Preventive Medicine; Feinberg School of Medicine Fred Northrup, Chemistry Magdalena Osburn, Earth and Planetary Sciences Laura Panko, Biological Sciences

So Faculty Judges of Undergraduate Posters, continued

Andy Rivers, Physics

Cynthia Robin, Anthropology

Fay Rosner, French; Weinberg Academic Advisor

Lilah Shapiro, School of Education and Social Policy

Mark Sheldon, Philosophy, Medical Humanities and Bioethics; Weinberg Academic Advisor

Yumi Shiojima, Asian Languages and Cultures

Jesseca Simmons, Radio/Television/Film

David Smith, Psychology

Mike Smutko, Physics

Karrie Snyder, Sociology

Francesca Tataranni, Classics

Alvin Tillery, Political Science

Christie Traina, Religion

Lisa Wilsbacher, Cardiology Division; Feinberg School of Medicine

Mark Witte, Economics

Ji-Yeon Yuh, History; Asian American Studies

Brad Zakarin, History

Ingrid Zeller, German

ഇന്ദ

So Poster Presentation Abstracts

Alphabetical by presenter's last name

Imogene Asa

Faculty Advisor: Thorsten Lumbsch

A biogeographical analysis of the lichenized fungus Pseudocyphellaria glabra

Lichens are a symbiotic relationship between a fungus and a photosynthetic partner, usually green algae or cyanobacteria. Large distribution ranges of lichens is an unexplained phenomenon. The biogeography of *Pseudocyphellaria glabra* was analyzed through molecular data to understand the range of diaspore dispersal, diversification, and evolution for this species. *P. glabra* has a distribution ranging across Australasia and parts of South America. The study compares the genetic patterns among populations of *P. glabra* in Tasmania, mainland Australia, and New Zealand, specifically differences in the internal transcribed spacer (ITS), a barcoding marker for fungi.

ନ୍ଧର

Urooj Azmi

Faculty Advisor: Kaveh Askari

Bedari: The awakening of Pakistani patriotism through melodramatic cinema

On the 14th of August, 1947, Pakistan gained independence from India, and the country experienced a "post-partum depression". The country's economy, however, started to steadily improve in the 1950's. This rise in opportunities paved a way for artists such as filmmakers to emerge. At this point, the popular Pakistani melodrama film Bedari was made. A film that was eventually forgotten over time, Bedari aimed to inspire patriotism amongst citizens for their new home. In my essay, I argue that the melodramatic genre of the film, which was presented in the songs, mise-en-scene and dialogue, was an important tool for storytelling by filmmakers to inspire the aforementioned sentiments. To do so, I wrote an analysis using existing literature and film reviews from newspapers at the time of the release, and also created a video essay by conducting and recording a unique Skype interview of the child actor and protagonist from the film, the only living creator of the film remaining at the time, who passed away shortly after. In doing so, I concluded that the movie was not only a hallmark in Pakistani cinema for educating the youth, but also a powerful social device for raising pro-Pakistani sentiments in the culture. At a time when Pakistan needed to develop its economy in competition with its neighbor India, this film was useful in creating a free-standing film industry and inspiring other industry professionals to become free-standing as well.

ନ୍ଧର୍ୟ

Katherine Bae

Faculty Advisor: Claudia Haase

Positive Emotions and Marital Satisfaction: A Laboratory-Based Study of Genuine and Nongenuine Smiles in Married Couples

Marital emotional functioning is one of the most important predictors of marital outcomes (e.g., marital satisfaction), which in turn has important consequences for well-being and health factors for both spouses and their children. Thus far, negative emotions (e.g., anger) have been the central focus in distinguishing dissatisfied from satisfied couples (i.e., low and high marital satisfaction). In sharp contrast, positive emotions have rarely been the target of empirical marital research, notwithstanding the sizeable body of research garnered showing a myriad of cognitive, social, psychological, and physical benefits positive emotions hold for individuals (i.e., broaden-and-build theory of positive emotions). Thus, the present study examined a potentially important aspect of marital emotional functioning: the experience of positive emotion via displays of positive facial expression (i.e., genuine and nongenuine smiles), and associations with marital satisfaction. Marital satisfaction was expected to be positively associated with the display of genuine smiles, but not the display of nongenuine smiles. In a sample of 66 married spouses (33 couples), participants' facial expressions were videotaped during pleasant and conflict conversations. Smiles were coded as either genuine or non-genuine based on the Facial Action Coding System on a second-by-second coding basis for the first three minutes of both conversations (interrater agreement: k= .93-1). Marital satisfaction was measured using the Marital Adjustment Test questionnaire (15 items; a = .8). Results showed that there was no association between the frequency of both genuine (inconsistent with hypothesis) and nongenuine (consistent with hypothesis) smiles and marital satisfaction. Follow-up exploratory analyses showed a positive association between the frequency of genuine smiles and positive emotional experiences (i.e., amusement) during both conversations, consistent with previous findings of a positive association between genuine smiles and emotional well-being. Limitations (e.g., small sample size), implications, and future directions are discussed.

ନ୍ଧର୍ୟ

Vilte Baliutaviciute

Faculty Advisor: Renee Engeln

Awareness of and Attitudes Toward Anti-Weight Stigma Movements

There is a pervasive social bias against overweight individuals. Heavier people are often thought of as dirty, lacking self-control, and even immoral. To combat this stigma, two social movements have emerged: the Fat Acceptance Movement and Health at Every Size movement. While many of the principles of these movements emerged from diet and weight research, the movements themselves have seen little academic investigation. This study explored awareness of and attitudes toward these two movements. Seven hundred thirty-two online participants were randomly assigned to read one vignette in a two (gender of vignette target: Laura or John) by three (movement: FAM, HAES, or control) between-subjects design. In the control conditions, the vignette only described an overweight person. In the FAM condition, the vignette additionally described the target believing in FAM tenets; in the HAES condition, the target held HAES beliefs. After reading the vignette, participants were

told the name of the movement described and asked to indicate their awareness. Participants in the control condition were randomly assigned to awareness questions about either FAM or HAES. After the awareness questions, participants rated the movement on a scale ranging from 1 -- *It's definitely a bad idea* to 5 -- *It's definitely a good idea*. Results indicated low awareness of both movements. For HAES, providing a brief story of an overweight person who endorses HAES improved participants' perceptions of the movement. Information about these movements may be most effective in changing attitudes when accompanied by stories of overweight individuals struggling with stigma.

ഗ്രര

Lauren Barmore

Faculty Advisor: Siegfried Glenzer

Determining the grain size of polycrystalline diamond for high energy density experiments

The High Energy Density Sciences group at SLAC National Accelerator Laboratory uses shock waves produced by the Linac Coherent Light Source to dynamically compress polycrystalline diamond samples. Compressing these polycrystalline samples allows us to use x-ray diffraction to study the changes to the structure as it experiences high pressure conditions. Polycrystalline diamond is valuable to study because it can be formed into ablator capsules for use in inertial confinement fusion reactions. As a result of the shock compression, the polycrystalline diamond samples undergo dynamic compression, a combination of stress and strain. To understand how dynamic compression takes place in a polycrystalline material, we can predict the changes in the x-ray diffraction pattern that occur from the compressed material. This predictive model uses the crystal grain size and orientation of our polycrystalline diamond samples as parameters. Procuring a precise measurement of the crystal grain size in our samples will allow us to make more accurate predictions of the changes to the diffraction pattern in order to understand how the diamond sample responds to dynamic compression. Analyzing images of the samples from a scanning electron microscope (SEM) can give us information about the crystal grain size. We determine that the diamond crystals in our sample are 18.91 nm in diameter on average and that our material is relatively uniform across all areas of each sample.

ନ୍ଧର୍ୟ

Blair Batky

Faculty Advisor: Jennifer Tackett

Personality Accounts for Associations Between Problem Behaviors and Academic Performance

Prior research suggests that psychopathology may impede childhood academic performance and that internalizing and externalizing behaviors are associated with personality profiles implicated in lower achievement. The current study's goal was therefore to determine if personality is helpful in understanding psychopathology and academic achievement relationships. Participants were mainly mothers of 307 children (45.60% male, $M_{age} = 9.78$, $SD_{age} = 0.65$) who reported on children's psychopathology, personality, and academic performance. Math and reading grades were also obtained for each child. Results demonstrated that low Conscientiousness accounted for shared variance in the

relationship between externalizing and poorer parent-reported academic performance. Agreeableness accounted for shared variance in the externalizing and grades relationship. Specifically, Agreeableness was negatively correlated with externalizing and with grades after controlling for externalizing. Personality did not account for internalizing and achievement associations. Results suggest it could be beneficial to cultivate personality-related strengths in children whose externalizing behaviors predispose them to underachievement.

ହ୍ୟ

Steven Bennett

Faculty Advisor: Kyla Ebels-Duggan

Human Rights Will Not Cause Anarchy

Human rights — to life, liberty, and property, for example — appear to structure much of contemporary international law and relations. But what if the very concept of human rights rests on a mistake: what if their very existence brings about a state of affairs in which no one has reason to pay heed to law, and so does not? This line of argument, that human rights effect violent political anarchy, formed one of Jeremy Bentham's attacks on the French National Constituent Assembly's 1789 *Declaration of Human Rights*.

If we think that human rights *do* structure international law, Bentham's argument, if sound, should worry us. But in this presentation, I shall argue that it is not. In particular, I will discuss the problem within Bentham's reading of the conception of human rights as specified by the *Declaration*, that human rights can be to anything at all and can allow any sort of behavior when violated. I will then counter his argument by sketching a more modest, plausible conception of human that could certainly obtain without bringing about a state of constant political violence.

ହ୍ୟ

Sarah B. Benton

Faculty Advisor: Frederick J. Northrup

A Spectroscopic Analysis of Barium- and Zinc-Containing Ceramic Glazes

Ceramic glazes must be stable to be used safely as food and beverage containers. Barium is a toxic metal present in ceramic glazes, but its levels are not regulated by the FDA, as are lead and cadmium. The Northrup group found that adding zinc in small amounts can stabilize a barium-containing glaze, while adding zinc in larger amounts causes high levels of many materials to leach from the glaze when in mildly acidic media. To better understand these trends, scanning electron microscopy (SEM), Raman spectroscopy, and powder x-ray diffraction (PXRD) have been used to study the molecular and elemental compositions of the glazes. Raman spectroscopy proves especially useful due to its ability to probe the low-frequency vibrational modes of heavy molecules containing barium. Raman spectra of stable barium- and zinc-containing glazes generally show broad features, indicating the presence of a complex aluminosilicate lattice likely with variable structure throughout the glazes. This is consistent with previous research on barium aluminosilicate systems which find there to be many different phases within narrow temperature and composition ranges. For less

stable glazes, sharper Raman spectral features are found in the unleached areas, and these features disappear after leaching. These features are likely due to molecular compositions that are not incorporated into the aluminosilicate lattice, but rather represent zinc or barium compounds outside of the lattice. PXRD spectra of the same unstable glazes closely match that of the mineral celsian, BaAl₂Si₂O₈, suggesting its presence in some amount with zinc remaining outside of the primary lattice.

ഗ്രരു

Taylor Brown, Huseyin Demir, Michelle Guo, David Park

Faculty Advisor: Erica M. Hartmann

Cultivating Microbes from Dust

As contemporary humans spend increasingly longer times in indoor environments, it is important to study the microbial communities that inhabit the indoors, such as those found in dust. It is especially important to examine indoor microbial communities for potential pathogens, given the widespread rise in antibiotic resistance. Our purpose was to screen dust-borne bacteria for potentially hazardous phenotypes (i.e., antibiotic resistance). Dust collected by collaborators at University of Oregon was suspended in buffer and inoculated onto triplicate Tryptic Soy Agar (TSA) plates. Distinct colonies were collected as isolates, grown in Tryptic Soy Broth (TSB), and stored at -80°C. The original plates were then replicated onto TSA amended with ampicillin, clarithromycin, or tetracycline to test resistance. The morphology of each colony from both antibiotic and non-antibiotic plates was characterized. We further screened colonies using PCR to identify Staphylococcus aureus and methicillin-resistant S. aureus (MRSA). Growth on the TSA plates was highly variable in terms of number and physical characteristics of colonies. We collected about 1400 isolates, representing over 30 distinct morphologies roughly. General patterns among the samples cultured so far show that the majority of cultured isolates are not resistant to any of the tested antibiotics. Of the resistant bacteria, the most common resistance was to clarithromycin, followed by ampicillin. In the future, we will use DNA sequencing to reveal the presence of known antibiotic resistance genes, and possibly identify new varieties. In addition, evidence of antibiotic-resistant bacteria in community dust can be used to inform policies related to public health.

ନ୍ଧର

Lucia Brunel

Faculty Advisor: John Torkelson

Glass Transition Temperature Broadening of Syrene/n-Butyl Acrylate Copolymer and Polyphenylene Oxide Blends

Over the past several decades, there has been great interest in polymeric materials that exhibit damping properties to minimize sound and vibrations. The acoustic properties of polymers are closely coupled with its glass transition, which is the transition from a glassy state to a rubbery state that occurs over a temperature regime specific to that polymer. A broad glass transition is a highly desirable feature, because the temperature range over which the material exhibits good damping characteristics is also broadened. My research focuses on broadening the glass transition behavior of a styrene-based polymer blend. I hypothesized that unusually broad glass transitions would be observed when synthesizing styrene/*n*-butyl acrylate copolymers to lower the onset of the glass transition regime, and then blending the copolymers with polyphenylene oxide (PPO) to raise the endset of the glass transition regime. I expect the glass transition to broaden with increasing amounts of *n*-butyl acrylate and PPO in the polymer blend, until a limit of miscibility after which the components of the polymer blend will phase separate. Experiments thus far have shown good miscibility and glass transition breadths already exceeding breadths previously reported for blends of polystyrene homopolymer and PPO, indicating the great potential of these novel materials for damping applications.

ନ୍ଧର

Megan Burton

Faculty Advisors: Lindsey Szymczak, Maria Cabezas, Milan Mrksich

A New Assay for Profiling Endogenous Phosphatase Activity

Deregulation of kinases and/or phosphatases, the regulators of phosphorylation, have a direct cause in the pathogenesis of many diseases such as cancers, diabetes, and neurodegenerative disorders. Kinases have been well studied and today are one of the most attractive drug targets, however details of phosphatase regulation are comparatively unknown as they have proven more challenging to study. We propose a new, high-throughput, label-free assay capable of measuring endogenous phosphatase activity using self-assembled monolayers (SAMs) of alkanethiolates on gold with matrix-assisted laser desorption ionization- time of flight mass spectrometry (SAMDI-TOF MS). Using this technique to profile phosphatases in cell lysates, we monitored phosphatase activity during differentiation of human mesenchymal stem cells (hMSCs). Three 361-member peptide libraries consisting of a central phosphothreonine, phosphoserine and phosphotyrosine (Ac-CKGXT^p/S^p/Y^pZA where X and Z represent all amino acids except cysteine) were synthesized. After lysate of differentiated hMSCs is applied to SAMDI arrays, the amount of dephosphorylation on each of the 361 peptides were measured using MALDI-TOF mass spectrometry. Heat maps were generated for undifferentiated cells, osteogenic, and adipogenic differentiation cells after 5, 10, and 15 days, and then compared to observe trends and changes in phosphatase activity. Heat maps showed substantial differences in phosphatase activity throughout differentiation. This is the first high-throughput, label-free assay to compare endogenous phosphatase activity. This new assay has the potential to offer a better understanding of the mechanisms underlying phosphatase activity and their roles in mesenchymal stem cell differentiation, potentially offering new therapeutic strategies for human diseases.

ହ୍ୟ

Kristen Campbell

Faculty Advisor: Henry Binford

Bohemian Masks: Identity and Belonging in Towertown, 1917-1933

Bohemia, as a counterculture home to artists and writers, outcasts and radicals, has attracted significant scholarly attention. Particularly in the context of its well-known, regional expressions in

Paris and New York, bohemia has entranced generations of scholars. Despite Chicago's impressive literary history in the early twentieth century, little research has been done on the bohemian circles of the period. The scholarship that does exist on Chicago's bohemian milieu usually focuses on artists, political radicals, or writers, without considering the bohemian community in its totality. For this reason, how bohemian identities in Chicago were imagined and understood has not been adequately addressed. This project will focus on the Near North Side bohemian neighborhood of Towertown in the early decades of the twentieth century. It will demonstrate that bohemians in Towertown organized around certain shared values, but that these values were not sufficient to mark the boundaries of bohemia or understand how individuals navigated and utilized identity within the community. Through an investigation of the contradictions and difficulties inherent in individual and communal understandings of bohemia in Towertown, this project will show that bohemia was a constructed identity which proved unsustainable in 1920s and 30s Chicago. However, it will further argue that it is within the very inconsistencies and ambiguities of identity in Towertown that the possibility of a true freedom may be found, open to almost anyone willing to leave her dignity outside and enter the wild realm of self-expression and emphatic difference that was bohemian Chicago.

ନ୍ଧର୍ୟ

Gabriela Carr

Faculty Advisor: Robert Podolsky

Effects of elevated CO2 on encapsulated development in 14 gastropod species

Due to the ocean acidification (OA), it is increasingly important to identify characteristics of organisms that make them susceptible or resilient to pH change. Encapsulating structures during early development, present in several taxa, are of special interest because (1) they could help to buffer against low pH as they have been shown to do for other environmental risks, and (2) embryos that develop inside such structures may have been selected to withstand the pH decline resulting from their own respiratory CO2 production. We tested the effect of elevated CO2 on hatching shell size, inorganic and organic content, and development rate in 14 gastropod species with different types of encapsulating structures. We found mostly moderate differences in response to three CO₂ concentrations across all species taken as a whole. In a few cases we found a decline in shell length with increased CO₂, though without a corresponding decline in inorganic content, suggesting that while calcification was generally resilient the morphology of certain shells might have been affected. Development rate decreased in several species and overall among all species, indicating that developmental processes were sensitive to elevated CO2. Species with string-type egg masses appeared particularly sensitive. Our results suggest that encapsulated embryos tend to be resilient to low pH and other effects of CO2, and that designs of some encapsulating structures may contribute to this resilience more than others. Such effects could have implications for future differences in species persistence in the face of increasing OA.
Patsy F. Castro

Faculty Advisor: William Revelle

Personality Correlates of Health Factors

The present study draws upon main the Big Five and the Five-Factor Model (FFM) using the five personality traits: conscientiousness, agreeableness, neuroticism, openness, and extraversion. In previous personality correlates to health factors, high levels neuroticism, low levels of conscientiousness, and oftentimes low levels of openness tend to correlate to a variety of chronic diseases, though not much research has been done on health factors such as exercise history, eating and dentist habits. The data was collected through an online survey known as the Synthetic Aperture Personality Assessment technique, "SAPA." While controlling for income, education, gender and age, this project finds strong correlates high levels of neuroticism and low levels of conscientiousness to emergency room usage and high levels of conscientiousness to primary care usage. Overall, the understanding of the personality underpinnings of these health factors are pertinent to proper education of patients in the future.

ନ୍ଧର

Arjuna Chatrathi

Faculty Advisor: Robert Hurley

An Investigation of ALFF as a method of Improving the Estimation of Grey Matter Voxel Locations

Accurately determining the biological validity of tissue at each point in an magnetic resonance imaging (MRI) brain scan is critical for accurately interpreting the contents of the scan. Standard methods for determining the tissue type are usually sufficient for scans of healthy brains, but neurodegenerative atrophy in primary progressive aphasia (PPA) degrades the integrity of neural tissue, which can make it difficult to determine the nature of the tissue. By taking into account the functional characteristics of the tissue, its biological validity may be elucidated. To investigate this, the amplitude of low frequency fluctuations (ALFF) was calculated from the MRI scans of 13 healthy controls and 13 PPA patients obtained from the CNADC. ALFF is a metric that characterizes the brain activity. ALFF was used to determine the most active brain areas in each set of subjects, and then functional connectivity analyses (FCA) was performed. FCAs were also performed on brain scans processed with standard methods. The results from each FCA were compared to determine how ALFF performed at determining the validity of tissue relative to standard processing methods. It was found that the ALFF approach was not statistically significantly different from the standard approach at determining the biological validity of tissue. However, this does not prevent the functional characteristics from being useful for tissue classification. Between the standard and ALFF approaches, many of the preprocessing steps are similar, and changing these may improve the performance of the ALFF approach. Additionally, ALFF may serve to augment the standard approach.

Chen Chen

Faculty Advisor: Paul W. Burridge

Evaluating cardiomyocytes metabolic and maturation effect on hiPSC-CM drug response modeling

Despite their application in understanding molecular mechanisms of cardiac diseases and drug screening, human induced pluripotent stem cells-derived cardiomyocytes (hiPSC-CMs) remain immature in culture and resemble fetal human hearts, which differ from adult cardiomyocytes in metabolic phenotype and thus hinder the system to accurately recapitulate patient response to drugs. The project 1) evaluated the effect of different metabolic modifiers on hiPSC-CM drug response and 2) determined whether cell metabolism during drug dosing makes a difference in drug response. We tested different metabolic modifier conditions – various concentrations of glucose, galactose, and selected fatty acids – and maturation factors - insulin growth factor-1 (IGF1), dexamethasone and tri-iodo-L-thyronine (T3) during hiPSC-CMs maturation stage. Then, drug responses of these hiPSC-CMs to Doxorubicin, an anti-cancer drug with known high rate of dose-dependent cardiotoxicity, were monitored. Preliminary data showed that media condition during drug dosing makes an observable difference in drug response, and one or more components of maturation factors are toxic to hiPSC-CMs. This project provides insight for further improving hiPSC-CM maturation in vitro and drug response modeling.

ହ୍ୟ

Tuofei Chen

Faculty Advisor: Aggelos Katsaggelos

RGB-D SLAM for MAV autonomous indoor navigation

Micro-aerial-vehicles (MAVs) have gathered interests from vastly different fields in the recent years: surveillance, search and rescue, remote sensing and photography, to name a few. However, most of such missions have been conducted outdoor where GPS data is available for localization and control. Maneuvering an MAV indoor autonomously, where GPS is likely unavailable, remains a challenging problem formulated as Simultaneous Localization and Mapping (SLAM).

In this project, we utilized image processing techniques to achieve SLAM from video stream of a forward pointing RGB-Depth sensor on the MAV. Using a feature matching + pose graph optimization based approach, we obtained an initial position estimate which is fused with inertial sensor data on the MAV to give the final position estimate.

We use such position estimate to devise algorithms that control the MAV to execute tasks autonomously. We have shown promising result in both benchmark dataset for RGB-D SLAM and real world test flight. From the TUM RGB-D desk dataset, we can achieve a root-mean-square error of 0.02 meters. In real flight circumstances, we demonstrated a simple autonomous object searching task in an enclosed environment based on the proposed SLAM architecture. Results from this project help identify the tradeoff of different image processing algorithms involved in SLAM and provides insight on improving sensor fusion of MAV systems.

Samantha Crowe

Faculty Advisor: Michael C. Jewett

Developing a Modular, Two-Pot Cell-Free System for Expression of Metabolic Pathways and Natural Product Discovery

Natural products like antibiotics are important hallmarks of medicine but are difficult to discover as native producers are hard to grow in lab settings. Instead, scientists often try to express biosynthesis pathways in easy-to-grow cells like Escherichia coli to discover new natural products, but sometimes these experiments do not work. Cell-free systems could be leveraged for natural-product discovery as they decouple the engineer's objectives from the cell's objectives, allowing direct access to cellular machinery to study biosynthetic pathways. A recent development in cell-free systems is a technique where crude E. coli lysates are used to perform cell-free protein synthesis of biosynthetic enzymes and activation of metabolic pathways in one pot (CFPS-ME). We noticed one-pot CFPS-ME underperforms compared to other cell-free approaches. Thus, we developed a modular two-pot CFPS-ME system. In one pot, cell-free protein-synthesis reactions produce biosynthetic enzymes in vitro, and in a second pot, biosynthetic pathways are assembled using a mix-and-match approach. We optimized reaction conditions in the second pot to account for phosphate inhibition that is observed in one-pot CFPS-ME. We then compare butanol production from a 17-enzymatic-step pathway derived from Clostridium and native E. coli glycolysis in our new two-pot CFPS-ME to other cell-free systems. We observe two-pot CFPS-ME outperforms one-pot CFPS-ME and has similar butanol production rates as cell-free systems without CFPS-ME. We extend two-pot CFPS-ME to look at expression of gut-bacterial natural products. We believe cell-free systems increase the toolkit available for scientists to design, build, and test metabolic pathways and novel natural-product routes.

ഗ്രരു

Karishma Daftary

Faculty Advisor: Edith Chen

Perceived Parent Instrumental Support and Child Asthma Health

A large area of literature has shown the beneficial effects of social support on health across age and demographics. The characteristics of a parent's social network and degree of perceived social support may significantly impact the health of their child. Severity of asthma is an important method of measuring child health outcomes because it is the most prevalent chronic disease in adolescence, has multiple biological and environmental contributors, and may require complex and time-dependent management. A parent's perceived instrumental support has been shown to correlate with child asthma symptom severity. In this study, we aim to further examine the extent to which perceived parent instrumental support affect both self-reported and measured child asthma health. We studied 300 parent-child dyads in which each child had been diagnosed with asthma by a physician. The parents were given a questionnaire that measured their perceived instrumental support in general and as it pertains to caring for their child with asthma. We administered questionnaires concerning the symptom severity of the child's asthma to both the parent and child. Finally, we measured the child's lung function in lab using spirometry techniques.

Raymond Dai

Faculty Advisor: Milan Mrksich

Self-Assembled Monolayer Arrays for the Discovery of Novel Cell Adhesion Ligands

To maintain proper functions, cells must bind to proteins on the extracellular matrix (ECM), an insoluble aggregate of proteins, fibers and proteoglycans. This adhesion anchors the cells to the ECM and provides signaling for proliferation and differentiation. In order to study cell-protein interactions on the surface, proteins must be properly oriented to expose active ligands to the cell receptor. However, a key limitation of traditional methods for studying cell adhesion is the hindered presentation of active ligands due to unfavorable protein orientations. We present a surface-mediate approach using peptides, known to be excellent mimics for proteins in the ECM, to overcome this restraint. The use of self-assembled monolayers (SAMs) of alkanethiolates on gold permits the immobilization of peptide ligands at defined orientations and controlled densities, allowing for the direct presentation of peptides to the surface. With SAM arrays, cell receptors interact directly with the peptides, presenting ideal conditions to study new peptide ligands. In this study, short peptide libraries were immobilized onto SAM surfaces and screened for cell-ligand binding activity. Adherent cells were visualized under fluorescent microscopy to observe adhesion and ligands bound to cells were characterized by MALDI-TOF mass spectrometry. This approach led to positive hits for isoDGR, a known integrin ligand, supporting the continuation of this project and the use of SAMs as an efficient surface-mediated method for studying cell adhesion ligands. Cell adhesion remains a large and active area in cell biology, and our investigations promote the understanding of adhesion-related signaling transduction pathways and cellular processes.

ହ୍ୟ

Yue Wen Deng

Faculty Advisor: Amy Rosenzweig

Characterizing Metalloenzyme Interactions in Biological Methane Oxidation

Due to rising dependence on hydraulic fracturing to extract oil, there is an increased need to develop more sustainable methods to use the natural gas that is co-extracted during fracking. Technologies that convert methane gas into liquid fuel can decrease global methane levels and provide alternative fuel sources, but current industrial processes are limited by the extreme conditions needed to break the C-H bond. Naturally-occurring biological catalysts are especially attractive for methane remediation due to reaction efficiency at ambient temperatures and pressures. The enzyme particulate methane monooxygenase (pMMO), expressed by methanotrophic bacteria, is the main methane oxidation catalyst found in nature. While pMMO has been characterized structurally and biochemically, pMMO in the context of cell metabolism is not well-understood, including its relationship to the next enzyme in the metabolic pathway, methanol dehydrogenase (MDH). To investigate the relationship between pMMO and MDH, a lanthanum-containing MDH was isolated from *Methylomicrobium buryatense* 5G. Biolayer interferometry studies demonstrated protein-protein interaction between pMMO and MDH. Activity assays were performed to probe the possibility of direct electron transfer between MDH and pMMO to drive methane oxidation, but no product was detected. The observed protein binding suggests a connection between MDH and pMMO enzymatic

activity in vivo, but the results of the activity assays suggest this relationship may involve other factors such as the membrane or other proteins. Further structural studies such as x-ray crystallography are needed to elucidate the details of this interaction and to inform the method of electron transfer to pMMO.

ହ୍ୟ

Yasemin Dogruol

Faculty Advisor: Eli J. Finkel

Ego Depletion Replication Study

Self-control has been widely accepted as the "key to success", as it describes the capacity for altering one's own responses in order to bring them in line with social standards, ideals, values, morals, beliefs, expectations and goals. A widespread approach to investigating the effects of self-control is the Limited Resource Model, which describes acts of self-control as a limited, depletable, yet renewable resource just like most biological processes. The model has typically been studied using the sequentialtask paradigm, where participants initially complete a task that depletes mental resources, thereby impeding the performance in a subsequent self-control task, a state known as ego depletion. Although the theory has been well studied, and accepted in various domains, several failed replication efforts followed with a Registered Replication Report null finding, cast doubt on the effect size and the robustness of the theory. The conflicting findings served as a catalyst for the current study, which is part of a pre-registered multi-site replication effort, spearheaded by the leading figures of the ego depletion space, Roy Baumeister and Kathleen Vohs, using their well tested measures. The results from the Northwestern site-which were gathered as part of the author's honors thesis, do not support Baumeister and Vohs' predictions. However, the meta-analytic findings from the multi-site replication effort will be much more reliable for a definite discussion of existence and robustness of the ego depletion effect.

ഗ്രരു

Amy Eckland

Faculty Advisor: Erica M. Hartmann

Antimicrobial resistance in the dust microbiome

Antibiotic resistance is a growing problem in modern medicine; however, the issue is not unique to the medical field. Recent studies suggest that exposure to antimicrobial chemicals, including those in consumer products, is linked to evolution of antimicrobial resistance in environmental microbes. Antimicrobial products are present everywhere from homes and schools to hospitals and athletic facilities. It is thus of interest to determine if indoor microbes are resistant to antimicrobials like triclosan and benzalkonium chloride, which are prevalent in consumer products. This study expands on investigations of antimicrobial resistance in the dust microbiome by determining the resistance profiles of these same microbes. Bacteria cultured from dust collected from athletic facilities were first tested for resistance to the antibiotic clarithromycin. Colonies capable of surviving on clarithromycin were then exposed to each of two antimicrobials – triclosan and benzalkonium chloride – at the

minimum inhibitory concentrations for *Staphylococcus aureus*, commonly found in dust. Multiple samples yielded growth on benzalkonium chloride, while very few samples exhibited the ability to grow on triclosan. These results indicate that bacteria in the dust samples studied have developed antimicrobial resistance, especially to benzalkonium chloride. This supports concerns that the use of antimicrobial chemicals in domestic settings is associated with emergence of resistance in bacteria. This link will be studied further using isolates obtained from the samples to perform PCR analysis of resistance genes.

ନ୍ଧର

Tiffany Fang

Faculty Advisor: Advisor: Jennifer Tackett

Child personality moderates associations between parenting strategies and psychopathology

Negative parenting strategies are a risk factor for many maladaptive youth outcomes, including internalizing and externalizing psychopathology. Personality traits have been identified as a moderator of the association between negative parenting and psychopathology. The current study seeks to replicate previous findings. Participants were mothers of 686 children (53.4% female, M=10.98 years, *SD*=1.36). Mothers reported on their parenting practices, youth personality traits, and youth psychopathology. Results indicated that three child personality traits (neuroticism, agreeableness, and conscientiousness) moderated the relationship between corporal punishment and externalizing psychopathology. Specifically, youth high in neuroticism, low and high in agreeableness and low in conscientiousness showed the highest levels of externalizing psychopathology in the context of corporal punishment. When examining findings across racial/ethnic subgroups, a consistent pattern was found across White, Black, and Latino youth. These results highlight the importance of examining child personality as a moderator of parental influences on psychopathology development.

ହ୍ୟ

Maria Fantozzi

Faculty Advisor: Geraldo Cadava

Bienvenidos a St. Francis of Assisi: Making Chicago's Mexican-American Community, 1945-1961

This research project was undertaken to support an ongoing senior honors thesis in the History Department. It argues that St. Francis of Assisi Catholic Church was the organizing mechanism through which Mexican Americans on the Near West Side of Chicago could establish a unified community and improve their economic, social, and racial position in the city's multi-ethnic hierarchy in the years 1945-1961. This significance of this project is that it brings to light the institutional barriers to social advancement and the conflicted, often unsuccessful, initial attempts by communities of color to combat them. This project primarily used archival source material from the Claretian Missionary Archives of Chicago. The primary sources from these locations included correspondence, minutes of committee meetings, and informal publications. Historical literature, scholarly journals, and dissertations constituted the majority of secondary source literature for this project. These sources

indicated that mid-century conflicts over urban renewal programs brought Mexican Americans into public, city-wide debates for the first time and established the precedent for future civic involvement. This project will not only contribute to the growing body of literature on the Mexican-American experience in the Midwest, but will also redirect attention to the period prior to the Chicano Movement of the 1960's. The Catholic Church, particularly urban neighborhood parishes, had a function and a relevance to the community it served that went far beyond religious services.

ନ୍ଧର୍ୟ

Adam Farsheed

Faculty Advisor: Cheng Sun

3D Printing High-Resolution Bioresorbable Vascular Stents

There have traditionally been two main obstacles surrounding 3D printing technologies: production speed and part quality. The recent development of the Continuous Liquid Interface Production (CLIP) method has successfully alleviated both. Following the same working principle, our research team developed a high-resolution µCLIP method that enables 3D printing of biomedical devices with micron-scale precision. The µCLIP method presents the opportunity for creating patient-specific medical implants at a relatively low cost. In my study, the µCLIP process was used to 3D print bioresorbable vascular stents (BVS), which are a class of implants used within the body to reopen narrowed or obstructed passageways. BVSs were fabricated in 70 minutes in our group's previous work, but they were not biocompatible and required rather large thicknesses (400 µm and higher) to be strong enough for potential use. Due to the inability to load these thick BVSs onto a catheter, the BVSs' thicknesses needed to be reduced to below 200 µm. By optimizing the printer settings and the composition of the bioresorbable ink used for printing, BVSs were successfully fabricated with radial stiffness comparable to the industry standard and with a thickness of 150 µm. Further, the new BVSs are biocompatible and the optimized fabrication speed allows for printing of BVSs within 11.5 minutes. This work validates the possibility for the use of customized, 3D printed vascular stents for patients in emergency settings.

ନ୍ଧର

Jeffrey Frankel

Faculty Advisor: Katherine Amato

Going With Your Gut: How a Study in Wild and Captive Nonhuman Primates Elucidates Evolution of the Human Gut Microbiome

The mammalian gut microbiome is intimately connected to health and disease, and diet is a key mediator in its stability. Most research in microbial ecology focuses on humans and attempting to assign blame to certain microbes that may cause disease in Western, industrialized populations. Many of these diseases are of anthropological importance: obesity, diabetes, autoimmune and inflammatory disease, etc. Studies in nonhuman primates complement this research, given their evolutionary relationships with humans; however, given the dramatic shifts in human diets and activity patterns throughout evolutionary history, host-microbe interactions have likely undergone immense selective pressures to allow for survival of the constantly-transforming human species. Here, it is shown that the alpha diversity of nonhuman primate gut microbiota respond as expected to low-fiber diets in captivity; overall, it decreases, with leaf-eaters being affected the most strongly. However, the gut microbiota of the nonhuman primates respond differently to low-fiber diets in captivity than those of humans in previous research have. Specifically, humans experience increased abundances of Firmicutes and decreased abundances of Bacteroidetes and *Treponema*, while the captive nonhuman primates in this study demonstrated opposite patterns. These results suggest that different populations across evolution of the Primate order—leaf-eating nonhuman primates, omnivorous non-human primates, hunter-gatherer humans, early agriculturalists, and modern, Western populations—may have evolutionary preferences for certain bacteria to be their dominant fiber-processing microbes. Firstly, the data call for a change in diets for captive NHPs, with an attempt to incorporate higher-fiber items to more accurately mimic wild diets. Also, these results augur a potential reclassification of which bacteria are healthy versus unhealthy to possess in the human gut, being more mindful of the selective pressures that may have influenced evolution of the gut microbiome throughout human history.

ନ୍ଧର

Rebecca Fudge

Faculty Advisor: Rexxi D. Prasasya

Investigation of Notch Ligand-Receptor Interactions in Ovarian Granulosa Cells

The mammalian ovary produces fertilizable eggs, or oocytes. Follicles, the functional units of the ovary, consist of an oocyte surrounded by somatic granulosa cells. Notch signaling is a cell signaling pathway that influences the function of ovarian follicles, particularly in the communication between the oocyte and granulosa cells. Notch signaling requires cell-to-cell contact and involves a membranebound ligand and receptor [1]. In the mouse ovary, NOTCH2 and NOTCH3 are the most abundantly expressed receptors, and JAG1 and JAG2 are the most abundantly expressed ligands of Notch signaling [2,3]. This project investigated whether there is a preferential ligand-receptor combination for activation of Notch signaling in granulosa cells, specifically looking at JAG1, JAG2, and NOTCH2. The study was performed using mouse primary granulosa cells that were cultured with immobilized recombinant JAG1 (rJAG1) and recombinant JAG2 (rJAG2). qRT-PCR was used to measure Notch downstream gene expression. A transcriptional reporter assay was also used, in which granulosa cells were transfected with a vector that expresses luciferase under the control of the Notch-responsive promoter. Notch activity could be measured by the luminescence produced following the addition of the luciferase substrate, luciferin. We hypothesized that the more efficient ligand would result in greater increased Notch target gene expression and greater activation of the Notch transcriptional reporter. Both the qRT-PCR results and luciferase assay results suggest that JAG1 is a more efficient ligand at activating Notch signaling in cultured granulosa cells than JAG2.

Isabella Gau

Faculty Advisor: Deyu Fang

The Roles of Hrd1 and Smad7 and Hrd1 and Parp1 in Immunosuppression

Immunotherapy is a promising treatment that uses a patient's own immune system to battle cancer; however, tumors can frequently evade immune detection by associating with immune-suppressing Regulatory T-Cells (Tregs). The objective of this project was to determine the relationship between Hrd1 and Smad7 and Hrd1 and Parp1 in Tregs. These proteins are important because they participate in the TGF- β signaling pathway, which is an important signal transduction pathway that ultimately leads to the development of Tregs and their function. If Hrd1 interacts and ubiquitinates these proteins (targeting them for degradation), more research can be conducted on regulating Hrd1 as a potential target for immunotherapy in the future. The scope of this project was cellular, so all experiments were done using Co-Immunoprecipitation (Co-IP) and Ubiquitination Assays and Western Blotting techniques on transfected 293T cells to determine if the proteins interact and if they are subsequently ubiquitinated. From the Co-IP, it was found that Hrd1 and Parp1 do interact, because there was a band on the immunoprecipitation blot in the Flag-Hrd1 and Parp1 column. The ubiquitination assays also show that Parp1 was ubiquitinated because bands with higher molecular weights (indicating ubiquitin conjugation) were detected on the blot. For Smad7, interaction with Hrd1 and ubiquitination was also seen, but not all of the controls worked, so the relationship between Hrd1 and Smad7 remains inconclusive. The results of this project demonstrate that Parp1 is a substrate for Hrd1, and if Hrd1 could be downregulated, then immunosuppressive activity in Tregs may also be downregulated.

ନ୍ଧର୍ୟ

Barbara Gawin

Faculty Advisor: Yarrow Axford

The Holocene Sedimentary Record of Lake T3 in Southwest Greenland: Timing of Isostatic Emergence and Evidence of Upstream Glacier Fluctuations.

Greenland is an important area of focus in today's warming world because of its potential response to climate change in the near future. In order to understand how glaciated landscapes on Greenland have responded to past climate change, Holocene lake sediment records were obtained from Lake T3, a glacially-fed lake near Tasiusarsuaq Bay in southwest Greenland. The records were analyzed through magnetic susceptibility, loss on ignition, and elemental analysis of carbon and nitrogen in order to determine the timing of the lake's post-glacial isostatic emergence above sea level and evidence of upstream glacier fluctuations during the Holocene. The results indicate that the Lake T3 site was submerged in a marine environment in the late Pleistocene and early Holocene, with a larger than present glacial extent during this time. This was followed by a Holocene Thermal Maximum (HTM) decrease in glacial extent and isostatic rebound, which ultimately caused a transition of Lake T3 from a marine to a lacustrine environment sometime after 10.9 cal ka BP. After the lake's isostatic emergence, glaciers have remained within T3's catchment area throughout the rest of the Holocene with an additional, small increase in glacial extent closer to present day. The data collected in this project will supplement a larger project focused on reconstructing Holocene climate history in southwest Greenland, which will allow current conditions and changes to be put into a longerterm context. These studies will supplement understanding of how this and similar landscapes respond to climate change and thus help predict their future.

ହ୍ୟ

Julian Gerez

Faculty Advisor: Daniel Krcmaric

Civil resistance, armed insurgencies, and government dependence on nontax revenue

Many theories attempt to explain the reasons for the likelihood of a mass group of individuals taking risks and joining armed insurrections. Even with the prevalence and increased attention to nonviolent uprisings, existing research has produced few theories and empirical tests that explain variations in frequency of these campaigns or an explanation for the onset of nonviolent versus violent campaigns. I find that tax revenue lowers the likelihood of the onset of violent campaigns possibly by increasing institutional strength, while dependence on natural resource rents increase the likelihood of the onset of violent campaigns. Perhaps most interestingly, I find that oil revenue decreases the likelihood of nonviolent campaigns, likely though a suppression effect. At the same time, I do not find evidence for the claim that tax revenue increases the total number of protests.

ନ୍ଧର୍ୟ

Ayla Joyce Goktan

Faculty Advisor: Daniel Mroczek

Do Personality Traits Predict Mental Health Care Utilization? Longitudinal Findings from the MIDUS

Previous research suggests an association between health care utilization and personality, but less work exists on mental health care utilization (MHCU). The current study investigated whether the Big 5 traits predicted MHCU concurrently at three measurement occasions and longitudinally at 10- and 20-year follow-ups. Data included 3 waves of the Midlife Development in the United States (MIDUS) study, with 4,658; 2,481; and 1,632 participants. MHCU was measured via participants' self-reported use of medications, professional help, self-help groups, and complementary/alternative medications (CAM). Logistic regression models showed that, after adjusting for demographics and mental illnesses, neuroticism was consistently associated with medication and professional help use. Conscientiousness was associated with lower professional help and self-help use. Openness was associated with CAM utilization. Lastly, high agreeableness and low extraversion were associated with medication use. These results indicate that personality relates to MHCU over time and may inform interventions to increase MHCU among target populations.

Caroline Gold

Faculty Advisor: Dan Lewis

An Ethnographic Review of Excel Academy

Social disadvantages often cluster in low-income, African American neighborhoods. Such disadvantages are capable of inducing trauma among community members, which leads to a number of adverse psychological consequences. Children, whose brains have not yet fully developed, are especially at risk when it comes to these negative effects. In an attempt to remedy these social disparities and better serve children who have experienced trauma, a growing number of schools have adopted trauma-informed approaches to treating problem behaviors. By way of non-participant observations of classrooms at Excel Academy, a therapeutic day school with a trauma-informed approach, this study attempts to better understand the student and teacher behavior patterns that contribute to a student's success or failure. The findings suggest that there exists a spectrum of success at Excel Academy. There are students whose needs are being met, and many others who, for a number of structural and behavioral reasons, Excel Academy seems unable to serve. There also exists a number of students who fall somewhere in the middle. A close analysis of the case studies representative of each place along the spectrum of success leads us to two somewhat contradictory policy implications. Do we need to be more careful and nuanced about whom we serve with this model and how we identify student candidates? Or should we work on implementing practices that better serve a wider variety of students?

ഗ്രര

Gideon Goldberg

Faculty Advisor: Cristina Lafont

A Case For Secession

Independence was the biggest political transition of the 20th century. Nearly 100 new states were established between 1920s and the 1980s. However, this trend stopped short of granting people secession rights – the right of political liberation for a people within an already established state. Many modern state lines were constructed by imperial rulers without concern for different identities on the ground, or by forced circumstances that have changed over time. As a result, secession-aspirations emerge across the world, from California to Scotland, South Sudan, Chechnya, Kosovo, and everywhere in between. Where secession dreams emerge, its also reasonable to expect extreme and dangerous forms of nationalism, so International Law defends a *prima-facia* denial of secession rights. My thesis is to show what type of right the right to self-determination is, and to develop guidelines for the international community to embrace self-determination rights in a way that is maximally consistent with protecting human rights.

୬୦୧୪

Margaret Grasse

Faculty Advisor: Lawrence Henschen

Improved Nightclub Experiences with CALASC (Crowd And Load Aware SmartClub)

We present an implementation of a prototype system that aims at improving the attendee experience in nightclubs. Typically, the cornerstone of entertainment in these venues is a DJ, who is goal is to play music the majority of the crowd likes. To improve the nightclub experience our system actively and passively senses the crowd's emotional response to the current track and, based on this feedback, curates a dynamic set-list to match the crowd's taste. To improve the clubbing experience, we propose the CALASC (Crowd And Load Aware SmartClub) system which: (1) senses crowd feedback using passive methods and (2) uses the collected sentiment data along with machine learning methods to predict which track the crowd would prefer to hear next.

ഗ്രരു

Jeremy Green

Faculty Advisor: Joan Cook-Mills

Serotonin Receptor Regulation of Eosinophil Transendothelial Migration During the Allergic Response

It is estimated that fifty million Americans suffer from allergies. It is imperative that all pathways that function to control allergic responses are thoroughly studied in order to further understand the mechanisms that control allergic reactions. The serotonin-dependent regulatory network is one of those critical pathways. Previous experimentation has demonstrated that 5-hydroxytryptophan (5HTP), a metabolic precursor of serotonin, reduces allergic inflammation by inhibiting eosinophil migration across endothelial monolayers in Murinae mus. Studies have shown that 5HTP inhibition of eosinophil migration is blocked by inhibiting the conversion of 5HTP to serotonin. It is currently unknown if serotonin receptors are involved in mediating 5HTP function. Western blots were performed in order to examine protein expression of serotonin receptors in both endothelial cells and eosinophils. qPCR experiments were conducted in order to quantify mRNA expression of specific serotonin receptor genes and investigate the response of serotonin receptor expression to varying treatments. These experiments indicated that serotonin receptors 1A, 1B, and 3A are expressed by both endothelial cells and eosinophils. Further experiments investigated the function of the expressed serotonin receptors. Migration assays were performed in order to isolate and examine the effects of specific serotonin receptors on eosinophil transendothelial migration in response to different treatments, including serotonin receptor inhibitors. It was shown that specific inhibitors of both serotonin receptors 1A and 1B effectively block 5HTP-mediated inhibition of eosinophil migration. Inhibition of serotonin receptor 3A does not show this abrogating effect. This novel insight provides anew site of potential intervention in allergic and inflammatory responses.

ഗ്രര

Nick Griffiths

Faculty Advisor: Christian Petersen

dachsous restricts brain cell density during regeneration in the planarian Schmidtea mediterranea

The regeneration of missing tissues is a complex process, and relies on coordination between many regulatory systems. Regenerating organs and tissues return to precise proportions with the rest of the body, but this process is incompletely understood. Impressively, the planarian flatworm Schmidtea mediterranea can regenerate any organ or missing tissue. In a functional genetic screen, the gene dachsous (ds) is identified as a key growth regulator during regeneration of the planarian brain. ds is expressed in neurons, and limits brain cell numbers during regeneration, as demonstrated by *in situ* hybridization and quantitative RNA interference experiments. In contrast with other known regulators of brain size, the gene does not affect brain length or antero-posterior patterning. ds controls brain cell density, ensuring that neuronal numbers match the overall size of the brain. Planarians have homologs of Fat, the canonical Dachsous receptor, and Hippo pathway components, which can act downstream of Dachsous and Fat. While Fat homologs fat and fat-like limit brain growth, surprisingly, Hippo pathway homologs salvador and warts promote brain growth. These elements likely act in parallel with genes that pattern the head region, such that anteroposterior patterning regulates the size of a brain region while Dachsous/Fat and Hippo signaling adjust final cell numbers within this region. Research into these pathways-how they interact, how they send and receive information, and how they affect stem cell activity-will increase our understanding of how organ size is regulated during regeneration.

ഗ്രര

William S. Grubbe

Faculty Advisor: Michael C. Jewett

High-yield *E. Coli* Cell-Free Protein Synthesis and Site-Specific Labeling in Human Tyrosine Kinases

Receptor tyrosine kinases (RTKs) are critical proteins involved in cell signaling and communication in eukaryotic cells. In the past decades, compared to mammalian-based protein synthesis platforms, *E. coli* cell-free protein synthesis has demonstrated numerous advantages in protein yield, convenience, function accessibility, and cost in study and in industry. Moreover, our cell-free system allows for efficient non-standard amino acid (nsAA) incorporation into proteins by use of the UAG stop codon. Utilizing out genome-recoded *E. coli* cell-free system, we report the expression of the intracellular domain of EGFR and full-length STAT-1 proteins at >600 ug/mL total protein expression at an appropriate solubility. Additionally, we report the successful incorporation of *p*-Azido-phenylalanine (pAzF) into EGFR, enabling site-specific labeling for use with click chemistry to aid in protein functionalization and targeted drug development. This system will potentially allow the site-specific incorporation of phosphoserine and phosphotyrosine directly into EGFR and STAT-1, which would facilitate the investigation of the role of phosphorylation in gene expression and regulation, cell development, and tumor therapy.

Sunny Ha

Faculty Advisor: Frederick Northrup

Conformation of Chiral Amines

The conformation of a molecule in solution plays a significant role in determining its chemical reactivity and other properties. As many amines are involved in important biochemical reactions, our research has studied solution conformations of chiral tertiary amines with possible intramolecular hydrogen bonding which hinders molecular rotation. The effects of temperature, solvent, and stereochemistry on solution conformation of these molecules have been studied using variable temperature (VT) NMR spectroscopy. Results have shown that NMR spectral features separate into those of multiple stable conformations as temperature is lowered to -50 C indicating hindered rotation of the molecules with different chiral center stereochemistry and for the same molecules in different solvents. Experiments are being conducted to try to explain these observations. These experiments include studies with molecules of different structure to understand the relative contributions of hydrogen bonding and steric effects to the observed hindered rotation. Nuclear Overhauser Enhancement (NOE) NMR experiments have been used to identify the conformers observed at low temperature.

୬୦୧୪

Jenny Halpern

Faculty Advisor: Lilah Shapiro

"It is Who I Am"

This research is an ethnographic study looking at the connection among identity, the body, life story, and dance for professional and pre-professional modern and jazz dancers. Using data gathered from observations and in-depth interviews, I argue that many dancers within the professional dance world view dance as a calling, rather than as a career. Through dance, they form their identities and they structure their lives around their need and ability to dance. It is a primary way through which these men and women communicate with and make meaning of their worlds.

While this research focuses on dancers, the findings contribute to an expanding understanding of the relationship between body and identity, body and work, and work and identity more generally. Because of the highly-embodied nature of dance, the experiences of dancers are able to foreground connections between body and identity and body and work that are less explored and/or latent in the experiences of the population at large. In particular, I found that fear of and/or experiences with ability-altering injury for dancers, even when temporary, produce a deep sense of dislocation resulting both from the inability to work (thus loss of economic livelihood) and a rupture in the sense of self/identity because of the change to the body and loss of sense of purpose. These findings have potential implications in informing productive responses to physical compromise for people both in and well-beyond the dance world. In short, I found that for professional dancers, dance is the guiding force of their lives and dominates their life stories – people do not "dance," they **are** dancers.

Jordan Harrison

Faculty Advisor: John Mordacq

CRIPSR Capsules: Engineering pathways for incorporating functional Cas9 protein into outer membrane vesicles

Antibiotic resistance is a growing predicament in the battle against infectious diseases. Researchers have found promising methods to combat antibiotic resistance by directing Cas9 to cleave resistance genes; however, delivering Cas9 in vivo remains difficult. Current methods of delivering Cas9 plasmids in vivo are limited by expression regulation in recipient cells, and by pathological complications associated with toxic contaminants or harsh administration requirements. My research team aimed to deliver Cas9 protein via bacterial outer membrane vesicles (OMVs), whose delivery selectivity and immunological toxicity can be modified. Unlike other systems delivering Cas9-encoding DNA, this technology will enable the delivery of functional Cas9 protein and will serve as a model whole-protein delivery system for a wide array of applications.

ହ୍ୟ

Celia Hauw and Nonye Ogbuefi

Faculty Advisor: Sandra Waxman

Neural Correlates of the Link Between Language and Thought in Young Infants

To acquire language, infants must first distinguish the sounds of their native language and then ascertain how these sounds are linked to the objects and events they encounter. At 3 and 4 months, listening to both human (speech) and nonhuman primate vocalizations (Madagascar, blue-eyed lemur: *Eulemur macaco flavifrons*) support infants' object categorization, a core cognitive capacity (Ferry, Hespos & Waxman, 2010; 2013). By 6 months, only human speech confers this advantageous effect. Moreover, backward human speech—a sound equally complex to forward human speech—does not have this effect at any age. Here we use EEG to reveal the neural correlates of listening to these three types of sounds. Our results indicate that for 6-month-olds, both lemur vocalizations and backward speech elicit robust P300s in right parietal regions, suggesting that these unfamiliar sounds draw more of infants' attention relative to forward speech. In addition, lemur vocalizations elicit enhanced gamma activation (40-60Hz) in right frontal regions relative to forward or backward speech, suggesting that these sounds are affectively arousing (Muller, Keil, Gruber, & Elbert, 1999). Together, these results suggest that there may be multiple routes by which a signal can support infant cognition.

ഗ്രരു

Tanner Howard

Faculty Advisor: Edward Muir

Sustainability in Freetown Christiania

My research, completed in December 2016, examined the squatter community of Freetown Christiania, located in the heart of Copenhagen since 1971. This radical community, which has sought to live by its anarchist principles, has recently been forced to purchase its land from the government, while maintaining collective ownership of all property so nobody living in the community can sell their homes and leave. My findings spoke to the challenges the community faces, and yet its ongoing vitality in a city that has seen significant changes to its historical traditions of egalitarianism. Specifically, the city of Copenhagen is seeing the same forces of gentrification raise the cost of living for its residents, making it more difficult for working-class and immigrant communities to succeed in the city. Christiania's unique model is a direct challenge to this vision of land ownership. By keeping the land in collective ownership, and asking residents to pay per square meter for their homes, residents consistently pay hundreds of dollars less per month than the average Copenhagen resident, for a home in a central location in the city. The community's biggest challenge is maintaining itself and bringing in new residents, because they have not been allowed to build new homes since the 1990s. Without new residents, the community struggles to keep a lively energy, and as a political project many residents suggest the community is "tired." Still, the significance of the community is still apparent, and their efforts suggest that a better world is still possible.

ହ୍ୟ

Yue Hu

Faculty Advisors: Ohad Perry, Jing Dong

Fluid Approximations and Limit Theorems for Polling Systems with Non-Zero Switch-Over Time

Polling systems refer to queueing networks in which multiple working stations share one single source of service. The server can serve at most one queue at a time, and incurs a switch-over period each time it switches from one station to another. Such systems with multiple queues and one switching server are applicable to a variety of applications in areas of computer and communication, production, and transportation. Due to the difficulty in explicit mathematical analyses, one naturally resorts to the asymptotic (limiting) estimates of polling systems under proper scaling.

Our work complements the asymptotic analysis of polling systems under heavy-switch-over scaling, i.e., as switch-over time is sent to infinity. We study a symmetric polling system with two queues, where the arrivals follow independent Poisson processes. Service durations are exponentially distributed and switch-over times are held constant. We begin by defining a fluid model, in which the arrivals and service completions occur continuously at deterministic rates. The fluid model is shown to have a unique periodic equilibrium, which can be approached within finite time independent of initial conditions. We next find that the fluid process is indeed the fluid limit, namely, a Functional Strong Law of Large Numbers (FSLLN) of a sequence of scaled stochastic systems to the fluid model. The fluid limit provides insights for systems with moderate switch-over times, and is used to optimize

over a certain class of service policies. Finally, we conduct simulation experiments to study the approximation accuracy of the fluid model to the stochastic system.

ନ୍ଧର

David Huang

Faculty Advisor: Claudia Haase

Positive Emotions in Response to an Affiliation Film Clip: Associations with Well-Being

Positive emotions have long been linked to happiness and health. However, we know little about whether responding with positive emotions has differential associations with well-being depending on the social context in which they are elicited. The present study examined whether higher levels of positive (but not negative) emotions in response to an affiliation (but not power) film clip would predict higher levels of well-being. The sample viewed an affiliation film clip from the film, "Love Actually," which included a montage of scenes with families, friends, and couples reuniting and a power film clip from the film "Braveheart," which showed a leader preparing soldiers for battle. At baseline and after each film clip, individuals reported on their emotional experiences. We averaged across emotion items to derive measures of positive emotion (e.g., amusement, contentment) and negative emotion (e.g., anger, fear). Well-being (e.g., positive affect, negative affect) was measured using established questionnaires. For each film clip, the six well-being outcomes were regressed on the emotional response (positive or negative), age, their interaction, gender, and baseline emotion (reported prior to the film clip). Results showed that positive emotional reactivity in response to the affiliation film clip positively predicted positive affect (p = .02) and extraversion (p = .003). These findings generalized across age and were specific to positive emotional reactivity, positive aspects of well-being and the affiliation film clip. Altogether, results emphasize the role that positive emotions play in our well-being and highlight the importance of social context in which these positive emotions emerge.

ହ୍ୟ

Alexandra Huffman

Faculty Advisor: Laura B. Ramsey

The influence of SLCO1B1 functional variants on the uptake of simvastatin

SLCO1B1 is a gene encoding a transporter that moves drugs and organic compounds into the liver, where they are metabolized. Exploring the effect of *SLCO1B1* genetic variants on the transport of drugs can help determine optimal dosing, based on both effectiveness and side effects. Pharmacogenetic nomenclature uses star (*) alleles to indicate the presence of one or more variants in a gene. Simvastatin, a cholesterol-lowering drug that is known to cause myopathy in some patients, is taken up by the *SLCO1B1* transporter. Testing the transport of simvastatin by the *SLCO1B1* alleles that have reduced (*5, *15, *23, *31) or increased (*14, *35) transport of other drugs compared to the wildtype (*1a and *1b) can be used to determine optimal dosing. We cultured *SLCO1B1*-expressing HEK293 cells with radioactively-labelled simvastatin and compared the amount of radiation taken up by cell lines expressing each allele to that of the wildtype cell lines and a cell line that didn't express

the gene at all (vector control). The data suggest that the *5, *15, *23 and *31 alleles have reduced transport of simvastatin and the *1*b*, *14, and *35 alleles have transport at least as good as *1*a*. There are already guidelines for genetically guided dosing of simvastatin based on *SLCO1B1* genetic variants to avoid myopathy; this evidence supports additional research into the effects of additional alleles on myopathy, which may warrant the inclusion of these alleles in the guideline.

ഗ്രര

Justine Hung

Faculty Advisor: Wyndham Lathem

Differences in Substrate Cleavage Efficiency by Ancient versus Modern Yersinia pestis

The plague is a disease that is infamous for killing millions of people, and today, the World Health Organization classifies the plague as a reemerging disease. While the plague is treatable with antibiotics, the quick progression of the disease is a challenge in areas with little access to medicine. The goal for researchers is determining the mechanism behind how the plague rapidly infects and eventually develop a way to prevent individuals from being infected by the plague. Yersinia pestis is the bacteria known for causing the plague, and pla is the protein made by Y. pestis that causes infection. The goal for this summer was to compare pla in Yersinia pestis to pla in an ancient form of Y. pestis called Yersinia pseudotuberculosis that is rarely lethal and causes stomach flu-like symptoms. The aspect of pla function studied over the summer was its ability to cleave its known substrates CRAMP, PAI-1, Plasminogen, A2AP, and Prdx6. Based on previous papers testing the impact of each of these substrates on infection, the substrates shown to play a significant role in infection were cleaved more efficiently by Y. pestis. The substrates that did not significantly impact infection were cleaved more efficiently by Y. pseudotuberculosis. This implicates that the cleavage ability of pla in Y. pestis evolved to become more efficient in cleaving substrates that promoted infection. In the future, tests can be done to determine if substrate cleavage directly impacts infection and identify potential targets for preventative treatment of the plague.

ନ୍ଧର୍ୟ

Stephen Hynes

Faculty Advisor: Noshir Contractor

Quantitative Network Analysis of Seventeenth and Eighteenth Century Diplomatic Networks

A major thread of international relations research theorizes the links between political networks and the proclivity for interstate cooperation and conflict. While there is much conjecture regarding these links, there are relatively few attempts to formalize the theory, particularly for historic settings where empirical data is scarce. For this project, we collected and digitized over 19,000 of diplomatic missions between various states and localities in Western Europe from 1648 to 1815. This data was used to construct networks of states and their diplomatic activity over 25-year intervals. We investigate modes of diplomatic activity via the network structures they create. Individual, pairwise, and collective patterns of diplomacy were modeled in terms of the nodal, dyadic, and triadic structures found in the network. The statistical distribution of these network structures was evaluated using exponential random graph models. The results show an unequal distribution of diplomatic activity between states. States had a strong tendency to reciprocate diplomatic ties and form diplomatic clusters. These factors as well as the propensity for states to have few diplomatic ties suggest that diplomatic activity stabilized in regional patterns. Despite the consolidation and expansion of states that occurs, the overall structure of the network stabilized. This project demonstrates that quantitative network analysis can complement traditional historical methods of studying interstate relations.

ନ୍ଧର୍ୟ

Megan Imundo

Faculty Advisor: Renee Engeln

College Students' Imagined Lives: Gender Differences in Emphasis on Life Domains

According to Objectification Theory, women face greater pressure to monitor and alter their appearance, requiring time, money, and energy that may detract from other goals. To test whether women might be willing to sacrifice success in some areas of their lives in exchange for greater "appearance success," this study examined gender differences in willingness to allocate hypothetical resources to appearance vs. other life domains. Consistent with sociocultural theories, we predicted that women would emphasize appearance domains, particularly when young, and men would emphasize wealth and intellect. College students divided 100 "life points" (represented with poker chips) into jars labeled with different domains: Mental Health, Face/Hair Attractiveness, Intellect/Knowledge, Wealth, Body Attractiveness, Close Relationships, and Bodily Health. Participants created their ideal life for their current age, then for 10 years in the future, then 30 years in the future. More points given to a life domain indicated they would be more satisfied with that area. Chips allocated to Intellect/Knowledge and Body Attractiveness decreased over imagined time period, though men consistently placed more chips Intellect/Knowledge and women placed more chips in Body Attractiveness. Other domains showed only a significant effect of time period. Surprisingly, women did not emphasize Face/Hair Attractiveness more than men at any time point. While the effect of intellect was as predicted, wealth showed only an effect of time period. Overall, the pattern highlighted gender similarities over differences. Time analyses were also often unexpected, suggesting future research into how young people imagine their life priorities will change over time.

ନ୍ଧର

Mable Je and Olivia Shay

Faculty Advisor: Claudia M. Haase

Negative Emotions during Marital Conflict and Child Problem Behaviors

Marital conflict often permeates into family life, parent-child relations, and child behavior. Specifically, negativity between spouses can profoundly impact children's development across psychosocial, educational, and health domains. There has been limited work examining the association between spouses' emotions during actual marital conflict and child outcomes. The present laboratory-based study examined associations between spouses' negative emotion during marital conflict and their

child's externalizing and internalizing problem behaviors. We hypothesized that children of couples who experience more negative emotions (i.e., anger, fear, sadness) during marital conflict would engage in more internalizing (i.e., anxious/depressed, withdrawn/depressed, somatic complaints) and externalizing (i.e., aggressive, rule-breaking) problem behavior compared to children of couples who experience less negative emotions. Results showed that greater sadness experienced by mothers after a marital conflict conversation was associated with greater internalizing problem behaviors in children (r=.401, p=.026). These results were specific to sadness (not found for anger and fear) during marital conflict, to children's internalizing problem behavior (not found for externalizing problem behavior), and to mothers (not found for fathers). The results remained stable when controlling for income and when a log transformation was performed on the problem behavior data to account for positive skew. In sum, significant associations were found between mothers' sadness during marital conflict and internalizing problem behavior in their children. These results call for further investigation into the role that parental emotions during marital conflict, particularly mothers' emotions, play in children's problem behavior and psychosocial development.

ഗ്രരു

Sarah Johnson

Faculty Advisor: Renee Engeln

Function Over Form: A Novel Body Image Program Focused on Body Functionality

Women's dissatisfaction with their bodies has become so second nature that it has been described as normative discontent (Rodin et al., 1984). Body dissatisfaction is particularly prevalent among young women, with rates as high as 80-90 percent reported for college women (Runfola et al., 2012). Additionally, many studies have demonstrated that women in sororities are more likely to suffer from body image disturbance compared to women not in sororities. One method of combatting body dissatisfaction is viewing one's body from a body functionality perspective, which emphasizes what the body can do rather than how it looks. This study assessed the effectiveness of a week-long education program for sorority women focused on body functionality. The education program consisted of three components: an initial presentation introducing body functionality, signs posted in various areas of the sorority house, and daily interactive posters. To assess the effectiveness of the program, data assessing body image was collected three days before the education program, the day after the program ended, and a week after the end of the program. Seventy women living in on-campus sorority housing participated in the education program, and an additional fifty-two sorority women served as a control group (i.e., they took the surveys but did not participate in the program). The program did not significantly improve women's body dissatisfaction, body appreciation, body surveillance, eating attitudes and behaviors, or fat talk. Future research should include a larger sample to assess if body functionality is an effective means of improving women's body image.

୬୦୧୪

Finote Aster Gijsman Kelemu

Faculty Advisor: Pati Vitt

Lifetime Fitness Analysis of Threatened *Cirsium pitcheri* in *Larinus planus* Infected Environments

Cirsium pitcheri (Pitcher's thistle) is a federally-listed, threatened thistle species endemic to the Great Lakes region. Its threatened status derives from its declining population as a result of lake level fluctuations, seed predation by a non-native weevil, Larinus planus, and human disturbances. The successful restoration and preservation of this threatened thistle is therefore dependent on a deeper understanding of its habitat, reproductive biology, and seedling ecology to ensure the success of evidence-based management in the future. A study analyzing the reproductive success of flowering plants at two study sites in Door County, Wisconsin - the Whitefish Dunes State Park and the Ship Canal Nature Preserve, was conducted with the aim of understanding the nature of C. pitcheri's reproduction in different dune environments and analyzing the impacts of the non-native weevil on seed production. Individual flower heads were wrapped towards the end of flowering to retain seeds and collected for seed counts. The results of this study demonstrated that mature seed production and seed abortion significantly differed between the study sites, with Larinus planus considerably affecting the number of mature seeds being produced at the Whitefish Dunes State Park. The most remarkable of these results, however, were the differences in seed production and seed abortion by flower head position at each site. This in turn indicates that flowering plants at both study sites are attempting to maximize their efforts by allocating their resources to specific flower heads on the plant.

ନ୍ଧର୍ୟ

Tyler A. Kramlich

Faculty Advisor: Chris Mercer

The survival, transmission and adaptation of Lan Na music in Northern Thailand, in spite of surrounding cultural shifts.

The city of Chiang Mai was established in 1296 as the capital of the Lan Na kingdom which is located in the mountainous regions of northern Thailand and extended into China, Laos, and Myanmar. Although today it is part of the country of Thailand, it has retained many unique cultural traditions including its own folk music — Lan Na music. The purpose of this research project was to discover the key to the preservation and transmission of Lan Na music. In order to answer this question, the author conducted the following research: read different text sources about Lan Na music, interviewed multiple Lan Na music teachers, visited different performance venues where Lan Na music has an audience, and took lessons from a Lan Na instructor two days a week to learn about various Lan Na instruments, written notation and the heterophonic performance style. The findings of this research indicated that there are four main reasons for the survival of Lan Na music in modern-day Thai society.

- 1. Tourism (Provides performance venues for a majority *farang (foreigner)* and Chinese audience)
- 2. Education (Universities and Schools provide both lessons and performance venues for students).

- 3. Khru Add (An influential Lan Na teacher and nationally-recognized performer)
- 4. Lan Na Wisdoms School (A non-profit dedicated to keeping Lan Na traditions alive in Chiang Mai).

Despite the successes Lan Na musical traditions have had in Thailand, organizations and individuals are still fighting for its survival today with little resources, leaving its future uncertain.

ഗ്രരു

Dashia Kwok

Faculty Advisor: Ellen Wartella

Calories in your Console? A Content Analysis of Food and Other Marketing in Children's Video Games

The marketing of unhealthy foods to children contributes to the childhood obesity crisis (Institute of Medicine, 2006). In 2006, America's leading food and beverage manufacturers pledged to avoid marketing unhealthy foods in media (e.g., video games) primarily directed at children under 12 as part of the Children's Food and Beverage Initiative (CFBAI) (Better Business Bureau, 2014). Relative to other media platforms, marketing in video games has not been the subject of much academic research; therefore, it is unclear the extent to which marketers are adhering to their pledges about videos games. In this study, I examined seventeen of Toys R Us's top selling video games, coding each for target audience (child-targeted vs. family friendly), genre (e.g., sports; simulation), and nature of marketing. I found marketing in general is present only in family-friendly games targeting multiple generations, typically in sports games. No marketing was present in games solely targeting children. Seventeen instances of food marketing were found in three games, none of which adhered to CFBAI's nutritional requirements. Food marketing tended to be featured in more active ways than marketing for other products (e.g., characters drinking Gatorade vs. a background marketing billboard). These results present a complicated picture. Food marketers are abiding by CFBAI guidelines and refraining from engaging in purely child-directed marketing. However, given that large numbers of children are consuming family-friendly games, stricter pledges or more formal governmental regulation may be needed as this marketing can have a negative impact on children's food preferences.

ହ୍ୟ

Amanda Leung

Faculty Advisor: Tiffany Schmidt

Visual acuity of GABAergic retinal ganglion cells

Light is known to be an important regulator of subconscious behavioral process including circadian photoentrainment, pupillary light reflex and the direct modulation of mood. There are three known photoreceptors that detect light in the mammalian retina: rods, cones and the recently discovered intrinsically sensitive retinal ganglion cells (ipRGCs). ipRGCs take light input and relay the information through an intrinsic, melanopsin-based phototransduction cascade and innervate to visual areas of the brain. Currently, ipRGCs are believed to release only excitatory neurotransmitter

glutamate. However, recent findings from our lab suggest that ipRGCs and cRGCs also release the inhibitory neurotransmitter GABA at their postsynaptic targets in the brain. GABAergic RGCs have shown projections to the brain areas that involve optokinetic tracking, the nucleus of the optic tract (NOT) and the medial terminal nucleus (MT). To determine the significance of GABAergic signaling by RGCs for visual behavior, I am using optokinetic tracking to test the visual acuity in mouse models with loss of GABA release in ipRGCs or cRGCs. We predict that mice lacking GABA function in ipRGCs and/or cRGCs will have altered visual acuity.

ഇരു

Amy Lieberman

Faculty Advisor: Vijay Mittal

Voice-pitch Perturbation in Non-clinical Psychosis Population

When confronted with auditory feedback paradigms such as voice-pitch tasks, individuals hear the pitch of their own voice electronically altered. Normally, individuals compensate by either lowering or raising their pitch in the opposite direction, demonstrating intact communication between relevant neurological regions governing the integration of auditory input and vocal motor output. Given that individuals along the psychosis continuum exhibit deficits in these processes, this paradigm, which is highly sensitive to abnormal integration, has significant promise for detecting vulnerability. The present study recruited 100 community individuals across quartiles of self-reported non-clinical psychosis (NCP) symptoms to complete a voice-pitch task. This population represents otherwise healthy individuals who endorse occasional psychotic-like experiences and may provide invaluable etiological insight. We predict that those who score higher NCP symptoms will exhibit more difficulties differentiating between changing pitches, demonstrated behaviorally by less vocal compensation and motor control of their voice. Understanding underlying mechanisms of auditory feedback processes in the NCP population may identify an important biomarker related to motor control and may improve our understanding of the pathogenesis of psychosis.

ନ୍ଧର୍ୟ

Rachel Lin

Faculty Advisor: Karen Smilowitz

Data Analytics in a Marathon Setting: Medical Volunteer Recruitment and Corral Assignment

In addition to unique tests of athlete endurance, marathons are notable logistical challenges for race organizers. During the months leading up to the race, organizers for the Bank of America Chicago Marathon process runner registration and assign start corrals for over 40 thousand runners. In addition, thousands of general and medical volunteers are recruited for the annual event. On race day, the medical team sees over 2 thousand patients for a wide range of conditions. Many key decisions are made months before the event, when factors involving race day conditions and participant behavior are unknown. Drawing upon available data can inform operational decisions for the Chicago Marathon and other races of similar size. Many of these events currently make

concerted efforts to collect data, such as recording the patient load throughout the race. Using 2013-2016 Chicago Marathon aid station records, patient arrival rates and visit behavior were determined for each of the 20 aid stations along the race course. A discrete event simulation then tested aid station performance at various staffing levels. The results suggest that the number of medical professional volunteers needed along the course more closely follow a bell curve than the increasing trend used in current recruitment targets. Next, K-means clustering on 2015-2016 Chicago Marathon finisher data determined 10 distinct groups of runners based on race characteristics such as average speed. Incorporating the clustering results in start corral assignments can aid race organizers in making accurate predictions regarding the flow of runners throughout the race.

ഗ്രരു

Patrick Z. Liu

Faculty Advisor: John F. Marko

Nuclear Blebbing Solely as a Function of Chromatin Compaction State

The nucleus houses the genome and is critical for regulating its functional organization. Classically, in mammalian nuclei, the compact, transcriptionally silent heterochromatin is docked to the lamina network at the periphery, thereby providing mechanical support to the nucleus. In many human diseases, such as progeria, cancers, and muscular dystrophies, nuclear morphology becomes severely altered and demonstrates blebbing as a result of impaired nuclear rigidity stemming from disruptions to chromatin compaction and lamina content. To elucidate chromatin's individual role in contributing to the formation of pathologically misshapen nuclei, we show that decompacting chromatin via histone deacetylase inhibitor (HDACi) treatment alone is sufficient to induce nuclear blebbing. Through immunofluorescence imaging via confocal microscopy, we demonstrate that treating mouse embryonic fibroblasts with HDACi decompacts chromatin, relocates euchromatin to the periphery, and causes blebbing independent of disruptions to the lamina or actin network. Moreover, the divalent ion magnesium is known to compact chromatin. In accordance with this, we found that increasing extracellular magnesium chloride concentrations rescues nuclear blebbing in a dose-dependent manner, restores heterochromatin signal at the periphery, and significantly increases the heterochromatin signal histone H3 lysine 27 tri-methyl. Moreover, nuclear morphology in HeLa cells expressing progerin, a mutated form of lamin A present in progeria that causes severe nuclear deformities, was also rescued via magnesium chloride treatment. Thus, nuclear blebbing can both be induced and suppressed through solely altering chromatin compaction states. Similarly, a pathological phenotype that stems from a lamina mutation can be rescued through the same chromatin mechanism, thereby suggesting a significant role of chromatin in disease and providing a potential therapeutic target.

୬୦୧୪

Yingchong Liu

Faculty Advisor: Francesca Tataranni

Roman imperium and Chinese tianxia: a Cross-Cultural Approach to Roman Studies

Ancient empires have once again seized our attention in the context of current international affairs. Politicians, journalists, and scholars have often adopted the language and imagery of the great empires of the past to illuminate and discuss the nature of today's rapidly changing geopolitical relations. This project investigates the idea of an "empire" with regard to ancient Rome and early imperial China. The goal of this project is to raise questions on the nature, origins, and legitimization of imperial power in the two cultures. What was the basis for their imperial rule? How were the empire-builders able to justify and institutionalize their power? Scholars of ancient Rome have addressed these questions since the beginnings of modern classical scholarship. The vast, often contradicting array of answers can be disorienting at times. In order to overcome this impasse, I posed the same questions in relation to an empire comparable to ancient Rome in terms of territorial expansion and legacy-early imperial China. I relied on historiography, philosophy, epic poetry and other relevant prose texts to search for answers in both Latin and Chinese literature. Investigating similar concepts in the context of the foundation of the Chinese empire was particularly illuminating. For instance, the territorial connotation of *tianxia* has shed light on the evolution of imperium from an abstract Roman magisterial power to a physical entity-one that corresponds to its modern day English derivative "empire". The study of early imperial China offered a new approach to old queries in Roman studies.

ହ୍ୟ

Colin F. Lynch

Faculty Advisor: Thomas J. Meade

Development of Gd(III)-Based Magnetic Resonance Agents for Molecular Imaging of Hydrogen Peroxide and Hypoxic Tumor Conditions

Magnetic resonance (MR) imaging is a valuable diagnostic tool for detailed analysis of anatomy and tissue structure. Our objective is to use MR imaging to analyze both anatomy and underlying biochemistry, enabling *in vivo* analysis of molecular mechanisms of disease. In order to achieve this goal, paramagnetic gadolinium-(III) complexes have been synthesized that 'turn on' in response to biological targets of interest. These probes modulate the coordination of the local water molecules by the Gd(III) center in response to stimuli, 'turning on' the probes' effect on local MR signal.¹ We present a Gd(III)-based MR contrast agent which activates via oxidation of a boronic acid group in response to hydrogen peroxide (H₂O₂), an important cell signaling molecule that has been implicated in numerous disease processes.² In HeLa cells, treatment with 10 equivalents of H₂O₂ *produced* a detectable increase in contrast. These *in vitro* results show promise for molecular imaging of H₂O₂ *in vivo*. Additionally, we present the synthesis of an indolequinone-functionalized Gd(III) complex. In a reductive environment, a hallmark of hypoxic tumors, we believe that the indolequinone moiety will eliminate and enable water coordination, activating the agent. Moreover, the elimination will release a small molecule that has been shown to have chemotherapeutic properties, meaning the agent could function as a theranostic for hypoxic cancers.³ Our activation strategy allows for incorporation of

various bioresponsive moieties, potentially opening the door to non-invasive, *in vivo* analysis of biochemical disease pathology with MR imaging.

୬୦୧୪

Jo Machesky

Faculty Advisor: Franz Geiger

Alteration of membrane compositional asymmetry by LiCoO₂ nanosheets

Given the projected massive presence of redox-active nanomaterials in the next generation of consumer electronics and electric vehicle batteries, they are likely to eventually come in contact with cell membranes, with biological consequences that are currently not known. Here, we present nonlinear optical studies to address the role of ion dissolution from the nanoscale redox active materials. Our results indicate that while LiCoO₂ nanosheets having positive ζ -potentials induce changes in lipid alignment and interleaflet composition in supported lipid bilayers formed from zwitterionic and anionic lipids, aqueous Li⁺ and Co²⁺ ions alone alter the compositional asymmetry of the two membrane leaflets at 10 times higher concentrations than those that are released from LiCoO₂ nanosheets in bulk solution. This finding provides an estimate for the dissolved ion concentration in the bilayer-nanosheet gap. The insight that LiCoO₂ nanosheets induce alterations to the compositional asymmetry in idealized model membranes through an ion dissolution mechanism may represent an important step towards designing new materials with reduced environmental impacts.

ഗ്രര

Bomani McClendon and Sameer Srivastava

Faculty Advisor: Haoqi Zhang

Scaffolding Research Training and Skill-Development in Design-Based Undergraduate Research with Computer-based Guidance Systems

This research focuses on developing socio-technical systems that teaches novice researchers an iterative approach to design-based research by using a set of computer-based learning interfaces. The motivation behind this work is to help novices make significant research progress quicker because novices typically have great difficulty making research contributions.

In particular, the system uses *instructional slicing* – splitting teaching concepts to match student competencies – to help teach critical research skills opportunistically to beginner, intermediate, and advanced undergraduate researchers. The key component of this system is the "Knowledge Map," a research model of a novice researcher's learnings in their research space. The representation of the Knowledge Map becomes more complex as the novice researcher gains more research skills and our system uses instructional slicing to scaffold novices through this complexity. This allows novice researchers to not only work within their own abilities, but also contribute research value consistently. The system is currently being tested with novice researchers in the Delta Lab at Northwestern. As a potential implication of this work, many more novices could engage in meaningful design-based

research than before, contributing more novel work to their research domains. More generally, it may provide insight on how to scale self-directed project-based learning in other domains.

ഗ്രരു

Eric J. Mercadante

Faculty Advisor: Jennifer L. Tackett

Social Dominance and the 5-Factor Model: Do different measures lead to different results?

Social dominance refers to an individual's preference for and ability to achieve social prominence and control resource distribution within a group. Social dominance emerges in early childhood immediately affecting children's social environment in both positive and negative ways, so understanding socially dominant behavior early on allows for appropriate and effective intervention. When studying social dominance in children, researchers typically use observational methods or ratings from others, but very little research uses implicit measurement. In the present study, the association of social dominance with the five-factor model of personality was examined in 631 children between the ages of 8 and 12 using two methods: an established parent-report scale and a novel, implicit language analysis tool. Results indicated no significant correlations between scores on the language analysis tool and any of the five factor personality traits. Regarding the parent-report scale, results indicated a positive association with neuroticism and openness and a negative association with agreeableness. This significant break from the existing social dominance literature has many implications concerning differences in methodologies in this field and the necessity for continued study of social dominance in children.

ഗ്രര

Gregory Mulderink

Faculty Advisor: Mark Hersam

Nitrogen Doping of Few-Layer Black Phosphorus Flakes

Two-dimensional materials are a hot topic in current electronic materials research. They represent an opportunity for gains in performance in conjunction with novel devices and structures. One such material is black phosphorus, which possesses a thickness varying band gap and mobility, as well as a natural p-type doping. These properties can be utilized to construct a wide variety of unique devices. However, the creation of traditional p-n homojunctions is limited by the current inability to n-type dope black phosphorus. By bombarding black phosphorus with nitrogen plasma, I have been able to demonstrate a nitrogen presence using XPS, and show a duration-based signal response. I have also confirmed using AFM that the plasma is nondestructive (in contrast to other techniques utilizing plasma and black phosphorus). This technique shows promise for further electronic characterization, and is a swift and simple method to introduce nitrogen into few layer black phosphorus flakes.

Katelyn Noronha

Faculty Advisor: Tiffany Schmidt

Melanopsin expression is dynamically regulated during retinal development

In addition to rod and cone photoreceptors of the retina, intrinsically photosensitive retinal ganglion cells (ipRGCs) constitute a third class of inner retinal photoreceptors that play roles in image and nonimage forming vision. ipRGCs express melanopsin, a photopigment that renders them intrinsically photosensitive. Each of the five ipRGC subtypes (M1 to M5) express different levels of melanopsin in adult retinas, with M1 ipRGCs expressing the most and M4 and M5 ipRGCs expressing the least. Additionally, M1 ipRGCs have been found to express two isoforms (Opn4S and Opn4L) of the melanopsin protein, while all other subtypes express one (Opn4L). However, how ipRGCs regulate both melanopsin levels and melanopsin isoforms is unknown. We examined melanopsin expression levels in ipRGC subtypes across development to investigate melanopsin regulation. We assessed ipRGC number in mouse lines where different complements of the ipRGC subtypes can be immunolabeled in adulthood (Opn4Cre, Opn4-GFP, and Opn4LacZ). We counted total number of ipRGCs in the retina at various postnatal time points. We further examined melanopsin labeling patterns of M4 ipRGCs in different regions of the retina during development. We used quantitative real-time PCR to detect changes in melanopsin expression and melanopsin isoform expression in the retina during development and adulthood. Unexpectedly, we found that M4 ipRGCs express higher levels of melanopsin in development than in adulthood. qPCR results indicate total melanopsin RNA levels and melanopsin isoform RNA levels fluctuate across development before eventually settling at adult levels. Our data suggest that ipRGC subtypes dynamically regulate melanopsin expression.

ഗ്രര

Samantha Oberman

Faculty Advisor: Terri Sabol

Teacher Quality Assessment Across the Academic Year

Teacher-student interaction is a critical factor in positive student outcomes, however teacher quality historically has been assessed at one point time. Assessing teachers once does not account for the variability in teacher quality across the academic year. The NCRECE Professional Development Study provided a data set, which included multiple observations across the school year, to more fully understand a teacher's trajectory. Teachers sent in 30-minute videos of instruction throughout the year. Videos were coded for teacher quality using the Classroom Assessment Scoring SystemTM (CLASSTM), which assesses teacher-student interactions housed in three subscales: emotional support, classroom organization, and instructional support. In addition, teacher characteristics, such as professional demographics, and psychological characteristics, are analyzed to assess other factors that may affect this trajectory. This data set allows us to analyze the teacher-quality trajectory to provide insight into the child's full experience, as well as the times in the year where teachers could benefit from professional development training. It also aims to understand how classroom factors, family characteristics, center type, and teacher characteristics affect teacher quality over the course of the year. Further research could investigate factors as to why dips in teacher quality occur and the affect this has on students.

Jaclyn Pachicano

Faculty Advisor: Claudia Haase

Associations between Relational Pronouns during Marital Conflict and Marital Satisfaction

How spouses navigate marital conflict has profound consequences for marital satisfaction. Studies show that a collaborative approach in which couples view issues as a "we" problem instead of a "you or me" problem predicts relationship satisfaction. Analyzing couples' language and use of relational pronouns effectively probes how spouses handle marital conflict. Few studies have examined how the use of specific relational pronouns during marital conflict relates to marital satisfaction. In this study, we examined how husbands' and wives' use of communal pronouns and individualistic pronouns during a marital conflict conversation predicted marital satisfaction. We hypothesized that more frequent use of "We" words by either spouse would predict greater marital satisfaction. The sample consisted of 27 married couples who engaged in a conversation about a topic of disagreement. Conversations were recorded, transcribed, and analyzed. Dictionaries consisted of two categories of first-person pronouns to determine the usage of communal and individualistic pronouns by each spouse. The relative frequency of each type of pronoun was then calculated by dividing the amount of "We," "I," and "You" pronouns by the total number of words for each spouse. Marital satisfaction was assessed using the Marital Adjustment Test. Correlation analyses showed that husbands using more communal pronouns (i.e., "We" words) during the experiment had greater marital satisfaction. However, the use of communal pronouns was not associated with increased marital satisfaction for wives. No associations were found between the use of individualistic pronouns and marital satisfaction for either husbands or wives. These findings show that when husbands use communal language during marital conflict and talk about the couple as a unit, they have higher levels of marital satisfaction. Future research may probe links between spouses' pronoun use and emotional functioning (e.g., emotional experience, behavior, physiology) during marital conflict to (1) identify underlying mechanisms that drive associations with marital satisfaction and (2) understand why associations are specific to husbands and not found for wives.

ନ୍ଧର

Jay Park

Faculty Advisor: Galen Bodenhausen

Social Identity Complexity and Intergroup Attitude

People who perceive their social identities as more complexly related to each other tend to be more tolerant toward a variety of outgroups. However, this relationship between *social identity complexity* (SIC) and tolerance has only been shown in correlational data. We experimentally manipulated whether people wrote about their social identities in a complex way or in a simplistic way in order to determine whether this relationship is causal—an aim that may be of particular importance for developing short-term, low-cost interventions that can improve intergroup relations. In the high-SIC condition, participants reflected on how their social identities could be construed as similar to one another, or as different from one other, depending on the frame of reference. In the low-SIC condition, participants wrote about how they were similar to others with their same social identities, yet different from others who possess different social identities. Then we measured their explicit and implicit attitudes toward

various marginalized groups. To our surprise, individuals in the low-SIC condition and individuals in the high-SIC condition did not significantly differ from each other on the majority of our outcome variables. Thus, we did not find support for our prediction that people in the high-SIC condition would be more tolerant than those in the low-SIC condition. Our results suggest that further research needs to be conducted in order to investigate the influence of social identity complexity on people's attitudes toward different social groups. In particular, different approaches to manipulating people's social identity should be tested.

ନ୍ଧର

Ali Pelczar

Faculty Advisor: Anthony Chen

The Relationship Between Career Identity and Persistence in Postsecondary Education Among Low-Income Mothers

As the graduation rates of nontraditional students remain low, identifying predictors of persistence remains important so that effective interventions and policy changes can be implemented. Longitudinal interview data from a sample of low-income mothers with young children, most of whom are pursuing education in the health care sector, is used to explore the relationship between career identity and persistence. It is postulated that this relationship is bidirectional. Career identity is found to be related to persistence through the mechanism of social and academic integration, which enables socialization into the profession of interest and leads to career identity development. Under the bidirectional relationship, career identity catalyzes enrollment and motivates students through unexpected barriers to degree completion, and persistence allows for more integration and opportunities for professional socialization. These findings have implications for research into persistence and integration for nontraditional students, and for practitioners seeking to improve retention and completion rates among this population.

ନ୍ଧର

Gabrielle Petito

Faculty Advisor: William Tatum

Stereotactic Laser Ablation: A Single Center Report

Advances in treatments applied to patients with drug resistant epilepsy have recently included novel surgical therapy. Stereotactic laser ablation (SLA) is a minimally invasive procedure for patients with drug-resistant focal seizures of temporal lobe origin. We reviewed the records of all patients operated for epilepsy at Mayo Clinic in Florida between 2013 and 2015 with follow-up including 2016. Thirty-two patients underwent SLA by a single surgeon for drug-resistant localized epilepsy. Demographics, surgical procedures, and post-operative measures were assessed to compare surgical outcomes. Five patients received additional surgical resection. Patients had a mean age at onset of 21.66 years (range 0-52 years) and had taken an average of 4.9 antiepileptic drugs prior to the mean age at operation of 46.97 years (range 17-74 years). MRI demonstrated a lesion in 27/32 patients who had SLA. MTS occurred in 25/32 patients with 3 normal patients, 2 neuronal migrational disorders, 1 atrophy and 1

post lobectomy. 97% of patients underwent laser ablation on one temporal lobe (L=21; 1 re-operation; R= 10). 56.3% of the subjects were seizure free after surgery with a mean follow-up of 21.09 months (range 6-42 months). 87.9% of patients were discharged the day following surgery. Two patients experienced a visual field deficit, 3 patients had a significant memory deficit (2 normal MRI) and 3 had immediate peri-operative seizures. Outcome resulted in seizure freedom in over 50% of patients. The ease of use and degree of resource utilization makes SLA a viable surgical alternative with minimal complications.

ନ୍ଧର

Kelsey Pukelis

Faculty Advisor: Sara Hernandez

The effects of fair trade on livelihood diversification and food security: a study of Peruvian coffee farmers

Fair trade certification attempts to support the livelihoods of participating, small-scale farmers by paying them at least a minimum price per unit and providing them access to credit for farming, education and health related expenses. But despite these benefits, how and to what extent does fair trade certification affect farmers' livelihoods? In particular, does fair trade status protect farmers' food security? To answer these questions, surveys were conducted with 50 farmers of a fair trade coffee and cacao cooperative in Peru to gather information on their households' demographics, income generating activities, crops cultivated, fair trade certification history, and measures of food security. The survey data reveal that a considerable proportion of farmers' households are food insecure. Furthermore, exploiting some variation in food security levels reveals which household characteristics are associated with higher levels of food insecurity. Results indicate that few income generating activities and low levels of crop diversification—including both subsistence and commercial crops— are predictive of food insecurity among households in the sample. These findings weigh in on an outstanding controversy in the literature and suggest that specialization in the fair trade commodity alone may not adequately support small-scale farmers' livelihoods, even given fair trade's supports for certified producers.

ନ୍ଧର

Bryan Quandt

Faculty Advisor: David Gatchell

Reducing waste in maker spaces

The production and disposal of municipal solid waste harms humans and the environment, and sustainable materials management is being increasingly studied and implemented. There is, however, little practice or theory addressing solid waste in the growing number of maker spaces, locations where users learn how to, and do, fabricate items using shared equipment. To the extent of our knowledge, there is only one researcher focused on sustainability in maker spaces, and no research on maker space waste reduction regarding low-fidelity fabrication. This study focuses on low-fidelity fabrication waste reduction in Northwestern University's Segal Prototyping and Fabrication Lab (the "Shop"). To reach

this scope, twelve problem statements were generated through user and expert interviews analyzed using grounded theory, and primary and secondary literature on four municipal solid waste sectors. Problem statements and project scope were evaluated via a multi-criteria weighted decision matrix. Five problem statements within the scope were identified through a waste characterization study, user observation following the AEIOU observation framework, and user interviews. Ideas to address these problem statements were iteratively generated in brainstorming sessions with multiple stakeholder groups, and clustered. The current solution to the problem statements consists of educational modules for new Shop users and a provision system for cardboard and materials joining methods. Alternatives within these solution classes are currently being tested. Proposed solutions can be adapted to other maker spaces, facilitating waste reduction in a larger context. Additionally, this study improves the current understanding of how waste is produced in maker spaces.

ନ୍ଧର

Ashley Radee

Faculty Advisor: Galen Bodenhausen

Asian Americans and Stereotypes of Femininity

Previous research has demonstrated that non-Asians perceive Asian people as more feminine than Caucasian people. This study aims to address whether these stereotypes are reflected in the self-concepts of Asian Americans. Relative femininity and masculinity of self-concept were assessed with a trait nomination task, the Communal Agentic Motives (CAM) scale, and spontaneous self-descriptions. The first study compared the responses of Caucasian relative to Asian participants; the results demonstrated effects of gender but no effects of race on relative femininity. The second study compared Asian participants primed with their racial identity to those in a control condition, demonstrating that Asian Americans primed with their racial identity, contrary to stereotypes, described themselves using less feminine traits. Overall, these results challenge the accuracy of stereotypes suggested by previous literature on the perceived femininity of Asians.

ഗ്രെ

Eva Rios

Faculty Advisor: John Hagan

Rethinking the Categorization of Prison Gangs: the Primeiro Comando da Capital, Numbers Gang, and the Mexican Mafia

Prison gangs are regarded as criminal organizations that operate primarily within the penal system; however, this categorization is not consistent with their characteristics. Three prison gangs were chosen as case studies—the Primeiro Comando da Capital, the Numbers Gang, and the Mexican Mafia—that represent the wide variety in which prison gangs manifest. I broke each case down to four of its most significant characteristics: their origin, structure, governance, and use of violence. By using a combination of academic literature and primary sources, the aforementioned characteristics of these groups were analyzed in comparison to criminal organizations and insurgent groups in order to determine where the categorization of prison gangs truly lies. My findings suggest that prison gangs

are very different from most other criminal organizations; their motivations are much more in line with insurgent groups, which shapes much of their other behavior. Yet there is an inherent criminality to prison gangs that separate them from insurgent groups. I believe that prison gangs inhabit the grey space in between criminal organizations and insurgent groups. When prison gangs are approached as a subset of criminal organizations, the policies created to combat their influence are ineffective. By shifting the perception of prison gangs to legitimate insurgents against a prison authority, better policies can be put in place that limit their power.

ഗ്രരു

Alexandra Robertson

Faculty Advisors: John Cutler, Harris Feinsod

George Washington Gómez and the Political Consequences of Bilingualism

My investigations comprised of analyzing Américo Paredes's novel George Washington Gómez and I argue in my thesis that this novel of cultural experience depicts the racialization of language at work within systemic institutions of education and electoral politics. I implement a lot of theory as evidence for my thesis. I draw from language theorists such as Joshua Miller and Roman Jakobson; historians such as David Montejano; borderland theorists such as Gloria Anzaldúa and Michael Deare; and cultural theorists that include Ramón Saldívar and José E. Limón, among a variety of others to inform my thesis. At the Paredes archives at the Benson Latin American Collection at the University of Texas at Austin, I found many historical and personal events in Paredes's life that align with certain scenes within the novel. Consequently, these findings historicize this novel as culturally representative of the linguistic struggles along the borderlands. There exists an extensive amount of scholarship on George Washington Gómez, mostly centering on character analysis, the politics surrounding land and language, and cultural theory. I demonstrate how the use of multilingual mixing recounts a connection to struggles in conceiving a sense of self within the U.S. that is inclusive of ethnicity, race, and citizenship. The social institutions addressed within the novel are not radically different from those utilized currently; investigating how bilingualism permeates and is derived from these systemic programs allows for a greater understanding of the situation faced by Mexican Americans and other linguistic minorities.

ନ୍ଧର୍ୟ

Juliet Roll

Faculty Advisor: Milan Mrksich

An Enzymatic Microfluidic Reactor System

Enzymatic reactions, or chemical reactions catalyzed by enzymes (biological proteins), drive many human processes. It is difficult to analyze these reactions because a) they have many steps, and solution-phase reactions do not allow for removal of components after each step, and b) mass spectrometry, often used to identify products, is difficult to perform on large molecules as it fragments them into too many pieces. Our project aimed to resolve these issues by a) creating a system that relies on attaching components to a surface, allowing for easy addition and removal of reactant solutions, and b) using SAMDI, a mass-spectrometry technique that prevents fragmentation of molecules. These goals were achieved by creating a 3D-printed mold for a polymer prism with a channel indent. The prism is pressed to a gold-covered glass slide covered in SAM (mixture of specific molecules that coat the gold) to which the enzyme (via an intermediate linker molecule) and products can attach. One-by-one, reagents travel through the channel, assembling the enzymatic system step-by-step. Different linkers can be patterned on the gold for multi-enzyme reactions. Products bind to the slide and are identified using SAMDI. So far, this technique has confirmed PAD1 and PCAF (enzymes that modify an H3 molecule involved in genetic regulation) surface activity. Future goals include creating a PAD/PCAF multi-enzyme system for H3 modification. This project has created a fast and easy analytic method for enzymatic reactions, and may be further used to create artificial Golgi systems for studying complex human modification networks.

ନ୍ଧର୍ୟ

Emily Roney

Faculty Advisor: Michael Jewett

Enabling Ribosome Evolution for Sequence-defined Polymerization: Optimization of bMettRNA Synthesis

In the last century, the advent of synthetic polymers has had far-reaching effects on virtually every realm of science and society. However, the scientific community's ability to engineer synthetic polymers containing multiple distinct monomers, known as heteropolymers, is still severely limited. In this project, I worked toward addressing this by engineering ribosomes (protein synthesis machines) to polymerize monomers beyond the 20 amino acid building blocks found in nature. By doing so, the ribosome could be repurposed as a machine for sequence-defined polymerization. The specific goal was to synthesize a new building block for ribosomes to incorporate into synthetic polymers: biotinylated methionyl-tRNA (bMet-tRNA). This requires reactions between three key molecules: 1) tRNA (delivers monomers to ribosome), 2) methionine (amino acid monomer), and 3) biotin (reactive small molecule). First, I generated tRNA using in vitro transcription with T7 RNA polymerase. Following purification, the tRNA product was used to synthesize methionine-tRNA (Met-tRNA) by chemically linking the tRNA molecules to the amino acid methionine using an enzyme, methionyltRNA synthetase. The final step of this synthesis was to attach biotin to the Met-tRNA molecule in a reaction with Sulfo-NHS-LC biotin. I optimized this protocol by rigorously testing different reaction stoichiometry, buffers, and pH levels to determine the conditions that result in the highest and most pure yields. Overall, the synthesis was successful and the product, bMet-tRNA, was confirmed by UV-Vis spectroscopy and polyacrylamide gel electrophoresis. Moving forward, this novel building block can now be incorporated by mutant ribosomes into sequence-defined synthetic polymers.

ഗ്രര

Paul Salamanca

Faculty Advisor: Gregory Phillips, II

"No chocolate, no rice"—An Investigation of Racial/Ethnic Homophily on Grindr

Men who have sex with men (MSM), and especially MSM of color, are disproportionately affected by HIV. Previous research shows that MSM have high levels of racial/ethnic homophily (the tendency for people to have sex with others who share the same racial/ethnic identification) in sexual dyads, which may explain HIV disparities. However, to date, researchers have not contextualized network data in virtual spaces (VSs) such as Grindr, a geosocial networking application. This study attempts to ground network data from a cohort study of young MSM in Chicago (RADAR) in the sociosexual contexts of VSs and examines differences in levels of racial/ethnic homophily using multilevellogistic-regression models. Results show that Grindr differs from other VSs in proportions of racially/ethnically homophilous dyads and by partner racial/ethnic identification. When controlling for general homophilous tendencies by racial/ethnic group, sex partners found on Grindr by Black MSM were significantly less likely to also be Black. This may be due to a dispreference for Black partners by Grindr users. As HIV disparities are perpetuated by racial/ethnic homophily, these findings can inform HIV interventions in VSs. This study adds nuance to previous research; while racial/ethnic minorities are more likely to form homophilous partnerships, this trend varies by VS.

ହ୍ୟ

Rachael Sarette

Faculty Advisor: J. Mauricio Garcia-C

Neotropical edge effects: a study of Phoridae and Atta cephalotes interactions

Deforestation and fragmentation are leading to increased forest edge which results in changes to forest structure and multi-tropic interactions. Often these changes lead to decreased parasitism and increased herbivory, especially by ants. This study looked at the impact of phorid flies on the behavior of leafcutter ant colonies of the species *Atta cephalotes* at La Selva Biological Research Station from September 27-29. Head size, tibia length, and activity rate of colonies, calculated by counting the number of ants passing specified point in one minute, were measured during the day and night in the edge and interior of the forest. The forest edge does not affect ant head size or tibia length but affects the activity rate of the colonies. Therefore, factors that influence the head size and tibia length are more complex than the presence of phorid flies, but activity level responds to changes in forest structure quicker since it is more directly tied to the nutritional needs of the colony. These results in head size and tibia length may not be different due to factors like the fact that *A. cephalotes* can forage up to 200m away, resulting in them encountering phorid flies not present on the exterior, or the 50 years since the edge has been around at La Selva was not enough time for ants to evolve a different behavior pattern in the ant sizes they choose to send out to forage.

ഗ്രര

Oma Seddiq, Shageaa Naqvi, Ifath Arwah Sayed

Faculty Advisor: Justin Martin

Trust in news media and media credibility as predictors of news consumption behaviors in six Arab countries

This study examines media trust and assessments of media credibility as potential predictors of news consumption among nationals in six Arab countries (N=4,411). The central research question is: How do trust in news media and its credibility influence levels of news consumption among residents in Arab countries? The recent focus on "fake news" and "alternative facts" in the United States and elsewhere has raised many questions on the role of news media and the trust that consumers have in them. Most discussions have been Western-centric and less has been said about trust in news media among consumers in the Arab region. In one widely cited study from the U.S., Tsfati and Cappella (2003) found that low trust in news media was associated with reduced consumption of news from mainstream news outlets and with increased consumption of news from non-mainstream sources. This study examines such existing literature on media trust and news use and also adds to that body of literature by exploring relationships among these variables in the Arab region. This study is a secondary analysis of data on news use from Northwestern University in Qatar's Media Use in the Middle East, 2017 survey of more than 4,400 citizens in Saudi Arabia, Lebanon, Qatar, Tunisia, Jordan, and the UAE (Dennis, Martin & Wood, 2017, forthcoming). NU-Q researchers collected the data for the 2017 iteration of their study as recently as January and February of this year, so the findings we report in this paper are extremely current and fresh. Three blocks of variables are incorporated as predictors: trust in media, demographic factors and certain political attitudes, such as whether respondents consider themselves conservative or progressive and whether they feel their country is on the right track. We use multiple linear regression models-and run a separate model for each country-to examine associations between trust in media and news consumption, while controlling for other possible determinants.

ഗ്രരു

Tara Morgan Sennott

Faculty Advisor: Clayton Brown

Senior Directing Thesis

I made a series of vignettes for a class called "Senior Directing." This project is inspired in part by the sterile and hyperreal look of medieval paintings and the ways in which they combine multiple narratives into a single composition. The graphic multi-linearity of these artworks is relevant now more than ever with the prevalence of interactive web design and the advent of technologies like virtual reality. I wanted to explore how this concept of multiple narratives could be interpreted in the tradition of long-take cinema. I've selected a vignette entitled "Lax Bro" to share with you today.

ഗ്രരു
Laura Sevilla, Julia Thelen

Faculty Advisor: Claudia Haase

Stressful life events and power motivation: A laboratory-based study

This laboratory-based study of 100 younger and older adults showed that higher levels of negative life stress predicted greater power motivation (i.e., desire to exert influence over others) in response to exciting, sad, and achievement film clips. Findings support a link between life stress and heightened power motivation.

ନ୍ଧର

Muhammad Faizan Shakir

Faculty Advisor: Joseph F. Khalil

The Emergence of Alternative Media in Yemen

Since 2015, Yemen has been devastated by war between a Saudi-led coalition and the rebel movement. Little to no coverage of the civilians was done by the local news channels with a lot of the news getting to the audience after rigorous gatekeeping. Due to the lack of coverage the civilians were getting a group of Yemeni youth started creating videos to highlight the victims of the forgotten war in Yemen. We focused our research on two Yemeni filmmakers, Ameen Alghabri and Shatha Alghabri. Both siblings have dedicated their time to make videos, films and photographs of untold stories of Yemen. The artifact we chose to analyze in our research is a video called 'Displacement' which features kids from various parts of Yemen who are asked questions about their lives before the war. Through indepth interviews and textual analysis, we found that the content the Alghabri siblings produce is alternative to the mainstream since they operate independent and separately from the state and the market. They only work towards the common goal of representing Yemen. Their videos include different dialects creating a platform for diverse participation and access from multiple communities in Yemen.

We believe that the under-representation of the Yemeni struggle by the mainstream catalyzed the need for self-representation. This motivation for self-representation has resulted in an increase in the level of participation in video and filmmaking.

ନ୍ଧର୍ୟ

Shoshana Shapiro

Faculty Advisor: Marcelo Worsley

Facilitation in Informal Makerspaces

Research on makerspaces is an emerging topic and most studies conducted thus far have looked at what activities occur in informal makerspaces and at how participants' identities are developed in such spaces. As researchers continue to show how impactful makerspaces are for participants, new research should be conducted to understand the role of the facilitator in makerspaces. To answer the questions what does a facilitator do when facilitating in a makerspace and what are the institutional reasons

behind their actions, I observed the makerspaces at the McGaw YMCA, Chicago Children's Museum and Museum of Science and Industry and interviewed several key staff members for each space. After coding the data, I found that many ways a facilitator interacts happens across all three makerspaces like acting as a safety monitor to ensure no participant is harmed during their participation and always support the participant on figuring out their ideas rather than suggestions activities for the participant to do. Other functions of a facilitator are different in the makerspaces like relationship builder. The relationship builder looks different depending on the length of time a participant is expected in the space, in makerspaces where students are coming almost every day long-term relationships are built and used to motivate participants making activities. This study can offer developing makerspaces ideas for how to structure their facilitation model, it also adds to the larger body of research on how STEM and informal learning are facilitated.

ହ୍ୟ

Andrea Shepard

Faculty Advisor: Joshua N. Leonard

Developing a Method to Increase Farnesyl Pyrophosphate in E. coli via Induction

Farnesyl pyrophosphate (FPP) is a naturally produced intermediate metabolite in Escherichia coli cells with applications in pharmaceuticals, biofuels, and other natural products. There currently is no way to effectively monitor its intracellular concentration, but it is known to be toxic at high concentrations. My goal was to develop a method to produce high levels of FPP via drug induction while maintaining the low noise levels needed for transcription factor biosensor development. Due to the toxicity of FPP at the high levels where the biosensor would respond, enzymes were introduced into E. coli to convert FPP into the red-orange product β -carotene, which is measurable via spectrophotometer. Another plasmid with the three enzymes native to E. coli cells shown to hinder FPP production at their natural low concentrations were added. These plasmids were created to have tunable gene expression to maximize orthogonality. Dosage curves for the two plasmids and the two chemical inducers were run to find the condition with the greatest production of β -carotene. In standard nutrient conditions, a five-fold increase in production compared to the control was seen by adding inducers and a thirteen and a half fold increase was seen between low nutrient levels with no inducers and the highest nutrient levels with inducers. Since β -carotene levels increased, I hypothesized FPP also increased and tried to measure FPP concentration using gas chromatography-mass spectrometry. After confirming that FPP expression is successfully tuned in the system, biosensor creation has moved forward.

ഗ്രര

Jamilah I. Silver

Faculty Advisor: Terri Sabol

Developing Stronger Constructs for the Evaluation of Neighborhoods

Neighborhood characteristics play an important role in fostering young children's healthy development. Yet, the most common measures of neighborhoods (e.g., U.S. Census data) often do not assess many important features, such as disorder and safety, that are most salient for young children. The current study seeks to develop and examine a multifaceted measurement tool that assesses neighborhood factors that may influence children's psychosocial and academic outcomes. The Systematic Social Observation tool (SSO) is a promising, novel tool that uses Google Earth to capture neighborhood processes that were unavailable or too expensive to collect previously. The SSO has been used in UK settings (Odgers et al., 2012), but the current study will adapt the SSO for U.S. neighborhoods surrounding children's early education programs. An extensive literature review was conducted to evaluate relevant neighborhood features for young children. We then developed new items for the SSO that reflect the findings of the literature review. Finally, we participated in preliminary coding of these new items by taking a "virtual walk" around neighborhoods. The literature review revealed key neighborhood features that matter for young kids, including the presence of speed limit signs and traffic, and playground safety. We will present preliminary case examples of early childhood education programs that serve low-income children in 10 cities in which we coded the surrounding neighborhoods using our adapted tool. These programs are a part of a larger study that will include 300 centers and 1,134 children. Our future research will explore whether the SSO relates to child outcomes.

ନ୍ଧର

Allison Sun, Jennie Werner

Faculty Advisor: Haoqi Zhang

Collective Experiences API

Collective Experiences is a novel platform that coordinates people in real spaces in real time to participate in experiences. For example, if we wanted to create a timelapse video of the sunset from beaches around the world, we need to reach diverse user base that meet the participation requirements and crowdsource these photos. Our platform opportunistically identifies and notifies users who are in a situation where they can participate in an experience. After gathering participation data from a group of users, we can synthesize that data into a final product to create a unique video, photo collage, story or other forms of media compilation. As part of Collective Experiences, we are developing an API to allow anyone to create and run highly customizable experiences using the platform. This technology opens up a whole new area of interactions to be explored. In the future, we hope to look into how different types of experiences can help users in similar situational context around the world feel connected to each other.

Bailey Sutton

Faculty Advisor: John Bushnell

The Evolution of Sexism Under Gorbachev: An Analysis of Abortion, Population Growth, and Societal Expectations Under Perestroika

The purpose of this project is to investigate the lack of significant reform regarding women's issues during the perestroika period. Although this project is ongoing, initial findings suggest institutionalized sexism created specific social roles for women that were impenetrable by reforms in several areas despite inconsistencies with communist ideology and attention early on under Gorbachev. Part one establishes the foundational ideology by analyzing Marxist and Leninist ideas on women and comparing them to official Soviet doctrine as established by government officials and leading scholars. Also in this section is an overview of feminist theory in regards to both social policy and communism. These form the set of beliefs regarding the role of women in a socialist society upon which this project frames the investigation of several cases. The main examples for analysis are the practice of abortion as the primary birth control method and the government's emphasis on population growth. Both cases incorporate society and the government as influencing factors for the creation of a gendered and patriarchal society while also representing areas of systematic sexism. Current literature has examined these cases independently from each other, however little research has been done analyzing them in tandem along with sexism, communist ideology, and perestroika. Therefore, this projects seeks to investigate the stagnation of reforms in the area of women's issues under Gorbachev despite the potential for significant strides early in the perestroika period.

ନ୍ଧର

Tiffany Teng

Faculty Advisor: Thomas Bozza

Deorphanizing olfactory receptors in vivo

The mouse olfactory system contains over 1000 odorant receptors. Volatile chemical compounds in the air bind to these receptors, which are expressed by olfactory sensory neurons (OSNs) within the nasal cavity that project to the olfactory bulb. Due to the vast number of olfactory receptors and possible chemical stimuli, it has been a longstanding and important goal to develop methods for validating ligand receptor pairs, and determining which receptors are activated by an odorant. My goal is to validate and implement newly developed methods to match odorant receptors with their ligands in vivo. One method uses immunohistochemical labeling for the protein phosphoS6 to identify OSNs activated in response to odor exposure. I exposed a mouse to an odor whose most sensitive receptor is known, and confirmed that staining for phosphoS6 identified the correct OSN. Another method, DREAM, uses quantitative PCR to measure decreases in expression of genes encoding olfactory receptors that are activated when an animal is exposed to an odorant. I validated the DREAM technique by exposing mice to phenylethylamine. The sensitivity of TAAR4 to phenylethylamine is well documented. I confirmed that DREAM identified the activation of TAAR4. I then exposed mice to an odor without known receptors, and used DREAM to identify activated receptors. My results indicate that phosphoS6 can be used to validate odor receptor pairs and that DREAM is able to

identify receptors activated by an odor. Future work will use my findings to identify all receptors activated by a given odor using RNAseq deep sequencing.

ନ୍ଧର

Shon Thomas

Faculty Advisor: Chyung-Ru Wang

Effect of CD1b and CD1c on Atherosclerotic Plaque Formation

Approximately 1 in 3 deaths in the US is caused by cardiovascular diseases, among them atherosclerosis. Atherosclerosis occurs through excessive cholesterol deposition (hyperlipidemia) along the inner layer of the artery called the intima, resulting in plaque formation that blocks arterial blood flow and could lead to heart attacks and strokes. It has recently been recognized that inflammation plays an important role in plaque formation. Specifically, T cell activation can affect the progression of atherosclerosis through interaction with antigen presenting cells (APCs) in a hyperlipidemic environment. APCs ingest foreign objects and present digested remnants on antigen presenting molecules at the cell surface and these complexes are recognized by T cells. Unlike common peptide antigen presenting molecules, group 1 CD1 molecules present both self and pathogenic lipids to T cells. This study looks at the unknown role of lipid antigen presenting molecules, specifically CD1b and CD1c subset molecules, on atherosclerotic plaque formation around the intima of hearts in new mice models: control LDL receptor knockout mice (LDLrko), LDL receptor knockout mice with hCD1 transgene (hCD1Tg/LDLrko), LDL receptor and CD1d knockout mice with hCD1 transgene (hCD1Tg/CD1dko/LDLrko), and LDL receptor inactivated mice with hCD1and HJ1 (hCD1Tg/ HJ1Tg/LDLrko).The results transgenes of this study indicate that hCD1Tg/CD1dko/LDLrko group had the highest plaque area with an average of 1,268,144.03 +/-196,133.22 um². Compared to the control mouse strain (LDLrko) with an average plaque area of 920,032.71 +/- 176,399.84 um², both hCD1Tg/LDLrko and hCD1Tg/ HJ1Tg/LDLrko mice had lower average plaque areas (816,594.55 +/- 292,567.95 and 555,188.84 +/- 171,016.61 um², respectively). One-way ANOVA and Turkey post-hoc statistical tests were performed using Prism Software. It is unclear whether the HJ1 T cell receptors were activated by the amount of plaque upon the end of the 12-week high fat diet period. Further research with an extended high fat diet period (16-18 weeks) can determine whether HJ1 T cell receptors are activated in hyperlipidemic mice. Future clinical uses of this research may include manipulating the group 1 CD1-restricted T cells to control heart plaque formation and, possibly, preventing atherosclerosis and heart attacks.

ନ୍ଧର

Stacy Tsai

Faculty Advisor: Joseph Bass

Regulation of hypoxic response in CRISPR-generated clock mutant mouse myotubes

The circadian clock coordinates physiologic processes with the 24-hour rising and setting of the sun. This cycle is regulated by a transcription-translation feedback loop, which induces the expression of molecules involved in energetic processes. Molecular clock transcription factors belong to the basic-

helix-loop-helix PER-ARNT-SIM (bHLH-PAS) superfamily, and are structurally similar to proteins such as hypoxia-inducible factors (HIFs). Previous studies have shown that bHLH-PAS proteins mediate adaptation to environmental oxygen, a primary function of the hypoxia-inducible factor (HIF). However, whether clock and HIF pathways interact *in vivo* remains poorly understood. Here, we provide evidence for a reciprocal relationship between the circadian clock and HIF-mediated oxygen sensing in skeletal muscle. Our in vitro transcriptional analyses demonstrate direct functional interactions between the clock protein BMAL1 and hypoxia-inducible factor HIF1 α . Using CRISPR-Cas9 genome editing, we generated *Bmal1*^{-/-} mouse myotubes in order to test the mechanism of crosstalk between oxygen sensing and the molecular clock. Surprisingly, induction of glycolysis in response to hypoxia was severely attenuated in clock mutant myotubes due to both abrogation of HIF transcription and increased HIF degradation. Collectively, these experiments provide the first genetic and functional evidence for interactions between circadian and HIF transcription pathways. In summary, our studies establish an essential role of the circadian clock in oxygenic metabolism within skeletal muscle through control of HIF-mediated aerobic glycolysis.

ହ୍ୟ

Kotaro Tsutsumi

Faculty Advisor: Joseph R. Mazzulli

R-SNARE Protein Ykt6 Restores Lysosomal Function in Parkinson's Disease Cell Model

Parkinson's disease (PD) is an age-dependent neurodegenerative disorder pathologically defined by the accumulation of protein aggregates, mainly consisting of α - synuclein (α -syn). Major efforts have been focused on how these aggregates, once formed, interfere with essential cellular pathways resulting in neurodegeneration. We have previously shown that α -syn aggregates disrupt vesicular trafficking at the level of endoplasmic reticulum (ER)-to-Golgi, reducing lysosomal hydrolase trafficking and function, causing substrates to accumulate. Since α -syn is normally degraded through lysosomes, lysosomal dysfunction results in augmentation of α -syn accumulation and the propagation of a feedforward pathogenic loop. Previous findings show that aggregated α-syn can bind to and interfere with Soluble NSF Attachment Protein Receptor (SNARE) proteins, resulting in alterations in membrane fusion events. Since SNARE proteins mediate vesicle fusion between the ER and Golgi, deficiency in these proteins may affect the trafficking of hydrolases as they move from the ER into the Golgi, and then finally into lysosomes. In this study, we show that α -syn disrupts the function of a particular R-SNARE found at the Golgi called ykt6. In transfected human embryonic kidney (HEK) cells, expression of the familial mutant A53T a-syn reduced vkt6 SNARE complex assembly. Overexpression of ykt6 rescued lysosomal function in PD midbrain dopaminergic neurons generated from induced pluripotent stem cells. Overexpression of a mutant form of ykt6 that exhibits an open, active conformation further enhanced this effect. Our study underscores the significance of ykt6 in PD pathogenesis, and indicates that it could potentially be a useful therapeutic target for synucleinopathies.

Yilan Wang

Faculty Advisor: Laura Lackner

A High-copy Suppressor Screen for Mitochondrial Inheritance Mechanisms in Budding Yeast

Mitochondria, besides providing energy for cellular functions, play a significant role in a myriad of cellular processes. Mitochondria cannot be generated de novo, therefore defects in mitochondrial inheritance during cell division can cause mitochondrial deficiency, which can lead to severe cellular dysfunction. In budding yeast, Mmr1 and Ypt11 function in parallel to mediate actin-based transport of mitochondria to the bud via the motor Myo2. Deletion of both genes causes a growth defect in W303 yeast strains rather than synthetic lethality, implying the existence of backup mitochondrial inheritance mechanisms. Therefore, I created a conditional *mmr1-aid ypt11* Δ strain, in which Mmr1 can be depleted in the presence of auxin, and conducted a high-copy suppressor screen to identify potential backup inheritance mechanisms. I transformed a yeast genomic over-expression library into the strain and selected colonies that grew on media containing auxin. 7 plasmids were extracted from the colonies and all rescued growth when retransformed into the original *mmr1-aid* ypt11 Δ strain grown on media containing auxin. Sequencing results of the plasmids identified the suppressors, which included proteins that localize to peroxisomes, ER, and vacuoles in addition to mitochondria. Imaging studies suggest that these suppressors rescue the mitochondrial inheritance defect of the conditional strain. The results confirmed the existence of backup mitochondrial transport mechanisms and suggested that different organelles, including peroxisomes, ER, and vacuoles, are probably involved in mitochondrial inheritance. Further characterizations of the possible inter-organelle interactions can be the first step of identifying cures for human neurodegenerative and immune diseases caused by mitochondrial deficiency.

ഗ്രരു

Yixian Wang

Faculty Advisor: Noshir Contractor

Observations, Research, and Thoughts about Networks in Gitter.im

Knowledge collaboration is defined broadly as the sharing, transfer, accumulation, transformation, and cocreation of knowledge, which is critical for developing communities. Knowledge collaboration takes place in many online communities, including Gitter.im, which is an online platform that supports open source software development on Github. However, online communities have networks that may differ from traditional social networks. This project analyzes structural and topical differences among chatrooms to answer the following research questions:

- How do factors, such as programming languages and organizations, affect chatrooms' usage?
- What factors could lead to a more active online chatroom?

Using a dataset from Free Code Camp, a non-profit organization focused on teaching programming, I performed basic descriptive analysis, network visualization, and topic modeling of texts. The results showed that seven chatrooms with different programming languages as their themes share similarities both in structure of the network and topics discussed in chatrooms. Corresponding to the tradition

network theory, there is an observed pattern of preferential attachment since new participants in the chatrooms tend to connect with more popular and influential people that are already in the chatroom. Surprisingly, topic modeling showed that the seven out of the twenty most popular topics are about the affiliated organization. These findings give insights about how online communities can remain active for several years and increase our understanding of how traditional social network theories can be adapted to online communities' settings.

ନ୍ଧର୍ୟ

Victoria Wee

Faculty Advisor: Dedre Gentner

The Role of Language in Toddlers' Relational Learning

Previous research has shown that young children's performance in the relational match-to-sample (RMTS) task improves with age. In this task, subjects are given a standard (AA) and must select a match between two options (BB or CD). The BB pair is the correct match to the AA pair because of the common relation between them. One important factor that contributes to success in this task is relational language. Three-year-olds can pass the RMTS task after they successfully learned the labels for 'same' and 'different.' However, 2-year-olds failed to learn these labels when given the same training. Thus, it remains unclear whether (1) 2-year-olds are able to learn the labels same/different if given more extensive training than in previous studies, and (2) learning these labels helps 2-year-olds pass the RMTS task. We created a new training task in which 2-year-olds (n=8) and 3-year-olds (n=9) saw triads of cards (2 same, 1 different). Children heard the labels 'same' or 'different' applied to each card. Children were then asked to use the labels and sort a new set of cards into same and different piles. Finally, children completed the RMTS task. Consistent with prior work, only 3-year-olds were capable of learning the labels (4 out of 9). None of the 2-year-olds learned the labels. These findings suggest that this particular training approach was ineffective for 2-year-olds, perhaps due to processing demands of the task. Future research will explore other approaches that may better suit their capabilities.

୬୦୧୪

Jonathan Young

Faculty Advisor: David Dunand

Temperature Dependence of Porous Structure in a Freeze-casted Titanium Oxide and Water System

Freeze-casting is an ice-templating process for creating templated porous materials through the solidification of suspended particles in solution. The technique allows for greater control of factors such as pore size and configuration than traditional methods. Although research has been conducted on the density difference between the fluid and the suspended particles, the temperature dependence of density in the fluid has never been considered. By varying initial suspension temperature to minimize convective fluid circulation during solidification, there may be a way to diminish the disruption of microstructural formation resulting from convective fluid motion, giving more control

over pore formation. Titanium oxide (TiO_2) is a common choice of particle for freeze-casting suspensions, due to its relative stability when suspended in water. In this study, titanium oxide and water systems were stabilized and freeze-casted. The resulting structure was analyzed with optical microscopy. The results of this study will help researchers understand the connection between density, convection, and the physics of freeze-casting. Null results will allow greater freedom in future research, while positive results will add both greater constraints and control to upcoming work.

ହ୍ୟ

Jiaqi Yu

Faculty Advisor: Wendi Gardner

Cultural Influence on Brand Identification and Brand Defense

According to Lisjak, Lee, and Gardner (2012), a threat to a brand elicited the same responses as a threat to the self. The current research examines how people react differently across cultures when a commercial brand they identify with is threatened by information from different sources, specifically, from a stranger or from a close friend. In Study 1, 616 U.S. and East Asian participants were recruited to complete an online survey via Amazon's M Turk. Participants were asked to read a blog post that contains negative evaluation on two U.S. brands. Participants were randomly assigned to conditions in which they were either told that the blog post was written by a close friend or by a stranger. After reading, participants' attitude change toward the brands were measured to reflect their defensiveness. Results showed that there were no significant differences in defensiveness between East Asian participants and U.S. participants in either condition. Study 2 was then conducted to address on the limitations of Study 1, that all participants completed the study in English, and both brands in the study were U.S. brands. In Study 2, 267 Chinese participants were recruited to complete the same survey in Mandarin. Two Chinese brands were added to in addition to the U.S. brands. Results reflected that participants show no significant difference in their defensiveness on brands from different countries. These findings suggested that this defensiveness may not be affected by cultural difference.

ନ୍ଧର୍ୟ

Nina Zhou

Faculty Advisor: Neal Blair

The Impact of Agriculture on Carbon

Globally, an estimated 16.7 million reservoirs have been rapidly accumulating organic carbon (OC). Research has linked OC accumulation in reservoirs with the emission of methane. Despite the potential importance to the global C-cycle and climate, little research has been done on the nature of the OC in reservoir sediments. This project seeks to better understand this cycle better by studying lake sediment samples from an Illinois reservoir impacted by agriculture. By studying the import of OC, it will be possible to better understand the transport and erosion of carbon due to farming, and how it may contribute to methane production. The sedimentary organic carbon is expected to be a

mixture of vascular plant inputs from land (including crops), and algal inputs supported by agricultural nutrients delivered to the lake. One experimental parameter that will be used to identify OC components in mixtures is the ¹³C/¹²C stable isotopic ratio, which is reported as the δ^{13} C value. This project seeks to isolate the signals from the different organic sources by performing a density separation and studying low density plant fragments in Lake Decatur sediments. Specifically, the plant debris will be analyzed for the carbon isotope values. After separating and analyzing the plant debris, I predict that the isotope value of the plant fraction should parallel the known changes in the crop input. The findings of this study will have implications for how agricultural practices impact not only the local environment but also how they impact the global carbon cycle.

```
ନ୍ଧର
```

50 Guide to Oral Presentations

80 Oral Presentation Session One

11:00-12:30

Advancements in Science and Engineering

Lake Room (203)

Moderator: Axford Yarrow, Earth and Planetary Science Department

Karalyn Berman, "A Paleoclimate Record from Lake Sediments of Southwest Greenland"

Jing Gao, "Regulation of Cyclic Diguanylate during Vibrio Fischeri Biofilm Formation"

- Brennan Jackson, "The Effect of Real-time Knee Adduction Moment Feedback on Knee Loading during Walking"
- Lauren Kearney, "Thermal and Microstructural Characterization of Ceramic Slurries for Freeze-Casting"

Kelly Powderly, "Discovery of a New High-Pressure NiBi Phase in a Diamond Anvil Cell"

Engagements with the Humanities

Arch Room (206)

Moderator: Carl Petry, History Department

Sarah Bruyere, "Every Sin in the Decalogue: Richard Francis Burton's Literary Career"

- **Phillip Davis**, "Junctures in American Religion: The Confluence of Charismatic and Traditional Practice in Evangelicalism"
- Ann Ho, "Redressing Modernism: The Poetry of Grace Nichols 198x-2009"
- **Inje Hwang**, "Appropriation and Cultural Development of the Porcelain Guanyin: How International Commerce Contributed to the Development of Porcelain Visual Cultures within the Early Modern World."

Julia Popham, "Exploring the Pages of a Book"

So Oral Presentation Session One, continued 11:00-12:30

Community Influence/ Influencing Communities

Rock Room (207)

Moderator: Kevin Boyle, History Department

Gustavo Berrizbeitia, "Deliberative Direct Action: The Case of Black Lives Matter"

- Udita Persuad, "Increasing Access to Local Health Information and Resources through Health Desks at Public Libraries: a Novel Approach for Community-Based Collaboration and Asset-Based Development"
- Isabel Robertson, "Abuse to Acceptance: Cleveland's Italian Community from 1880-1920"
- Jacob Rosenblum, "Predicting Chicago Veterans' Returns to Homelessness after Housing Placement"
- Kevin Slack, "Segregating the Suburbs: New Rochelle in Black and White 1900-1970"

Global Challenges and Connections

Armadillo Room (208)

Moderator: Jason Seawright, Political Science Department

- Shakeeb Asrar, "Sensationalism in Pakistani News Channels: The Downside of Media Deregulation"
- Amy Eisenstein, "Hollywood is Like a Durian:' American Cinema in Interwar Sinagpore"
- Angela Lin, "Quantitative Analysis of Palestinian-Jordanian Identity and Opinions toward Refugees"
- Jake Rothstein, "The Viability of Comedic Performance as Sociopolitical Speech: an Ethnographic Study at the Edinburgh Fringe Festival"
- Heiwon Shin, "How Couchsurfing in Iran Transforms the Private into Public Space and Connects an International Community in a 'Land of Contradictions?""

So Oral Presentation Session Two 1:00-2:30

At the Forefront of Science and Engineering

Lake Room (203)

Moderator: Joseph Schofer, Civil and Environmental Engineering Department

- **Emily Bold**, "Determining the Effect of Corallite Integration on Coral Bleaching Susceptibility"
- **Rebecca Diesing**, "Radio Observation of the Supermassive Black Hole at the Galactic Center and its Orbiting Magnetar"
- Esteban Doyle, "Evaluating Light Rail Transit in the United States"
- Jake Heggestad, "Characterizing Cell-Free Metabolism for Rapid Pathway Prototyping"
- Tazim Merchant, "Assessing Heart Wall Function Using Strain Imaging"
- Anna Preston, "Cobalt(III) Schiff Base Complexes for Inhibition of Metal-Mediated Amyloid-Beta Toxicity"

The Power of Narrative

Arch Room (206)

Moderator: Anthony Chen, Sociology Department

Katie Branch, "Framing Effects on Social Perception"

- Meredith Ford, "Gendered Advertising to Children: An Analysis of Differences in Maleand Female-Targeted Television Commercials"
- **Tess Levin,** "Political Possibilities of the Social Media Discourse about Sexual Assault: A Case Study at Northwestern University"

Ryan Martin, "American Mythology"

Arielle Zimmerman, "Digitized Consciousness: The Impact of Digital Self-Tracking Devices for Health/Fitness on the Attitudes, Body Image, and Health Behavior of Male and Female College Students"

So Oral Presentation Session Two, continued

1:00-2:30

How We Learn

Rock Room (207)

Moderator: David Figlio, School of Education and Social Policy Dean

- William Brennan Antone, "Building Extreme Teams: Simulating Team Dynamics Over Time"
- **Ross Chu**, "The Effects of Home-Country Crises on the Educational Performance of Immigrants"
- **Garrett Goehring**, "The Relationship Between Teaching Methods and Student Entrepreneurial Success"
- Rita Hirami, "Parental Perceptions of School Quality: Case Study in Chicago"
- Jemina Legaspi, "Different Perceptions of Audiences, Organizers, and Scientists in Public Science Majlis Forum in Qatar"

Informed Support and its Policy Implications

Armadillo Room (208)

Moderator: Peter Locke, Global Health Studies Program

Emily Blim, "Effects of Social Support Order on Liking and Emotional Improvement"

Meredith Greene, "Civil Rights Policy in Practice: Variation in the Provision of Language Assistance Services in Health Care"

Benjamin Levey, "The Inward Turn of Chicago Drill Rap"

Katie Rim, "Associations Between Cognitive Reappraisal and Anxiety: Socioeconomic Status as a Moderator"

De'Sean Weber, "Trauma-Informed Care at Heartland Alliance"

So Oral Presentation Judges

Fabian Bustamante, Electrical Engineering and Computer Science
Jaime Dominguez, Political Science
Deborah Douglas, Journalism
Miriam Sherin, Learning Sciences
Ceci Rogers, Journalism
Ozge Samanci, Radio/TV/Film
Harvey Young, Theatre

ഗ്രര

So Oral Presentation Abstracts

Alphabetical by presenter's last name

William Antone

Faculty Advisors: Noshir Contractor, Leslie DeChurch

Building Extreme Teams: Simulating Team Dynamics Over Time

Team composition, the selection of which individuals make up a team, influences that team's outcomes. One pertinent context to study this is the construction of space crews capable of collaborating effectively under extreme pressure and over extended periods of time. We define a theoretical framework linking team composition to team function through the emergence of social capital over time. This framework operationalizes social capital as a network of different interpersonal ties (affect, communication, hindrance, coordination, leadership) connecting teammates. A social network perspective describes the evolution of these ties and how these dyadic relations produce team-level performance outcomes. To specify this framework, we develop an agent-based model. We collect longitudinal data, in partnership with NASA, as teams assemble and complete intensive 30-day space exploration analog exercises. Our mixed-methods approach identifies theoretical mechanisms from literature and then parameterizes them to observed data using non-linear optimization methods. The resulting model simulates how a given set of teammates will develop social capital and function over time. Next, we use the validated model to extend theory by conducting in silico "virtual experiments" where we manipulate team composition and perform simulations of a large number of virtual teams. Our findings quantify the effects of teammate compatibility on team interactions, and the effects of team interactions upon teammate relations over time. We demonstrate how our model may be applied in practice: descriptively, to increase our understanding of teamwork; predictively, as a "what-if" decision support tool when building new teams; and **prescriptively**, to mitigate issues in existing teams.

ഗ്രര

Shakeeb Asrar

Faculty Advisor: Joe Khalil

Sensationalism in Pakistani News Channels: The downside of media deregulation

Pakistan has a very vibrant and outspoken media – one of the most dynamic in South Asia. Its independence is de facto credited to the media liberalization policies of 2002 by President Pervez Musharraf. Yet, the country's media landscape, particularly the private news channels, are often labeled as sensational for their exaggerated reporting style. Using Pakistan's premier news channel Geo TV as a case study, this research establishes connections between 2002's media deregulation and the present sensational nature of the country's broadcast news industry. While socio-political motives behind Musharraf's liberalization policies are commonly discussed in existing scholarship, this paper connects them to the content and format of Pakistani news channels. As reflected through Geo TV, the fierce competition among news TV channels has pushed them to adopt vivid aesthetics of yellow journalism, use audacious content, and blur the line between entertainment and news. Using critical cultural studies to examine news structure and content, the paper argues that the rapid mushrooming of private TV channels in Pakistan created an industry that had little time and resources to train its media personnel or establish a set code of conduct and ethical journalistic practices. The research also reveals

how media deregulation, often brought about by globalization and democratization of the industry, can result in undesired consequences.

୬୦୧୪

Karalyn Berman

Faculty Advisor: Yarrow Axford

A Paleoclimate Record from Lake Sediments of Southwest Greenland

The problems of climate change loom, with implications including substantial warming and rising sea level. A significant source of potential sea level rise is the melting of the Greenland Ice Sheet; however, the climate history of Greenland (and thus susceptibility of the ice sheet to temperature change) remains poorly understood. Paleolimnology is a field that utilizes lake sediments to reconstruct the history of a lake and its surrounding environment. This project examines the sedimentary record preserved in the lake Tasiusarsuaq 1 (T1), located in Southwest Greenland. Two sediment cores taken from this lake contain records for much of the Holocene, the most recent geologic epoch, from 11,700 years ago to the present. Multiple proxies are used to create a robust paleoclimate reconstruction. Magnetic Susceptibility provides information about the minerogenic content of the sediment and Biogenic Silica informs an understanding of primary productivity throughout the record. Additionally, chironomid assemblages are used for temperature reconstruction. Chironomids are a family of insect that are nearly ubiquitous and well-preserved in lake sediments. Many species of chironomids are very sensitive to temperature, allowing them to be good paleoenvironmental indicators. These proxy records are combined with visual description of the sediments and with radiocarbon ages. Through this analysis, we conclude that the record captures this lake's transition from a submerged marine environment that was glacially fed to a non-glacially fed freshwater lake. By increasing understanding of past changes in climate, we will be better informed about future responses and future sensitivity to change.

ഗ്രര

Gustavo Berrizbeitia

Faculty Advisor: Cristina Lafont

Deliberative Direct Action: The Case of Black Lives Matter

Deliberative democratic theory has come under fire for its supposed hostility to direct action and other conservative tendencies (Sanders, 1997). Young (2001) has challenged deliberative democracy for its inability to insulate the free exchange of discourses from structural inequality, creating a problem which she terms "discourse hegemony" in which those discourses supported by powerful societal actors for their own gain continuously win out unfairly in deliberations; her response is to place deliberative value in putatively non-communicative direct action. In rebutting Fung's (2005) retort to Young arguing that direct action is still non-deliberative, drawing off the work of Jürgen Habermas (1998) and Cristina Lafont (2016, 2017), and most importantly by examining the Black Lives Matter movement, I develop a model of direct action grounded in deliberation which I call deliberative direct action.

Emily Blim

Faculty Advisor: Wendi Gardner

Effects of Social Support Order on Liking and Emotional Improvement

The current study applied the social comparison and emotional similarity theories to the realm of social support. We investigated the relative effectiveness of two different types of social support (validation and reappraisal) and how the order may make a difference in support recipient liking of support provider (confederate) and recipient emotional improvement. We hypothesized that the social support order of validation then reappraisal would produce the greatest liking for the confederate and the most emotional improvement. We tested this hypothesis on two types of distressed states (sadness over the loss of a pet and anger over an unfair or disappointing grade). Measures of personality, emotion, and liking for the other person were collected during the study preand post-interactions with a confederate. The results did not confirm that validation followed by reappraisal would increase liking of the confederate and, in fact, for the disappointing grade condition the opposite was true. Our hypothesis, however, was confirmed in the pet condition for participants with high levels of prior emotional intensity as measured by sadness and emotional improvement. Given the current study's mixed results and limitations, we believe further investigation is warranted.

ഗ്രര

Emily Bold

Faculty Advisor: Luisa Marcelino

Determining the Effect of Corallite Integration on Coral Bleaching Susceptibility

Rising ocean temperatures due to global climate change lead to the breakdown of the symbiotic relationship between corals and the algae that reside within each coral, providing them with food and energy. When under thermal stress the symbiont algae become a liability because they produce toxic products instead of food and are expelled from the coral, turning it white in color (coral bleaching). Bleached corals are more likely to be subject to predation and disease and can die if the symbiont algae are not repopulated. With coral death, the entire ecosystem collapses. However, some coral species are more susceptible to bleaching events than others. We explored if differences in susceptibility are biological in nature and looked at morphology and function of the individual colonies potential bleaching determinants. We hypothesized that colonies with high morphological and physiological connectivity between polyps (well integrated colonies) would be less sensitive to bleaching and death. We examined the skeletal structures and integration traits of 88 coral species by looking for correlation between the level of integration within coral colonies, taking into consideration several micro scale traits, and the bleaching response of the coral species. Analyzing this data led to the conclusion that highly integrated corals are less susceptible to bleaching. These results are indicative that micro scale traits are most relevant to understanding bleaching. Knowing which integration traits lead to higher bleaching susceptibility will provide valuable insight into which corals should be the focus of future protection and sustainability efforts.

Katie Branch

Faculty Advisor: Douglas Medin

Framing Effects on Social Perception

Native Americans sometimes refer to themselves as Indians and both "tribe" and "nation" are used to describe the 566 federally recognized tribal entities. Do these different terms elicit different positive or negative associations? Some have suggested that "Indian" and "Tribe" have different connotations than "Native American" and "Nation" but there is little or no empirical evidence bearing on these questions. I am studying the effects of framing terms related to Native Americans in order to analyze the perceptions of Native Americans. In addition, I am examining the role of Indian sports mascots in affecting these associations. By using a series of questions framed with one set of terms versus the other I assessed influences of these terms on impressions of Native Americans along dimensions of perceptions of relations to nature and stereotypes based on the Chicago Blackhawks logo. The responses are analyzed through a coding system, which sorts emotions, relationships to nature, and associations to the Chicago Blackhawks logo. While the data collected is still being analyzed, the preliminary findings show more stereotypical responses when participants are exposed to the Chicago Blackhawks. Additionally, preliminary analysis shows more positive associations with the term "Native American" versus "Indian". Whether these differences are significant will be concluded shortly. This research has important implications for understanding how different terms affect how people perceive Native Americans and the communities in which they live.

ହ୍ୟ

Sarah Bruyere

Faculty Advisor: Carl Petry

"Every Sin in the Decalogue:" Richard Burton's Literary Career

For the past year, I have studied Richard Francis Burton, a British Victorian author-explorer famous for his travels around the world, travelogues documenting these travels, and translations of "oriental" texts. Historians remember Burton for his obsession with sexuality and his salacious writings that seem outlandish according to supposed nineteenth-century standards of propriety and sexual repression. I received a summer research grant from Weinberg to travel to London to study Burton from a historical perspective, finding letters, pamphlets, and rare books that are basically inaccessible in the United States. With these materials, I learned more about Burton's attitudes toward "oriental" cultures, his relationships with his colleagues, and his outstanding literary career. Over the school year, I received a second research grant to collect materials in the Huntington Library in San Marino, California. Using funding from the Office of Undergraduate Research, I received hundreds of pages of Burton's correspondence that informed me about his relationships with other men who were similarly interested in oriental language, culture, and sex. Using these materials, I wrote an honors thesis that outlined Burton's career with a particular focus on his translation of the Arabian Nights, which is widely regarded as the magnum opus of his literary career. While several historians have already studied and biographed Burton's career, I examine his writings from a postcolonial perspective and with an emphasis on his interest in sexology, and his potential influence on later sexologists like Freud and Havelock Ellis.

Ross Chu

Faculty Advisor: David Figlio

The Effects of Home-Country Disasters on the Educational Performance of Immigrants

When large-scale crises take place around the globe, immigrant students from originating countries can experience disruption in their mental focus and underperform academically as they are indirectly impacted through friends and family members back home. This paper investigates whether the educational performance of immigrants is affected by natural and technological disasters taking place in their countries of origin. Since disaster events are largely unpredictable and unrelated to student attributes, the empirical strategy takes advantage of a natural experiment setting in which immigrants are randomly assigned the treatment of home country disasters. Using a database on global disasters and administrative school records from Florida, this study measures the extent to which immigrants' test scores on the FCAT test respond to crises in their countries of origin. Findings suggest that home country disasters have a significantly negative impact on immigrants' test scores, and the magnitude of this impact varies depending on the severity of a disaster and its proximity to the testing date. There are heterogeneities in treatment effects based on geographic region of home countries, and estimated effects are significantly larger for elementary school students and for immigrants with a high level of interaction with coethnic peers.

୬୦୧୪

Phil Davis

Faculty Advisor: Robert A. Orsi

Junctures in American Religion: The Confluence of Charismatic and Traditional Practice in Evangelicalism

Following the ascendance of Pentecostal and charismatic Christian groups in the second half of the twentieth century, Evangelicals have increasingly favored a religion marked by ecstatic corporeality and strong emotional experience in place of the old standard characterized by conservative corporeality and an ethereal engagement with the world. But how far has this shift gone? By studying evangelical Christianity on college campuses, I attempted to gauge the degree to which charismatic Christianity has become the norm in American evangelicalism. After completing historical research on the history of American evangelicalism, I conducted a string of interviews at Northwestern University, University of Illinois, and Wheaton College across three mainstream evangelical campus ministries: Cru, InterVarsity, and Reformed University Fellowship. Through these interviews I attempted to gauge the limits of charismatic influence on mainstream evangelical groups, digging into the wealth of evangelical experience on college campuses, which provides a natural projection of the future of evangelicalism. In my study groups, charismatic influence has touched nearly every corner of evangelical practice; however, traditional norms remain central to the practice of each of ministry. However, evangelicals appear poised to continue their adoption of charismatic behavior and in so doing follow the global pattern of the last thirty-odd years. This trajectory affects evangelical engagement with every conceivable facet of modernity. Moreover, the shift toward charisma will affect evangelicals' identities as actors in the broader American culture even as that shift is a product of sweeping patterns in that culture.

Rebecca Diesing

Faculty Advisor: Farhad Zadeh

Radio Observation of the Supermassive Black Hole at the Galactic Center and its Orbiting Magnetar

At the center of our galaxy a bright radio source, Sgr A*, coincides with a black hole four million times the mass of our sun. Orbiting Sgr A* at a distance of \sim 3 arc seconds (an estimated 0.1 pc) and rotating with a period of 3.76 s is a magnetar, or pulsar with an extremely strong magnetic field. This magnetar exhibited an X-Ray outburst in April 2013, with enhanced, highly variable radio emission detected 10 months later. In order to better understand the behavior of Sgr A* and the magnetar, we study their intensity variability as a function of both time and frequency. More specifically, we present the results of short (8 minute) and long (7 hour) radio continuum observations, taken using the Jansky Very Large Array (VLA) over multiple epochs during the summer of 2016. We find that Sgr A*'s flux density (a proxy for intensity) is highly variable on an hourly timescale, with a frequency dependence that differs at low (34 GHz) and high (44 GHz) frequencies. We also find that the magnetar remains highly variable on both short (8 min) and long (monthly) timescales, in agreement with observations from 2014. However, since that time, its flux density has increased by a factor of \sim 2. The cause of this increase is unknown. Finally, we find that the magnetar's flux density does not exhibit a significant frequency dependence between 34 and 44 GHz.

ഗ്രരു

Esteban Doyle

Faculty Advisor: Joseph Schofer

Evaluating Light Rail Transit in the United States

Since the 1980s there has been a sharp increase of cities building light rail transit (LRT). LRT is best defined as an electric railway that operates short trains on exclusive right-of-ways. This mode of public transit has been a popular choice among politicians and planners as a means to curtail congestion, and as an opportunity to spur economic development. However, benefits of LRT can only come to fruition if the system is utilized, and there is a significant mode shift away from privately own vehicles. Simply put, if you build it and they don't come, all you did was waste taxpayer money. Therefore, an evaluation of the effectiveness of LRT was required. Two main questions needed to be addressed. The first, which cities have high performing light rail systems? The second, which demographic and system factors distinguish successful systems from failed ones? High performing systems were defined as having a high level of ridership when normalized to the amount of service provided. It was hypothesized that older systems would perform better because they are in established markets. However, no such trend was shown. The most successful systems included Los Angeles, Phoenix, and Salt Lake City. To determine which factors drive utilization, multivariate regressions were used to isolate the significant variables. From this analysis, city population and service extend were the largest factors. However, many cities in the US have mediocre performing LRT systems. People should be skeptical of the benefits when politicians want to invest in LRT.

Amy Eisenstein

Faculty Advisor: Haydon Cherry

"Hollywood is Like a Durian": American Cinema in Interwar Singapore

My honors thesis in history explores the prevalence, colonial regulation and popularity of American cinema in Singapore during the 1920s and 1930s through the examination of primary source newspapers and colonial office archives. I conducted on-site research in Singapore funded by the Undergraduate Research Grant and the Buffett Institute for Global Studies. Throughout the interwar period, approximately ninety percent of the films screened throughout Southeast Asia hailed from Hollywood, yet very little is known about how these films were received by local audiences. British officials in Singapore implemented a Censor, who cut American films in fear that they would incite crime or defame the prestige of British colonial rule. The films themselves, though, prove that the Censor's cuts were largely arbitrary - banned and passed films both portrayed similarly lascivious content. Furthermore, contradicting British anxieties, Asian residents of Singapore viewed American films self-reflectively. They challenged existing and adopted new social norms on the basis of American films as skirts shortened, "okay" entered popular discourse, and Asian women flaunted the Janet Gaynor bob. Ultimately, colonial regulation, the films themselves and local perceptions are disjointed, and pointedly. What the British censored for, what themes the films portrayed, and how Asian residents of Singapore viewed the films were three separate enterprises, suggesting the ineffective aims of British social control in Singapore. In this oral presentation, I intend to focus on one film as a case study that illuminates the divergence of colonial censorship methods and local perception.

ഇന്ദ

Meredith Ford

Faculty Advisor: Alexis Lauricella

Gendered Advertising to Children: an Analysis of Differences in Male- and Female-Targeted Television Commercials

Children are impressionable customers, and the media they consume influences their behaviors and perceptions. Gender stereotypes are highly prevalent in children's media, which can often lead children to create idealized images of what boys and girls should be. This paper explores advertising in children's television commercials given changes in our society promoting gender equality. Researchers studied commercials from 20 different television programs for children to find differences in male-and female-targeted advertisements. Commercials were coded for product characteristics, characters, and commercial logistics. Results show that children's television networks primarily air male-targeted commercials. Additionally, female-targeted commercials were more likely to involve spokescharacters, and gender stereotypes for both boys and girls were most prevalent in female-targeted commercials.

ഗ്രര

Jing Gao

Faculty Advisor: Mark Mandel

Regulation of cyclic diguanylate during Vibrio fischeri biofilm formation

The marine bacterium Vibrio fischeri forms a specific symbiotic relationship with Euprymna scolopes, the Hawaiian bobtail squid. V. fischeri transition from free-swimming in seawater into an aggregated state within the light organ of the squid in a matter of less than three hours. Preliminary evidence suggests that some signaling pathways that regulate aggregation may also modulate levels of cyclic diguanylate (cyclic-di-GMP or c-di-GMP; JFB, C. Waters, and MJM unpublished data). Cyclic-di-GMP levels are regulated by enzymes; diguanylate cyclases (DGCs) that contain conserved GGDEF amino acid domains are involved in its synthesis, and phosphodiesterases (PDEs) with conserved EAL or HD-GYP domains modulate its degradation. We identified approximately 50 genes that may encode DGC or PDE function. These genes were isolated and cloned from V. fischeri genomic DNA and inserted into an inducible plasmid, which was then transformed into E. coli and mated into several different strains of V. fischeri. By overexpressing each gene individually in culture-based biofilm assays, we will determine which are active to regulate c-di-GMP turnover and may be involved in regulating biofilm formation. Our early results suggest that even though over 40 genes in V. fischeri encode c-di-GMP turnover domains, only a small number of them modulate biofilm phenotypes in colony biofilm assays. Our goal is to identify and characterize these active proteins and determine which fit into the currently defined biofilm signaling pathways.

ନ୍ଧର୍ୟ

Garrett Goehring

Faculty Advisors: Jeanette Colyvas, Mindy Douthit

Examining the Relationship Between Entrepreneurial Learning and Student Entrepreneurial Self-Efficacy

Entrepreneurship education at the post-secondary level has been growing rapidly due to an increase in demand for these courses. At the same time our understanding of the learning process in these courses has not kept pace with the growth in courses. This study uses a pre- and post- survey to examine the relationship between entrepreneurial learning in undergraduate entrepreneurship courses and student entrepreneurial self-efficacy. Through examining the relationship between completing entrepreneurial activities in the context of these courses and student self-efficacy for these activities, it was determined that a significant and strong relationship exists for certain entrepreneurial activities. These relationships are most likely the result of the instruction provided by the entrepreneurship courses.

Meredith Greene

Faculty Advisor: Quinn Mulroy Reader: Candice Player

Civil Rights Policy in Practice: Variation in the Provision of Language Assistance Services in Health Care

With 80% of US hospitals seeing limited English proficient patients on a regular basis, language assistance services are a pivotal component of ensuring equal access to health care. State and federal civil rights policies guarantee the provision of language assistance services to limited English proficient hospital patients. However, local civil rights advisory committees report there is variation in the degree to which hospitals comply with these policies. Through the development and analysis of an original dataset of qualitative interviews with compliance officers, language assistance services administrators, and healthcare workers from five Chicagoland health systems, this study examines what these policies look like in practice and how actors' self interests affect implementation. A healthcare provider interest in "prudentiality" and an unfamiliarity with the civil rights law landscape were found to impede implementation of future civil rights and healthcare policy and, more generally, confirm that the multi-actor principal agent model may be applied to the study of public policy.

ନ୍ଧର୍ୟ

Jacob Heggestad

Faculty Advisor: Michael C. Jewett

Characterizing Cell-Free Metabolism for Rapid Pathway Prototyping

Making chemicals from biological systems has been a promising and complementary approach to industrial chemical synthesis for decades. Often biological systems fall short in yield, titer, and productivity due to the balancing of cellular and engineering objectives. Cell-free systems, in which cells are broken open and cellular machinery is used, offer an approach to rapidly study metabolism, observe enzyme kinetics, and prototype pathways to speed up engineering design-build-test cycles in cells. One recent advance has been using cell-free protein synthesis to generate biosynthetic pathway enzymes in crude lysates to assemble complete pathways in a tube. This reduces the build time to a day and allows for rapid pathway monitoring and manipulation of physiochemical conditions to prototype hundreds of metabolic pathway variations in one go. However, these systems routinely underperform compared to other cell-free systems where cell-free protein synthesis (CFPS) is not used. We describe a series of experiments, using the production of n-butanol as a model, outlining the differences in metabolic profiles of cell-free systems with and without CFPS. We further try to alleviate these differences by testing the impact of alternative energy sources on cell-free metabolism. We found that the components of CFPS reactions inhibit the production of n-butanol, and that phosphateminimal and pH controlled setups are necessary. This is the first time that metabolite profiles have been extensively characterized in these cell-free systems for small-molecule production, and this gives insight into how to expand these cell-free frameworks to accelerate the engineering design-build-test cycle.

Rita Hirami

Faculty Advisor: Anthony Chen

Parental Perceptions of School Quality: Case Study in Chicago

This study aims to unpack how Chicago parents form their perceptions of high school quality and make schooling decisions for their children. More specifically, it looks into uncovering what specific factors influence parents' perceptions of school quality, what methods parents use to inform these perceptions, whether there are systematic differences in how different groups of parents assess school quality, and whether these overarching methods and resulting perceptions of schools are based on objective or subjective information. Through 18 semi-structured interviews of parents who lived in the same geographic area and had children either currently considering high school options or already in high school, I was able to gather detailed information about parents' school assessments among parents who, theoretically, had roughly the options available to them. I concluded that there are significant differences in how different groups of parents form these decisions, but that all parents tend to rely heavily on pervasive school reputations and word-of-mouth in developing their perceptions of school quality. As a result, the process of choosing a high school should not be viewed as objective or one-size-fits-all, which is important to acknowledge for educators, policy makers, and parents who are invested in school quality. Though this data comes from a small case study, these findings are significant because they start to fill in gaps in previous research, which overwhelmingly failed to look at how parents weighed many different school quality factors and the degree to which parents considered subjective information in informing their perceptions of school quality.

ନ୍ଧର

Ann Ho

Faculty Advisor: Evan Mwangi

Redressing Modernism: The Poetry of Grace Nichols 198x-2009

From her early work in the 80s to 2009's Picasso, I Want My Face Back, Nichols has ushered in a reimagined Black British literary modernism through experimentation with Afro-Caribbean literary forms and redressed notions of racialized and gendered postcolonial identity. In the mid-twentieth century, writers and literary scholars alike began retreating from Eurocentric representations of modernity, reflecting the need to articulate the multiple imbrications of identity, which a fairly monolithic discourse of white British modernism excluded. The purpose of this analysis is to show how the poetry of Grace Nichols is attempting, amid contending evocations of a white-washed, British modernity, to articulate a specific and deliberate politics of Black British modernity. In my research, I follow Nichols's construction of a Black British modernism through three major facets: reassembly of the grammars and lexicons of a Black British poetic language in her 1984 collection of The Fat Black Woman's Poems, reassembly of representations of the urban Black British community in her "Cat-Rap" (1986), and finally, reassembly of the Black, female face in her 2009 poem, "Weeping Woman." What I wish to achieve is a progression of analysis of Nichols's poetry that redresses the colonial modernisms which govern representations of Black British languages, voices, and faces. As such, the development of my argument will complement Nichols's construction and re-embodiment of both postcolonial and modernist representations in poetry.

Inje Hwang

Faculty Advisor: Claudia Swan

Appropriation and Cultural Development of the Porcelain Guanyin: How international commerce contributed to the development of porcelain visual cultures within the Early Modern world

Porcelain figurines of the bodhisattva Guanyin that were produced in the Dehua kilns of Qing China were widely distributed in both domestic and international commodity markets from 16th to 18th Century. During this period the visual language of these objects underwent significant changes in different locations across the globe as various historical factors changed the dynamics of their production and replication. The fluid process of image appropriation that took place within such contexts calls for a more comprehensive understanding of the term as opposed to its contemporary conventional connotation. This research examines how each agent of the commercial production and replication of the Guanyin figurines (the Qing porcelain artisans, the Japanese Christians, and the European porcelain factories) engaged in nuanced image appropriation of foreign visual elements according to its own cultural predispositions and financial incentives. I have examined relevant primary sources that document the socioeconomic contexts within each area of interest (Qing China, Early Modern Japan, and Early Modern Europe) to determine the disparate motivations behind engaging in image appropriations which involved either the incorporation or selective adaptation of both Christian and Buddhist artistic practices. The research enabled me to better understand the extent to which global trade economy contributed to the evolution of the Early Modern visual culture through both the introduction of foreign visual elements and the production of socioeconomic incentives. Through this research I hope to expand the dialogue concerning the flow of images and its cultural implications within the Early Modern Art History.

ହ୍ୟ

Brennan Jackson

Faculty Advisors: Keith Gordon and Alison Chang

The Effect of Real-time Knee Adduction Moment Feedback on Knee Loading during Walking

The external knee adduction moment (KAM) during gait is an important loading variable in medial tibiofemoral osteoarthritis, a degenerative joint disease in the knee. Recent studies have shown that knee flexion moment (KFM) and KAM impulse also play a role in joint loading and disease progression. We evaluated the effects of gait modification, using real-time first peak KAM visual feedback, on the first peak KAM, KAM impulse during stance phase, and peak KFM; and whether participants could maintain the KAM-reducing gait after feedback removal. Eleven healthy individuals performed a series of walking trials on a split-belt instrumented treadmill under 4 conditions of Baseline, Feedback, No Feedback Early, and No Feedback Late, with subjects being asked to reduce KAM feedback during the latter 3 conditions. Three-dimensional joint kinematics and kinetics during each walking condition were recorded by a 12-camera motion capture system and the instrumented treadmill. Change in each knee loading parameter across conditions was assessed using one-way repeated measures analysis of variances. Successful 20% reductions in KAM and KAM impulse were

achieved, without the negative effect of increases in KFM, during Feedback and No Feedback Early conditions. The altered gait patterns for lowering KAM were variable between subjects; each participant reported a combination of 2-3 modification strategies used for KAM reduction. The findings support the use of real-time KAM visual feedback for individualized gait modification to reduce knee load. Future studies to evaluate effectiveness in participants with confirmed medial knee OA or at risk for knee OA development is warranted.

ନ୍ଧର

Lauren Kearney

Faculty Advisor: David Dunand

Thermal and Microstructural Characterization of Ceramic Slurries for Freeze-Casting

Unidirectionally freezing a suspension, or freeze-casting, is a unique process that produces highly aligned, porous materials that can be utilized in a variety of different applications from filtration to biomedical devices. The pore width of these samples is highly dependent on the thermal conductivity of the ceramic particles in suspension. To investigate the impact of thermal conductivity, stabilized ceramic suspensions were produced with 40 nm particles with similar densities. Aqueous suspensions with high (CuO, 72 W/mK) and low (ZrO \neg 2, 2.04 W/mK) thermally conductive nanoparticles were solidified to characterize the interfacial curvature and the resultant microstructure of the samples. Specifically, suspensions with low thermal conductivity exhibit concave interfacial curvature. Further microstructural investigation reveals greater pore width at the edge of the sample than at the center. Suspensions with high thermal conductivity exhibit concave interfacial curvature. Pore width is greater at the center of the sample than near the edge of the sample. These results help define the influence of thermal conductivity on the micro- and macrostructure of freeze-cast samples and provide further direction on the use of freeze-casting for manufacturing and as a processing technique.

ନ୍ଧର୍ୟ

Jemina Legaspi

Faculty Advisor: Anto Mohsin

Different Perceptions of Audiences, Organizers and Scientists in Public Science Majlis Forum in Qatar

Science Majlis is a monthly public forum in Qatar that aims to provide a safe space for the community to discuss topics relevant to Science and Qatar. It was initially sponsored by the Qatar Environment and Energy Research Institute (QEERI). QEERI supported the forum between April 2015 and November 2016. Starting January 2017, the Science Majlis officially became under the management of Hamad bin Khalifa University. While both institutions aim to engage Qatar's society to discuss topics and issues of energy, environment, and health in the country, this research finds that conversations conducted in this forum are interpreted differently by members of the audience based on – among other things – their educational background, prior exposure of the topic, ease of participation, and relevance of the scientific question to their daily lives. The audience and scientist participation, to a certain extent, informs how informal science education functions in Qatar,

specifically relating to the possible belief of the notion of "deficit model" – the idea that the publics have a deficit understanding of science. This research shows that the publics don't necessarily have a lack of knowledge about the topics discussed, but they have qualitatively different understandings of them. Using qualitative data gathered from participant observations and interviews with the attendees and organizers of the Science Majlis, I will fail to disprove the hypothesis that the deficit model assumption was mainly the approach taken by the organizers of the Science Majlis, but some attendees show a good knowledge of some of the topics discussed.

ഗ്രര

Benjamin Levey

Faculty Advisor: Reuel Rogers

The Inward Turn of Chicago Drill

Drill rap, a subgenre of hip-hop intimately connected to Chicago street life and brought into the nation's musical mainstream by Chicago rapper Chief Keef, sounds and means differently than traditional forms of hip-hop. Unlike most hip hop, drill is outwardly unconcerned with mobility. This project explores drill's departure from hip-hop's traditional aesthetics and messaging, considering what about Chicago gave rise to this departure, the extent to which the departure categorizes the subgenre, and what the departure says about the counter-public of young people that create and consume drill rap in the city. This project is highly interdisciplinary: the contextualization of the departure relies on history and urban studies; the consideration of the extent of the departure incorporates content analysis and literary studies; the discussion of the significance of drill turns to cultural studies and political science. My research suggests that a sense of hyper-containment underlies drill's non-engagement with mobility, or what I deem the subgenre's inward turn. This hypercontainment, I determine, resulted from the fallout of the demolition of the city's high-rise housing projects (part of the Chicago Housing Authority's Plan for Transformation) and the gang fragmentation that followed the prosecution of many of Chicago's gang leaders in the 1990s. I then conclude that this hyper-containment should inform policy in Chicago, particularly policy that relates to young people on the city's South and West sides, and call for further research into drill, what I believe to be a tremendously significant yet under-researched cultural form.

ନ୍ଧର୍ୟ

Tess Levin

Faculty Advisor: Janice Radway

Political Possibilities of the Social Media Discourse about Sexual Assault: A Case Study at Northwestern University

This project examines how women students at Northwestern use social media to discuss sexual assault. I explored how these women's social media use affects their understanding of sexual assault, their selves in relation to sexual assault (their political subjectivity), and how these changes in understanding affect their political practices. This project enters a scholarly debate regarding how social media affects political participation. By focusing on sexual assault and deploying feminist theory, I sought to partially

answer this question. This study centers on 11 semi-structured interviews and 55 short-answer surveys with women aged 18-22. My analyses of these women's experiences provide in-depth accounts of how the social media discourse about sexual assault is experienced, interpreted, and how processes of change may be taking place in these women's lives and in the discussion of sexual assault itself. My research suggests that the social media discourse about sexual assault sexual assault leads to political changes within the women in this study. Enabled by the social media affordance of narrative-sharing, which recodes sexual assault as a public issue, these women gain critical new understandings; they perceive sexual assault as a pervasive and systemic issue rooted in gender-based inequality and perceive themselves as part of a larger social category of women. Such new understandings enable these women to confront sexual assault as a public and political issue. I hope this study evokes new ways of thinking about how social media can be used to perform feminist politics, and how to continue to make "the personal political".

ହ୍ୟ

Angela Lin

Faculty Advisor: Jason Seawright

Quantitative analysis of Palestinian-Jordanian identity and opinions toward refugees

Most statistical and econometric research on attitudes toward refugees and immigrants focuses on host countries that vary greatly from the displaced population. Little quantitative research is done on host countries with similar language, religion, and geography as the incoming populations, as is the case with Jordan and its Syrian population. After Lebanon and Turkey, Jordan has accepted the third highest number of Syrian refugees. However, Jordan exhibits a unique historical dynamic between its citizens and refugees: despite being the second most water-scarce country in the world and a nonsignatory of the 1951 UNHCR convention, it is the only Arab country to naturalize Palestinian refugees. Today, Palestinians constitute over half of the Jordanian population, with a significant portion of the country sharing genealogical history with Palestine. While the integration of Palestinian refugees into Jordanian society is considered an economic and social success, the sudden influx of Syrian refugees presents an opportunity to understand how Jordanian-Palestinian identity may influence perceptions toward Syrian refugees. I hypothesize that Palestinian identity, which is measured as a non-binary variable through a variety of dimensions, has a positive correlation with opinions toward Syrian refugees. Using a stratified sample collection of surveys from Amman, Jordan, various statistical measures and econometric models are used to understand non-binary Palestinian identity and opinions toward Syrian refugees. Such measures use both indirect and direct questions about perceptions to gain a comprehensive understanding of the direction and magnitude of opinions. Preliminary results conclude that self-perceived Palestinian identity in Jordan does have a significant effect on sympathy towards Syrian refugees. Non-Palestinian Jordanians tend to view Syrians most negatively within cultural and political dimensions, while all citizens, within varying gradations, tend to view Syrians as negatively affecting the Jordanian economy.

Ryan Martin

Faculty Advisor: Peter Civetta

American Mythology

This summer I received an Undergraduate Research Grant to investigate the political evolution of Ronald Reagan and develop a musical exploring how his life and ideology speak to broader cultural narratives about individualism. My historical research illuminated the power of Reagan's symbolism: even his supporters were drawn to what he represented about America more so than how he proposed to improve it. At the same time, Reagan's symbolism often distorts the more complicated truths of American history. Reagan believed that history was the story of great men: individuals who changed the course of the nation through their vision and determination. He saw himself as one of them. Real history, however, isn't the product of individuals working from the top down, but of groups of people working from the bottom up. Since realizing this through my grant, I've decided to move away from the story of one man's life and political evolution. Instead, I want to tell history the way it really happens: on the macro-level. To do this, I'm using the form of a concept musical, a theatrical style developed in the mid-late 20th century to describe a new wave of non-narrative musicals. The concept musical is the perfect conduit through which to make this statement about history because of the way it automatically relegates the importance of both individuals and narrative. My ultimate goal is to critique pop cultural accounts of history through a pop cultural account of history.

ନ୍ଧର୍ୟ

Tazim Merchant

Faculty Advisor: Daniel Lee

Assessing Heart Wall Function Using Strain Imaging

Background: Reduced heart function can be attributed to excessive pressure against which the heart must pump (afterload), a decrease in the muscle's ability to contract (contractility), inadequate stretching prior to contraction (preload) or a combination of the three. To improve diagnosis, we must be able to measure heart function while considering all these factors. We developed such an index: Strain (deformation in the heart wall tissue) divided by PV/M (left ventricular (LV) pressure at the end of contraction * LV volume/LV mass). We now aim to determine (a) the optimal contractility index and (b) the most sensitive analysis software for calculating such measures with induced changes in contraction.

Methods: Circumferential and longitudinal strain and strain rate were calculated using three analyses: feature tracking, DENSE, and SPAMM tagged imaging software in 8 normals at rest and with low dose dobutamine. Extracellular volume, and afterload were also determined and heart rate and blood pressure recorded.

Results & Conclusions: There were no significant differences in heart rate, blood pressure, or afterload between rest and dobutamine infusion. DENSE data was the most sensitive to changes in contractility while SPAMM tagged images were inadequate for analysis with dobutamine. Out of strain based indices of heart function, longitudinal strain and strain rate consistently depicted the induced increase in heart pumping. Out of the ratios evaluated, strain rate to afterload proved to be the optimal

method. Finally, extracellular volume showed a strong inverse correlation with increase in heart function, suggesting a clinically significant relationship between the two.

ନ୍ଧର

Udita Persaud and Odette Zero

Faculty Advisor: Michael Diamond

Increasing Access to Local Health Information and Resources through Health Desks at Public Libraries: a Novel Approach for Community-Based Collaboration and Asset-Based Development

Greater access to health information and resources can be a powerful vehicle for improving community health. Public health initiatives must strive to consolidate resources through cross-collaboration among public, private and civil society and provide these resources in a way that is accessible to those who need them the most. The HIRCULES Health Hub was founded upon the grounding idea of asset-based community development to improve health outcomes of Evanston and Skokie from the inside out. Health information desks at local libraries were created through a collaboration between health departments, federally qualified health centers, community-based organizations, public libraries and Northwestern University undergraduates. Libraries are trusted centers for research and learning, as well as an accessible support system for all community members. Since its inception in October 2015, the HIRCULES Health Hub has answered over 300 health information requests and connected patrons to a number of local health resources. HIRCULES works with local community-based organizations to organize health fairs and bi-monthly health lectures at public libraries, creates and consolidates qualified health information, and formed an ArcGIS health resources map of over 1,000 local organizations. Thus, the HIRCULES Health Hub serves as an effective and novel model for community sectors to join together to improve local health access.

ନ୍ଧର

Julia Popham

Faculty Advisor: Jules Law

Exploring the Pages of a Book

Last quarter, I took professor Jules Law humanities course, Technologies of Language. In the first week, I visited Northwestern's Special Collections and selected a 1638 copy of *Poems by John Donne With Elegies on the Authors Death*. I was struck not by the words, but by the physical book—by its characteristics of 17th-century hand printing, its deterioration, and its accumulation and visible history of readers' marks. Therefore, over the ten weeks I explored this book as a physical object of distance, mystery and anachronism. Through close description and analysis, I looked at tears, watermarks, annotations and versifications as integral components to the book's unique identity and lingual significance. Next, I connected my primary findings to the philosophies of Ludwig Wittgenstein and Jaques Derrida. Although the two philosophers differ in fundamental ways, both challenge the common notions of words constituting language, and pursuit constituting Platonic Truth. Thus, I use Wittgenstein and Derrida to examine how "language" can exist in the non-textual, and how "Truth"

can exist in a scale of physical idiosyncrasy. The project's final component is its ironic place in a contemporary medium: the digital. As our society lives the digital, I decided to craft the project on a digital art site, NewHive, in order to relevantly examine the physical through the ironic lens of the digital.

ନ୍ଧର

Kelly Powderly

Faculty Advisor: Danna Freedman

Discovery of a New High-Pressure NiBi Phase in a Diamond Anvil Cell

The discovery of new materials is crucial for solving today's technological needs. However, the formation of new compounds using traditional solid-state methods is difficult as the high temperatures employed in these reactions select for the most thermodynamically stable product, a phase space which is well explored for binary intermetallic compounds. High-pressure synthesis, combined with in situ characterization, has opened up a rich phase space to explore in the search for new materials. In this presentation we report the synthesis of a new high-pressure phase within the Ni–Bi binary system, β -NiBi. Using the *in situ* X-ray diffraction and laser heating setup at Argonne National Laboratory, we obtained structural information while accessing high pressures and temperatures in a diamond anvil cell. This allowed for the observation of β -NiBi forming at high pressures and temperatures and subsequently reconverting to ambient pressure α -NiBi upon decompression. Using X-ray diffraction data obtained at high pressures, we solved the crystal structure in the TII structure type, which is characterized by zigzag chains of nickel and bismuth. The ability to observe the structural transformation from α -NiBi to β -NiBi may yet elucidate the driving force of the phase transition and give insight into what stabilizes intermetallic bismuth compounds. The success of the high-pressure investigation presented herein, in combination with previous syntheses of new transition metalbismuth compounds using high-pressure techniques, validates the strength of *in situ* characterization at high pressures as an exploratory method.

ହ୍ୟ

Anna Preston

Faculty Advisor: Thomas Meade

Cobalt(III) Schiff Base Complexes for Inhibition of Metal-Mediated Amyloid-Beta Toxicity

Alzheimer's Disease (AD) is a neurodegenerative disease that progressively and irreversibly impairs the neurological functioning of its victims, causing memory loss, loss of motor functions, and ultimately, death. As many as 5 million Americans suffer from AD1, and no cure or definitive cause has been identified. However, the amyloid-beta (A β) protein, which exists in two endogenous isoforms and is found in the plaques that diagnostically characterize AD, is thought to be implicated in the disease mechanism. When complexed with endogenous metal ions, such as Cu2+ and Zn2+, oligomeric A β aggregates more quickly and is able to catalyze the formation of reactive oxygen species. For this reason, our project targets the metal-binding capacity of A β for modulation by a cobalt(III) Schiff base. The cobalt(III) Schiff base (Co-sb) complex comprises a cobalt (III) ion equatorially coordinated to an acacen Schiff base and with two axial ligands that dissociate in solution. This dissociation allows the cobalt (III) ion to bind A β at the N-terminal histidine residues where it would normally bind Cu2+ or Zn2+. We assessed the modulation of A β aggregation and toxicity by Co-sb, using a ThT aggregation assay and a DCFDA assay respectively. Co-sb was found to be effective at inhibiting A β aggregation at 0.5 equivalents for both isoforms, as well as at their endogenous ratio. Preliminary results also indicate that Co-sb effectively reduces H2O2 production of A β , but further work is needed to optimize the assay for a cellular environment and improve on quantification metrics. Future work will also include the completion of a competitive binding assay, in which immunoprecipitation will be used to determine whether Co-sb is able to displace Cu2+ and Zn2+ from their binding sites on A β .

ହ୍ୟ

Katie Rim

Faculty Advisor: Claudia Haase

Associations Between Cognitive Reappraisal and Anxiety: Socioeconomic Status as a Moderator

Cognitive reappraisal is defined as thinking about an emotional situation in ways that reduce negative emotion. Reappraisal is considered an adaptive emotion regulation strategy and has been associated with greater mental health, including lower anxiety. However, few studies have examined potential moderators in this association. The present study examined socioeconomic status (SES) as a moderator of reappraisal and anxiety in a sample (N=84) of married couples. Reappraisal was measured using (a) a perceived reappraisal measure (i.e., Emotion Regulation Questionnaire reappraisal subscale; $\alpha = .85$) and (b) a performance-based measure (i.e., subjective sadness experience and autonomic physiology [i.e. heart rate, skin conductance and respiratory sinus arrhythmia] in response to a sad film clip in a reappraisal vs. just watch condition). Anxiety was measured using the Beck's Anxiety Inventory (α =.90). SES was operationalized as annual income and education. Regression analyses showed an interaction between income and (a) perceived reappraisal (B=.04,SE/B = .02, p=.05) as well as (b) performance-based reappraisal (B=-.02, SE/B = .01, p=.04) such that greater perceived and performance-based reappraisal predicted lower levels of anxiety at low income (ps < .05) but not at high income (ps > .05) levels. Similar results were found with education as a moderator. Results were specific to the subjective experience of emotion and did not emerge for physiological measures of reappraisal. These findings contribute to our understanding of the importance of socioeconomic context in moderating associations between emotion regulation and mental health. Thinking about situations in ways that reduce negative emotion appears to become most important in low-SES contexts, and this has important implications for prevention and intervention.

Isabel Robertson

Faculty Advisor: Henry Binford

Abuse to Acceptance: Cleveland's Italian Community from 1880-1920

Each successive wave of immigrants to America has faced prejudice founded in fear and uncertainty. Immigrants from Italy were particularly discriminated against in the early years of their arrival, from 1880 through 1920. They faced violence, racial slurs, and media attacks based on an unsubstantiated stereotype of criminality. This project set out to discern how the Italian immigrant community in America, through the case study of the city of Cleveland, evolved from being despised and racialized to being accepted as white Americans. Archival research, historical newspaper articles, and manuscripts such as letters and Americanization pamphlets largely inform the writing, in addition to secondary scholarship and memoirs. The paper lays out first the context in which immigrants came to Cleveland and where in the ethnic fabric they fit, then the negative reputation and stereotyping that the Italian population faced, and finally the Americanization processes of the Italian community in Cleveland. Economic mobility, support from hometown societies, individual community leaders, and the racial dynamics of Italians' white skin and subsequent discrimination against African Americans each contributed to the trajectory of Americanization for Italian immigrants. That trajectory is a pattern that every European ethnic group has faced to some degree through the history of American immigration. This arc of shifting 'whiteness' and gradual Americanization may provide a framework for understanding present-day immigration and ethnically based discrimination.

ହ୍ୟ

Jacob Rosenblum

Faculty Advisor: Dan Lewis

Predicting Chicago Veterans' Returns to Homelessness after Housing Placement

The Chicago's Ending Veterans' Homelessness Initiative (EVHI) aims to construct a risk assessment tool to pinpoint which veterans need increased case management to prevent them from returning to homelessness (RTH). Using a logistic regression methodology, it is hypothesized that substance abuse, mental illness, and low income levels should predict higher RTH risk. Random forest variable selection, followed by logistic regression, results show that none of these individual characteristics are significant. Instead, one's prior homelessness and program history - along with amount of SSDI income (aggravating) - predict RTH. The historical variables that significantly predict RTH are: number of prior times assessed (protective), number of prior times in which the client exited to a rental with a Veterans Affairs Supportive Housing subsidy (protective), prior times where the destination was not recorded (aggravating), number of times homeless (aggravating), number of times no data was entered for their primary reason for homelessness (protective), times where the client exited to a rental with no ongoing subsidy (protective), amount of SSDI income (aggravating), and number of nights spent in emergency shelter prior to assessment (protective). Overall, the data shows that case managers - who only have access to the data related to times a client accessed their organization - may not be able to use a predictive risk assessment. Rather, an organization with access to the entire Homeless Management Information System (HMIS) history of all veterans in EVHI
would need to work behind the scenes to tell case managers who should be prioritized based on RTH risk.

୬୦୧୪

Jake Rothstein

Faculty Advisor: Harvey Young

The Viability of Comedic Performance as Sociopolitical Speech: An Ethnographic Study at the Edinburgh Fringe Festival

I was motivated to study the viability of comedic material as a body of political speech by the threat of authoritarian populism to the western democratic arena. While traditionally, political rhetoric has contained some level of academic stoicism, the recent influx of emotionally charged speech motivated me to reevaluate the effectiveness of past methods of political speech and explore performative approaches. I traveled to Edinburgh, Scotland to perform an ethnographic study at the Fringe Festival, which hosts the largest body of coexistent, comedic work. I viewed more than 50 performances and executed more than 30 recorded interviews with performers from democratic nations and a local politician. I relied primarily on a qualitative approach based in these interviews and over 100 pages of field notes on the methodology of the performances themselves and the outlook of the performers. After performing the study, I was particularly interested in the differentiation between comedy about politics and viable political comedy. While comedy about politics seeks to simply mock disliked political actors, effective farce utilizes comedy as a medium to comment on or explain political phenomena. Additionally, I noted the effectiveness of clowning, based in a modernization of Buffon performance in French theatre, as more physical, but still viable method of performative speech. This adds to the existing body of knowledge by exploring political speech through the framework of performance methodology. Often projects on political performance focus on motivation, while I was particularly centered on effectiveness and performance theory, which will bolster existing literature.

ഗ്രര

Heiwon Shin

Faculty Advisor: Craig Duff

How Couchsurfing in Iran transforms the private into public space and connects an international community in a "land of contradictions"

Iran in media today barely goes beyond nuclear sanctions and strict religious rules. That is only a part of the "public" image. Inside people's homes, in private gatherings, the Iranian people can be themselves. I wanted to see what the role of Couchsurfing (a hospitality social networking service / in short a free and more social Airbnb) is in creating a new public domain within private spaces to go beyond the political, religious focus on Iran. I couchsurfed in Tehran and travelled to Yazd, a smaller and more traditional city, for a month in December 2016. I interviewed my hosts but also new Couchsurfers I met in events such as "Meet Afghan Refugee Students in Tehran," "Calligraphy," and "Reading 'Nahj al-Balagha"" (the second most holy text in Shiia Islam) in various secular environments. Based on the interviews, I learned that some busy Iranians use Couchsurfing to connect with the world outside of Iran by hosting foreigners, while some Iranians use Couchsurfing to go to events and connect with fellow Couchsurfers who share their passions like literature or hiking. Even within Couchsurfing, tolerance and discrimination, and tradition and experimentation coexist. Through the lens of this hospitality community, we can look at the people's Iran and better understand the contradictions the society is known for.

ନ୍ଧର୍ୟ

Kevin Slack

Faculty Advisor: Kevin Boyle

Segregating the Suburbs: New Rochelle in Black and White, 1900-1970

This thesis analyzes the role segregation and white flight played in the development of New York City's suburban Westchester County, particularly in regards to how white flight from (and within) New Rochelle during the 1940s, 1950s, and 1960s was presaged by the racial reification of the suburb's communal boundaries during the preceding four decades. Historians have charted how white flight after World War II trapped Blacks within urban spaces that public officials proceeded to devalue and underfund, but have paid less attention to the dynamics of white flight within, and between, suburban communities; nor have they analyzed the various housing and educational policies that enabled whites to create segregated suburbs even when those suburbs had substantial Black populations. Using newspapers, NAACP documents (including correspondences and press releases), title deeds, City Council minutes, and municipal government records, this project traces the development of New Rochelle's neighborhoods along racialized lines in the early twentieth century. It explores city officials' efforts to contain the suburb's burgeoning Black population during the 1930s and 1940s, and shows how these processes precipitated white flight in the 1960s. In doing so, this project showcases how integral white flight was to the suburban development process while also stressing the importance of considering inter-suburban (and intra-suburban) dynamics.

ନ୍ଧର୍ୟ

De'Sean Weber

Faculty Advisor: Peter Locke

Trauma-Informed Care at Heartland Alliance

My research examines how a trauma-informed paradigm of care is implemented by the Chicago-based health and social services NGO (nongovernmental organization) Heartland Alliance to address the impact of mental illness, addiction and homelessness among low-income Black beneficiaries. Often, mental health paradigms of care can work to depoliticize, decontextualize and pathologize experiences of trauma, which can lead to care that does not focus on the ongoing systemic issues that can lead to compounded and complex trauma. The aim is to understand if trauma-informed care meaningfully increases patients' sense of autonomy and their capacity to develop empowering—rather than pathologizing—autobiographical narratives that integrate their traumatic histories. Furthermore, I examined the way in which understanding trauma as a systemic and ongoing experience for Black Americans could be beneficial when providing mental health care. I examined the Black experience

and trauma through literature review, conversational participant observation, interviews, and illness narratives. Through my research, I have discovered that trauma-informed care leads to improved sense of power and agency for the beneficiaries, while moving past the narrative of victimhood towards a narrative of liberation from the complex trauma of being Black in America. The trauma-informed approach also enables the workers of Heartland Alliance an opportunity to provide unusually race-, class-, and otherwise context-sensitive care—which is often overlooked in traditional psychiatric care—for individual patients. This research could lead to better psychosocial support and community development that are more attuned to the systemic issues present in the lived experiences in the Black community.

ഗ്രര

Arielle Zimmerman

Faculty Advisor: Anthony Chen

Digitized Consciousness: The Impact of Digital Self-Tracking Devices for Health/Fitness on the Attitudes, Body Image, and Health Behavior of Male and Female College Students

Digital self-tracking devices for health/fitness have pervaded our society. These wearable technologies and smartphone apps promise us empowerment and control over our diets and workouts. Body image literature suggests that these devices may have unintended effects on young users, such as increased body insecurity, but research on self-tracking devices has not studied these consequences. In my senior thesis project, I examine if and how these devices impose social norms about health and fitness, which I term "neoliberal health norms" (e.g. health is an individual moral responsibility) and "gendered body ideals" (e.g. men must be muscular and women must be thin) on the young people who use them. Conducting semi-structured interviews with 20 undergraduate men and women with varying degrees of experience with these devices, I find that the devices themselves do not have a meaningful effect on young people's adoption of neoliberal health norms or gendered body ideals. Current self-tracking device users are highly similar to non-users in their thoughts about health/fitness, feelings about their bodies, and diet and fitness behaviors. Young men and women across both groups strongly believe that their health is a product of their individual actions, and gender rather than self-tracking device usage influences how these young people talk about their bodies and how they eat and exercise. I conclude that these devices bring users a "digitized consciousness" to act upon already internalized social norms about health and fitness. My findings thus validate existing health and body image literature, and suggest future directions for self-tracking scholarship.

50 Guide to Creative Arts Festival

In scheduled order of appearance

So Creative Arts Festival

8:00-9:30pm, Mussetter-Struble Theater

In scheduled order of appearance

Onyinyechi Ogwumike

Nne M Mary: Reconfiguring Fertility

In this project, Ogwumike conducted four interviews with her mother to create an oral history of her experiences with ambivalent fertility. She mobilized the oral history and literary review of other stories of Igbo womanhood to create a ceramic sculpture, through which she reimagines the visual representation of reproductive agency. The artist and her mother both identify as Igbo women, originating from the Abia State, Nigeria. Nne m Mary reconfigures the process and product of creating a ceramic fertility figure. The artist uses the ceramic medium to materialize the fragility of fertility constructs. Mary's oral history reflects the consequences of her relationship to her fecundity, and the concepts of womanhood she has internalized and reformed. For Mary, womanhood, cultural identity, and motherhood are performative duties. The sculpture's form emerges from a traditional dance Mary spontaneously performed mid-interview. The sculpture is constrained to the details most pertinent when considering how Mary behaves with increasing space to act in a manner accurate to herself. The artist reifies the form's stance, giving it an assured strut borrowed from Mary's dance. Igbo culture's binaristic opposition of success and failure as linked to childbearing is visually deconstructed by interrogating the dichotomy of full versus empty. Formally, these ideas are conveyed in the sculpture's irregularity. As the eye moves through the sculpture, it encounters rounded projections, squared bevels, and deflations. The form thus imagines an ambivalent manifestation of fertility, multifaceted and fluid, as accurate to the experience of the artist's mother. This project has given the artist the chance to show her mother the beauty of her mobility. The work demonstrates a reverence for women's narratives, and the worth of creative production to protect the humanity of subjects in ethnographic research.

ഗ്രര

Mahalia Sobhani

Eudemus Proteus

"Eudemus Proteus" is a series of poems on the topic of female sexuality and reproduction. Because these aspects of my own life are still so mysterious to me, and still so underrepresented, maligned, and misunderstood in politics and pop culture, I set out to explore them through the conceits of natural science, a field that is comfortable with quantifying the evasive. Performers: Mahalia Sobhani

Samuel Garcia

阳关三叠 (Three Tunes of Yang Guan)

This music sets a poem written by Wang Wei (王维) (699-759) during the Tang Dynasty. His poetry will be heard again in the second half of the program, in Three Album Leaves. The basic melody of Three Tunes of Yang Guan is from ancient China, and was first performed on a traditional Chinese instrument called the Guzheng (古筝). The music was first noted by Yang Yinliu and later arranged by Wang Zhengya. This arrangement for piano and voice, which transforms the traditional music into more of an art song, was made by Xia Yifeng in the 20th century. Performers: Samuel Garcia, Tenor Jason Carlson, Piano

ହରଙ୍କ

Rachel Hughes and Caroline Spikner

Zipadeegong

Rhythm surrounds everything, whether it's an explicit beat of a song, a cadence of a speech, or a walking pattern down the street. Rhythm, an everyday presence, is also a valuable tool used across multiple arts disciplines. Zipadeegong aims to exhibit how rhythm permeates many art forms, and explore how distinct artistic approaches to rhythm can be unified under a strong enough beat. For this project, a group of dancers collaborated with a film student and several jazz musicians to create a unique short dance film centered entirely on rhythm. The goal is to present the dancers moving rhythmically, filmed and edited in such a way that the beat is exemplified, rather than merely displayed. In addition to unifying the arts under the goal of rhythm, the piece also aims to expose the pedestrian nature of rhythm; a beat can appear out of anything and permeate our bodies in everyday life if one is looking (and listening) through the right lens.

Performers: Flux Dance Project, Sean van Dril and other jazz musicians

ନ୍ଧର

Tara Sennott

LaxBro

LaxBro is a short film that seeks to update the cinematic tradition of the long take using concepts developed in virtual reality and made possible with technology like green screen. Starring Robert Drewke as LaxBro and Brother Cinematography by Troy Lewis

ഗ്രര

Katy Murphy

H-

Despite the plethora of American pop culture that has erupted from the Vietnam War, little has actually explored the complicated nature of R&R: a military sanctioned vacation soldiers were permitted to take during their deployment. I was inspired by the story of my grandparents' R&R in Hawaii. Thus, with my SURG I embarked on an interview-based playwriting project to collect the stories of my grandparents' shared and individual experience during the war, specifically dwelling on their five days spent in Hawaii together. My research process this summer was broken up into three specific phases. Phase one was the collection of background information on Vietnam and what R&R in Oahu, Hawaii was like during the war. Phase two was the collection of primary source material (interviews conducted with my grandparents, the letters of theirs that I had access to, scanned-in Polaroid pictures from the time period, etc.) Phase three was the writing of the full-length first draft. Although R&R was meant to rest and reprieve, it was also the only time couples had to discuss upgrading their life insurance, how they hoped to raise any existing children, and even personal decisions like birth control. The beauty of my grandparents' story is that despite the separation, despite anxiety and occasional lapses in faith, they learned to find commonalities. The beauty of Hawaii, or H— as my grandfather calls it in his letters, is that it became a place in which they could both literally and metaphorically "meet in the middle."

ഗ്രരു

Diana Fu

Monologue from Tears at the Margins

Tears at the Margins is a theatre piece written from the oral histories of community leaders, artists, and activists in Oakland, California's Chinatown. The original premiere was May 25th – 27th, 2017, with an all Asian American cast and crew. This is not only significant as a theatre piece written, produced, directed, and performed completely by Asian Americans at a time when Asian American representation in art and media is lacking, but also because it illuminates the complexity and dynamism of Chinatown as an Asian ethnic enclave actively facing gentrification. For the Creative Arts Festival, I will be reading Stan's monologue. The scene begins with 17-year old Stan walking out of a gymnasium from his high school's dance in Oakland, California. He has just narrowly avoided a fight after standing up for a newly immigrated Chinese student who does not yet understand "the rules" of social conduct in a racially-tense high school.

ନ୍ଧର

Noah Perkins

The Temple on High

Puff, puff, pass. You may not even smoke, but you've probably heard the phrase before. It's in every stoners' vocabulary and yet, where does it come from? Well, if you want to find out, just come with me. The Temple on High answers this question and many more by taking you on a journey to the bastion of stoner culture. This immersive theatre piece takes you into the world of The Keepers, the

guardians of all stoner knowledge. A green education is to be had by all in this exciting new play written by Noah Perkins.

ନ୍ଧର୍ୟ

Alana Rosenbloom and Eliana Sanchez

Pretty Thing

This piece was originally made in our Documentary Production class with Debra Tolchinsky, Winter Quarter 2017. The documentary, centered on businesswoman Laura Kofoid, explores themes of beauty, style, time, and loss. Laura co-founded and runs her own business called "Laudi Vidni," that provides customized handbags, purses, and backpacks to its customers. As a female CEO, we wanted to highlight Laura's incredible ambition and perspective; however, even more compelling was how Laura has handled the hardship in her life and how those hardships have shaped her perspective. The intent of this piece is to highlight Laura's strength and wisdom and give a peek into how the big moments of her life impact her daily decisions. Furthermore, to explore the meaning of beauty and how beautiful things can be appreciated from an aesthetic point-of-view rather than a materialistic one.

Special thanks: Laura Kofoid

ନ୍ଧର୍ୟ

Alex Herz

A Normal Life - Narrative Feature Film

The first feature film from 19-year-old writer/director Alex Herz, A Normal Life is a semiautobiographical character piece that explores what it means to have a family member with a highfunctioning disability in the modern world. Michael, a week away from leaving for his first year of college, starts to become frustrated with his parent's overprotective tendencies toward his teen brother Nathan, who has Down syndrome. Shot over the course of several days, the story follows Michael as he attempts to grapple with the ambiguity of his situation, as well as the difficult emotions associated with leaving Nathan behind.

ନ୍ଧର

Poppy Shen

Aftermath of Rio2016 Olympics on Favela Vila Autodrómo

The summer Olympic Games in Rio de Janeiro was a huge success. I, as a volunteer for the badminton games, witnessed majestic new stadiums and inspiring stories of sporting glory. However, behind this amazing Olympic city, there lies a darker side. To make way for the Olympics, 22,059 local families lost their homes and more than 7 favela communities (urban slums) were knocked down. The hidden cost of the Games was the social sanitizing of the city. "The Olympics has nothing to do with our story," said a resident of Vila Autodromo favela, who battled to save his home from being demolished

for the construction of the Olympic Park, prior to the Games. Once home to more than 800 families, popular favela Vila Autodromo has now reduced to only 20 concrete houses.

I returned and spent 8 weeks in Rio de Janeiro conducting a multimedia journalism project about the aftermath of the Rio Olympics on the now broken community. Through living, interviewing and filming with residents of Vila Autodrómo, I put together a photo slideshow and a short documentary examining their current living situation and the impact of the Olympics through the eyes of the locals.

ഗ്രര

Landon Hegedus

National Parks Suite

The National Parks Suite is a six-movement suite for jazz sextet, comprising three wind players (alto & tenor saxophone, trumpet) and rhythm section (piano, bass, drum set). Each movement of the suite depicts the essence of five different national parks through the use of varying rhythms, orchestration, and timbre. The piece is a combination of through-composed and improvised material, allowing the performers to expand upon and embellish the written themes in a way that conveys each performer's artistic identity and expands upon the musical themes presented. The suite is composed in a way that creates a narrative arc over its six movements; however, any movement contained in the suite may stand alone as its own composition.

Excerpts from the National Parks Suite, composed and arranged by Landon Hegedus

II. Rainier III. Acadia

Performers: Sam Wolsk, *trumpet* Louis Danowsky, *alto saxophone* Landon Hegedus, *tenor saxophone* Sean van Dril, *piano* Brett Frey, *upright bass* Jared Decker, *drumset*

ഗ്രര

So Creative Arts Festival

Jury

Tara Mallen, Rivendell Theatre Mickie Pascal, Pascal-Rudnicke Casting Jennifer Rudnicke, Pascal-Rudnicke Casting Joe Zarrow, Playwright and Actor

ନ୍ଧର୍ୟ

Stage Manager

Sophia Barron

ഗ്രര

Master of Ceremonies

Grace Dowling

ഗ്രരു

So Guide to High School Showcase Presentations

NU High School Project Showcase Poster Presentations, 1:30 - 2:40

Wildcat Room (101), Big Ten Room (104)

Adlai E. Stevenson High School

- 1. Justin Lee, "Asteroid Ring Formation through Inelastic Collisions." Advisor, James Choi.
- 2. **Abhilash Raghuram & Abishek Kannan,** "The Effect of Teaching Methods on Test Results." Advisor, Christina Palffy.
- 3. **Sannidhi Sarvadhavabhatla,** "The Effect of Herbal Teas on the Heart Rate of Daphnia magna." Advisor, Christina Palffy.
- 4. **Shreya Sriram,** The Effect of Protein Purification on Target proteins PFK-1 and PFK-2." Advisor, Oscar Juarez.
- 5. **Shreya Viswanathan,** "Effect of Various Chelating Agents on the Mass of Lead Extracted from Soil." Advisor, Amy Gill.
- 6. **Caimin Xi,** "The Effect of N,N-Diethyl-3-methylbenzamid (DEET)-Containing Bug Repellent on the Germination Process of Raphanus Sativus (Radish) Plants." Advisor, Christina Palffy.
- 7. **Celeste Xu, Swarna Jammalamadaka,** "Effect of Brand of Contact Lens Solution on the Removal of Staphylococcus epidermidis." Advisor, Christina Palffy.

Aqsa School

- 8. **Amineh Ayyad,** "What's the Sitch?" Advisor, Sujud Ottman.
- 9. Hana Ishkirat & Jeneen Zahdan, "Orthopigic." Advisor, Sujud Ottman.
- 10. Illiana Sughayar, "Insects in Food." Advisor, Sujud Ottman.

Deerfield High School

11. **Annika Huprikar,** "Fruggie: A Board Game to Combat Obesity and Promote Healthy Eating." Advisor, Judy Luepke.

Glenbard East High School

12. **Mary Anderson, Deemah Qaq, Palak Patel, Richa Patel & Tyler Zondor,** "The Production of Human Leptin Using Cell-Free Protein Sunthesis." Advisor, Tom Martinez.

Glenbrook North High School

13. **Kamryn Abraskin, Brian Burke & Kendall Crispin,** "Cosmic Ray Study: The Effect of Detector Area on Shower Rates." Advisor, Tony Valsamis.

So NU High School Project Showcase Poster Presentations, continued

Glenbrook South High School

- 14. **Kiran Digavalli,** "An Analysis of the Performance of Diatomaceous Earth as a Substitute for the Tyre-Rubber Reinforcing Filler Carbon Black." Advisor, Michael Sinde.
- 15. **Sarah Erickson,** "Susceptibility of Three Bacterial Species to Non-Triclosan Topical Antiseptics." Advisor, Marianne Gudmundsson.
- 16. **Catherine Nowak,** "Ethyl Alcohol Based Hand Sanitizer's Effect on Healthy Bacteria." Advisor, Jill Serikaku.

Hinsdale Central High School

- 17. **Uma Bhattacharyya,** "Predicting Suicidal Ideation via Reddit Posts: a Text Mining Approach." Advisor, Yuheng Hu.
- 18. **Anna Kacergis,** "The Effects of Weight on Various Hormone Levels in Girls." Advisor, Mark Wollschlaeger.
- 19. Sanchayana Raghuvir, Parul Aggarwal, Zafar Siddiqui, Omar Iqbal & Jawed Fareed, "Anticoagulant Actions of recombinant Thrombomodulin and Heparin and their neutralization by FEIBA as measured by Thromboelastography." Advisor, Jawed Fareed.

Illinois Math and Science Academy

- 20. **Shriya Chennuru, Chandana Tetali, Blair Hu,** "The Effects of Phenol on Locomotor Behavior and Aging on Drosophila melanogaster." Advisor, Vandana Chinwalla.
- 21. Sonya Gupta, Shyam Sai, Shruthi Sundar, Daniel Mwangi, Goutam Gutta, "Targeting MLL Gene Expression Using CRISPR/Cas9 to Reduce Cell Density in Breast Cancer Cells." Advisor, Vandana Chinwalla.
- 22. **Yuri Oh,** "Characterization of Beta Arrestin Mediated CXCR4 Internalization after Treatment with Novel Small Molecule Ligands." Advisor, Richard J. Miller.
- 23. Akshaya P. Raghavan, "Using Statistical Models to Deduce Original Shape of Shattered Objects." Advisor, Eric Prebys.
- 24. **Mia Ye,** "Recent Temperature Changes in Chicago." Advisor, Qin Qin.

Lakeview High School

25. Chirag Lakshman, "Planaria: An Indicator for Safe Water." Advisor, Marcelo Caplan.

Lincoln Park High School

- 26. **Naa Asheley Ashitey,** "Effect of temperature on photovoltaic array." Advisor, Scott Payne.
- 27. Luke Coyle, "Musical Engineering Guitar Amps." Advisor, John Cabey.

So NU High School Project Showcase Poster Presentations, continued

Lincoln Park High School, continued

- 28. **Charles Freeman & Evannah Vernon,** "Efficacy of 3D printing in teaching high school and middle school students about the relationship between structure and function of opiates." Advisor, John Cabey.
- 29. Jorge Jaimes, "PBP." Advisor, John Cabey.
- 30. **Nathaniel Mohill,** "The Modulation of Amplitude Through an Aluminum Foil Medium." Advisor, John Cabey.
- 31. **Kira Ramirez, Cameron Feiler & Caroline Zareba,** "How Much Can a Tardigrade Handle?" Advisor, John Cabey.
- 32. Cheyenne Reggans-Jones, Edward Meza, Nitzan Aaron, Samiliar Birch & Brahzae Waddell, "The Science of Comics: Batarangs" Advisor, John Cabey.
- 33. **Bennett Shure,** "3-D Printed Personal Information Processor (Pip-boy)." Advisor, John Cabey.

Lindblom Math and Science Academy

- 34. **Kira Banks,** "Building a game system." Advisor, Elizabeth Copper.
- 35. Andrea Bossi, "Glacial Recession and Bio-Succession."
- 36. **Brycen Cousins,** "The Effect of Temperature on the Corrosion of Aluminum." Advisor, Elizabeth Copper.
- 37. **Ron Miranda,** "Pulse Width Modulated Magnetic Linear Accelerator." Advisor, Jesus Duran.

Niles North High School

38. **Sara Siddiqui,** "Charge Transport in Semiconducting TlPbI₃ Crystal for Gamma Radiation Detection." Advisor, Susie Posnock.

Von Steuben Metropolitan Science Center

- 39. Erika Anderson, Nooha Menk, Peter Yip & Marianna Garcia, "TrackThis: RFID Tracking System." Advisor, Emmanuel Aldana.
- 40. **Abigail Arnashus,** "Angling Energy for Vitamin D3 Synthesis Efficiency." Advisor, Jennifer Roden.
- 41. **Emma DeVarenne,** "Algae Fuel." Advisor, Mary Jo Arnashus.
- 42. **Hazel Rose Galvan,** "Aqueous v. Interfacial Route of Polyaniline." Advisor, Jennifer Roden.
- 43. **Malia Gehrenbeck,** "Grease Your Engines." Advisor, Urik Halliday.
- 44. **Brandon Gomez,** "Coding a Maze Solving Robot: Theory vs Reality." Advisor, Jennifer Roden.

80 NU High School Project Showcase Poster Presentations, continued

Von Steuben Metropolitan Science Center, continued

- 45. **Joren Ibarra, Erick Tobar & Pradhyum Patel,** "Whiteboard360" Advisor, Emmanuel Aldana.
- 46. Alvin Lam, "Effect Curvature has on a Line Sensor Robot." Advisor, Emmanuel Aldana.
- 47. Ivery Marquez, "Trash to Gas: Biomass." Advisor, Carrie Kaestner.
- 48. **Marcus Mrdak,** "Waterproof Bike Seat Cover." Advisor, Jennifer Roden.
- 49. **Samuel Oquendo, Mubin Hira, Brad Skorey & Kristopher Johnson,** "SmartVest." Advisor, Emmanuel Aldana.
- 50. **Jinson Padilla, Nathan Santana & Peter Wojnarowski,** "K-Org." Advisor, Emmanuel Aldana.
- 51. Michael Quan, "Advil: Gel vs Enteric?" Advisor, Michelle Klein.
- 52. **Sofia Rogel,** "The Heat Cure." Advisor, Carrie Kaestner.
- 53. Alex Rogers, Mohammad Jihaduddin, Rosendo Balmaseda & Alejandro Martinez, "EZ Tent." Advisor, Emmanuel Aldana.

Waubonsie Valley High School

54. **Hamsini Kala,** "Are P-C-O-S Patients More Likely to Be Diagnosed with Ovarian Cancer?" Advisor, Patrick Epley.

Judges for the NU High School Project Showcase, Poster Presentations

Adam Dempsey, Northwestern University Graduate School Albert Xue, Northwestern University Graduate School Alice Lucas, Northwestern University Graduate School Arjun Punjabi, Northwestern University Graduate School Ashty Karim, Northwestern University Graduate School Erin Anderson, Northwestern University Graduate School Fernando Castro, Northwestern University Graduate School Jen Guo, Northwestern University Graduate School Jessica Lenoir, Northwestern University Graduate School Melissa Barona, Northwestern University Graduate School Meriel Owen, Northwestern University Graduate School Michael Zevin, Northwestern University Graduate School Ryan Jones, Northwestern University Graduate School Sadie Witkowski, Northwestern University Graduate School Thomas Wytock, Northwestern University Graduate School Vicky Yang, Northwestern University Graduate School Y'Shanda Rivera, Northwestern University Graduate School

ഗ്രര

Zachary Hafen, Northwestern University Graduate School

NU High School Project Showcase Planning & Organization

Office of STEM Education Partnerships Amy Pratt, Michelle Paulsen, Phong Luu

ഇരു

80 NU High School Mentors

Ebony Calloway, Jonathan Cohen, Victoria Larsen, Nick Medrano, Will Oestreich, Grace Phelps, Carrie Willis

ନ୍ଧର

TAKE THE LEAD IN YOUR EDUCATION!

THE OFFICE OF UNDERGRADUATE RESEARCH OFFERS MANY OPPORTUNITIES TO GET INVOLVED:



Summer Undergraduate Mesearch Grants Get paid to do a Get paid to do a research or creative project of your choice - a great way to develop your own ideas & interests!

Academic Year Undergraduate Research Grants Money for research expenses for your research or creative project - expand your project in new and exciting ways!

Conference Travel Grants Present your research

or creative project at national or international conferences - meet the experts in your field, and show what you know!

UndergradResearch.Northwestern.edu/OUR

Northwestern UNDERGRADUATE RESEARCH



THINK. DO. SHARE.

A celebration of original research and creative projects by Northwestern University undergraduates

Presented in conjunction with Chicago area high school students and teachers participating in the NU High School Project Showcase

Visit UndergradResearch.Northwestern.edu

Northwestern UNDERGRADUATE RESEARCH