Table of Contents

2: Sessions at a Glance

3: Detailed Schedule

12: Symposium 101 for First-Time Attendees

14: Student & Mentor Awards

16: Acknowledgements

17: Index of Student Presenters

21: Extra Credit & Giveaway Entry Form

23: Abstracts

Visit ugresearch.ku.edu/symposium for a full list of abstracts and artists’ statements.
<table>
<thead>
<tr>
<th>Time</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 3 I: Posters</th>
<th>Session 2 I: Posters</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:45 to 1:20 pm</td>
<td>Registration: Presenter check-in at 5th floor lobby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 pm to 2:50 pm</td>
<td>Opening Session: Woodruff Auditorium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Welcome: John Augusto, Center for Undergraduate Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Opening Remarks: Chancellor Bernadette Gray-Little</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presentation of Awards: ACE Talks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACE Talks: Jesse Burbank, Joshua Marple, Jennifer Stern</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00 pm to 4:00 pm</td>
<td>Alderson</td>
<td>Big 12</td>
<td>Centennial</td>
<td>English</td>
</tr>
<tr>
<td></td>
<td>Session 2A</td>
<td>Session 2B</td>
<td>Session 2C</td>
<td>Session 2D</td>
</tr>
<tr>
<td>4:00 pm to 4:30 pm</td>
<td>Break: Join us in the 4th floor Lobby for snacks and a chance to mingle with friends, mentors, and family.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:30 pm to 5:30 pm</td>
<td>Session 3A</td>
<td>Session 3B</td>
<td>Session 3C</td>
<td>Session 3D</td>
</tr>
<tr>
<td></td>
<td>Session 3F</td>
<td>Session 3G</td>
<td>Session 3H</td>
<td>Session 3I: Posters</td>
</tr>
<tr>
<td>5:30 pm to 7 pm</td>
<td>Banquet: Ballroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Welcome: John Augusto, Center for Undergraduate Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presentation of Awards:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K. Barbara Schowen Undergraduate Research Mentor Award</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Undergraduate Research Mentor Award</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outstanding Presentation Awards</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Undergraduate Research Symposium Program
Saturday, April 23, 2016
University of Kansas, Kansas Union

12:45 – 1:20 Presenter registration (sign-in & name tags) – 5th Floor Lobby

1:30 – 2:50 Opening Session – Woodruff Auditorium

Welcome: John Augusto, Center for Undergraduate Research

Opening Remarks: Chancellor Bernadette Gray-Little

Presentation: ACE Talk Awards

ACE Talks:

1:50: Jesse Burbank, Space, Sex, and Race: Public Space as the Setting of Social Conflict in the Desegregation of K.C.’s Swope Park Pool, 1951-1955, mentored by Sheyda Jahanbani

2:10: Joshua Marple, An Alternative Eye Tracking System, mentored by Jonathan Brumberg

2:30: Jennifer Stern, Recurrent Evolution of Venomous Spines in Cartilaginous Fishes, mentored by Leo Smith

3:00-4:00 General Session 2

Undergraduate Student Panel: “Getting Started in Research”
Woodruff Auditorium

Oral Presentations – Sessions 2A-2H:

Session 2A: Alderson Auditorium (4th Floor)

3:00: Nicole Humphrey, Local Government and Social Equity: The Role of Chief Administrative Officers, mentored by Shannon Portillo

3:15: Jordan Jerkovich, The Road to a Sustainable Future: Renewable Energy in Kansas, mentored by Paul Stock & Ward Lyles

3:30: Abigail Schletzbaum, A Critical Analysis of NGO Operations in Post-Earthquake Nepal, mentored by Brian Lagotte & Kala Stroup
Session 2B: Big 12 Room (5th Floor)
3:00: Shawn Daubert, An application of social network analysis, mentored by Michael Vitevitch
3:15: Cornelius Baker, Racially and Ethnically Minoritized Groups and Their Perception of Mental Illness, mentored by Stephen Ilardi
3:30: Yee Ming Khaw, Familiarity and Affiliation with Anglo Names Affect Purchase Decisions of Chinese Food, mentored by Monica Biernat

Session 2C: Centennial Room (6th Floor)
3:00: Patrick Connelly, How Mimetic Expressions in Japanese are Comprehended by Adult Native Speakers, mentored by Utako Minai & Alison Gabriele
3:15: John-Patrick Doherty, The Left Periphery of Ibibio, mentored by Andrew McKenzie
3:30: Katherin Morales, Effects of Early Life Stress on Adult Neuronal Morphology, mentored by Cara Wellman
3:45: Hannah Morrow, The Effects of Motor Engagement on Semantic Retrieval for Flexible Object Use, mentored by Evangelia Chrysikou

Session 2D: English Room (6th Floor)
3:00: Vincent Fiorentino, Detection of Amino Acid Neurotransmitters in C. elegans via Capillary Electrophoresis, mentored by Susan Lunte
3:15: Ricardo Gonzalez, Detection of Peroxynitrite in Macrophage cells using HKGreen-4 and Microchip electrophoresis with laser induced fluorescence, mentored by Susan Lunte
3:30: Elise Gao, The Synthesis of Electrophilic Sultams as Potential Modifiers of HuR-mRNA Binding, mentored by Paul Hanson
3:45: Alex Kong, Establishing Kinetic Profiles and Degradation Pathways for the Tetracycline Destructases, mentored by Tim Wencewicz

Session 2E: Divine Nine Room (6th Floor)
3:00: Raul Flores, Synergistic mixed solvent effects on the conversion of fructose to 5-hydroxymethylfurfural for bio-fuel applications, mentored by Aaron Scurto
3:15: Dina Lyne, Calcium-Based Microspheres Containing PLGA for Sintering into 3D Scaffolds, mentored by Michael Detamore
3:30: Craig Vandervelden, Using Modeling to Reduce the Time Required for Immunostaining Cells Encapsulated in Hydrogels, mentored by Stevin Gehrke
Session 2F: Pine Room (6th Floor)

3:00: Sarah Anderson, Response of Periodical Cicadas to a Fragmented Landscape, mentored by Robert Hagen
3:15: Kristen Manion, Diversity of fungi on grasshoppers in urban and rural environments is similar in species richness and community structure, mentored by Benjamin Sikes
3:30: Christian Schillo, Whitetail Deer Populations at the University of Kansas Field Station, mentored by Robert Hagen & Lloyd Fox

Session 2G: Jayhawk Room (5th Floor)

3:00: Andrew Hoxey, Variation in Channel Steepness as Evidence for Uplift in the Western Nepal Himalaya, mentored by Michael Taylor
3:15: Bryce Tappan, Gold(I) Complexes of Azulenylthiolates: Molecular and Electronic Structures, Photoluminescence, and Reactivity Profiles, mentored by Mikhail Barybin

Session 2H: Malott Room (6th Floor)

3:00: Emily Donovan, Be Cool: A Short Story Collection, mentored by Tom Lorenz & Adam Desnoyers
3:15: Heidi Johnson, In Pursuit of Happiness, mentored by Meg Jamieson & Madison Davis Lacy
3:30: Samuel Powell, Smother, mentored by Meg Jamieson & Madison Davis Lacy

Poster Presentations:

Session 2I: Kansas Room (6th floor)

Sydney Bolin (#1), Microplastic Ingestion in Aquatic Invertebrates, A Method for Detection, mentored by James Thorp
Matthew Herndon and Caelan Graham (#2), Atmospheric [CO₂] affects resource allocation and growth in Nicotiana tabacum, mentored by Joy Ward
John Kelsh (#3), Probing the Senescence Associated Secretory Phenotype (SASP) in human follicular fluid: A potential marker of reproductive aging, mentored by Francesca Duncan
Claire Tracy (#4), Identification of Unknown Tadpoles from the Philippines, mentored by Rafe Brown
Asma Mukadam, Matt Hentges, Emma Overstreet, & Breanna Hoffman (#5), Pollen foraging of Kansas Native Bees, C. inaequalis, mentored by Deborah Smith
Madison Cline, Camille Claro, & Aletha Loeb, (#6), Co-culture of bacterial hosts Rhodococcus erythropolis and Gordonia terrae for bacteriophage isolation, mentored by Robert Ward
Aidan Dmitriev (#7), Characterization of the Lipooligosaccharide Transport System of Chlamydia trachomatis, mentored by Scott Hefty
Mason Marshall (#8), Corticotropin-releasing hormone receptor 1 mediates the interaction between low monoamine oxidase A activity and early stress in aggression, mentored by Marco Bortalato
Justin Massey (#9), Guilt by Association: Protein-Protein Interaction Screens in Chlamydia trachomatis, mentored by Scott Hefty
Justin Mehojah (#10), Ewsa inhibits TP53-mutation dependent tumorigenesis in zebrafish, mentored by Mizuki Azuma
Daniel Pham (#11), Studying Musashi-1 Function in Human Cancer Cells, mentored by Liang Xu
Miki Teferra (#12), Mitochondrial genome sequence variation, mutation accumulation, heteroplasmy, and haplogroups associated with Alzheimer's Disease, mentored by Eli Michaelis
Kayla Wilson (#13), Control of tissue specific growth in the larval trachea of Drosophila melanogaster, mentored by Robert Ward
Julia Santos (#14), Design, synthesis, and cytotoxicity study of short peptide analogues of anticancer agent cemadotin, mentored by Blake Peterson
Monica Ketchum (#15), Head Group Modifies the Extent of Surface Activity of Lipid Mixtures Interacting with the Synthetic Lung Surfactant Protein MiniB, mentored by Prajna Dhar
Sofia de la O (#16), Active microrheology to detect changes in viscoelasticity due to palladin-actin binding, mentored by Prajna Dhar
Kristina Hansen (#17), Model of Lateral Jetting Stimulation - A Reservoir Simulation Study Under Varying Reservoir Conditions, mentored by Reza Barati
Matt Hartenstein (#18), Analysis of an Artificial Bee Colony Algorithm Through Constrained Optimization of the Knapsack Problem, mentored by Kyle Camarda
Helena Salt (#19), Development of mechanically-tunable gelatin-alginate hydrogels to promote stem cell osteogenic differentiation, mentored by Arghya Paul
Kevin Tenny & Vikram Lakhanpal (#20), Process for Electro-Depositing Cobalt onto Carbon Substrates for Carbon Nanotube Growth for PEM Fuel Cells, mentored by Trung Van Nguyen
Aaron Hess (#21), Geologic Mapping and Geochemical Analysis of the Chimney Rock Fault and associated fault zone mineralization, Capitol Reef National Park, Utah, mentored by Diane Kamola
Robert Marshall (#22), Sea Level Rise and Guam: The U.S. Military's 'Unsinkable' Aircraft Carrier, mentored by Jay Johnson & Cornelis Van Der Veen
Emily Smith (#23), The search for electroweak production of a new vector-like quark T, decaying to a top quark and Higgs boson, mentored by Phil Baringer & Alice Bean
Emmaline Lorenzo (#24), Non-Resonant Two-Photon Excitation of p-Hydroxyphenacyl Diethyl Phosphate, mentored by Christopher Elles
Nicholas Martinez (#25), Generation and Crystallization of Human Cytochrome P450 Enzymes Involved in Cancer Therapeutic Activation, mentored by Emily Scott
4:00-4:30 – Break

Join us in the 4th floor lobby for snacks with your friends, mentors, and family.

4:30-5:30 - General Session 3

Undergraduate Student Panel: “Getting Started in Research”
Woodruff Auditorium

Oral Presentations – Sessions 3A-3H:

Session 3A: Alderson Auditorium (4th Floor)
4:30: Jerusha McFarland-Pitney, The Iraqis of Lawrence: Identifying factors of Iraqi immigration to Lawrence, Kansas through interviews, mentored by Brian Lagotte & Beverly Mack
4:45: Hannah Stevens, Quinton Buckhold, Erin Funk, and Philip Kaul, Effects of Pullout Interventions on Beginning Band Students’ Range, Embouchure Development, Breath Support, and Articulation: A Multiple Baseline Study, mentored by Martin Bergee
5:00: Ashlie Koehn, Testing the Porter Hypothesis in Transition Economies, mentored by Dietrich Earnhart

Session 3B: Big 12 Room (5th Floor)
4:30: Jeffery Durbin, Are We Our Brains? The Effects of Meta-Scientific Beliefs in Responsibility Assessments, mentored by Christopher Ramey
4:45: Joshua Mendoza, Making Music Speak: Simulated Cochlear Implant sounds and the Speech-to-Song Illusion, mentored by Michael Vitevitch
5:00: Madeleine Wilmsen, The influence of the number of syllables in a word on the speech-to-song illusion, mentored by Michael Vitevitch

Session 3C: Centennial Room (6th Floor)
4:30: Luanne Hale, Delayed Reward Value in Animal Models of Obesity, mentored by David Jarmolowicz
4:45: Sarah Cole, Attachment security and glucose: Can relationships increase our energy?, mentored by Omri Gillath
5:00: Will Fleming, Delay Discounting on the Miskitu Coast, mentored by David Jarmolowicz & Laura Herlihy
5:15: Jacob Chamberlin, High School Athletes’ Perceptions of the Motivational Climate in Their Off-Season Training Programs, mentored by Mary Fry

Session 3D: English Room (6th Floor)
4:30: Mackenzie Bloom, Quantifying Stem Cell Number in Mouse Colon Tissue, mentored by Kristi Neufeld
4:45: Jeremy Lippman, Influence of Childhood Obesity on Motor Unit Behavior of the Plantar Flexors, mentored by Trent Herda
5:00: Jessica van Loben Sels, The N Terminus of the HSV-1 E3 Ubiquitin Ligase ICP0 Stimulates Viral Replication and Gene Expression in Cells Exposed to Interferon-β, mentored by David Davido
5:15: Mason Wilkinson, Characterization of the Interaction of Yersinia Type III Secretion System Chaperone LcrG to Tip Protein LcrV, mentored by Roberto De Guzman

Session 3F: Pine Room (6th Floor)
4:30: Eric Becker, Canthariphilous Insects in Kansas and Costa Rica, mentored by Caroline Chaboo
4:45: Mackenzie Johnson, Clonal interference: the effect of detrimental mutations and finite genome size on the rate of evolution, mentored by Maria Orive
5:00: Matthew Gibson, Connecting the Breeding System to Mating Patterns in Macaronesian Tolpis Using Next-Generation Genomics, mentored by Mark Mort
5:15: Rachel Prather, Social abilities of C. familiaris and the related capacity for interspecies bonding, mentored by Jennifer Gleason

Session 3G: Jayhawk Room (5th Floor)
4:45: Eilish Gibson, Nuclear Interactions in the CMS Detector, mentored by Phil Baringer
5:00: Christopher Rooney, Motions of the Universe: The Velocity Correlation Function, mentored by Hume Feldman

Session 3H: Malott Room (6th Floor)
4:30: Megan Fox, The Third Murderer Mystery: An Editorial Genealogy, mentored by Jonathan Lamb
5:00: Trent Sanders, Our "Life of": A Literacy Autobiography, mentored by Phillip Drake
Poster Presentations:
Session 3I: Kansas Room (6th floor)

Aaron Anderson (#1), Development of the Adult Caregiver Sensory Profile, mentored by Winnie Dunn & Evan Dean
Aly Bauer (#2), Self-Determination Study, mentored by Susan Palmer
Ashley Bennett & Cassidy Nelson (#3), Introducing Empathy via Self-Other Overlap to Encourage Pro-Environmental Action, mentored by Rachel MacDonald
Cassidy Nelson (#4), Effects of Moderate and High Intensity Exercise on Positive and Negative Affect, mentored by Stephen Ilardi
Karthik Bonam, Crystal Dawson, Sarah Eckstein, & Hayley Hume (#5), Investigating the Effects of Video Games on Attention, mentored by Evangelia Chrysikou
Hannah Boyd (#6), Collective Memory of 9/11- Part 2, mentored by Glenn Adams
Halle Nick (#7), The influence of word overlap on the speech-to-song illusion, mentored by Michael Vitevitch
Abigail Hartzell (#8), Sound Localization in Reverberant and Noisy Settings, mentored by Kostas Kokkinakis
Shaina Stasi (#9), Effect of Glottal Source Characteristics on Speech Perception, mentored by Jon Brumberg
Alyssa Ott, Jamie Venzian, Shelbi Polasik, & Rebecca Kurtz (#10), They did what? A Systematic Review of Music Intervention Reporting in Healthcare Research, mentored by Deanna Hanson-Abromeit
Dustin Brockert (#11), Attachment Style, Sexual Strategies, and Love Songs, mentored by Omri Gillath
Keonya Jackson (#12), Tongue Twisters in Arabic speakers learning English as a second language, mentored by Joan Sereno & Michael Vitevitch
Emily Campbell (#13), Mood and Food: The Relationship Between Affect and Food Consumption in Adolescents, mentored by Christopher Cushing
Quinton Cheney (#14), Examining The Effects of Positive and Negative Priming on the Desirability of Marriage for Young, Never-Married Women and Men, mentored by Nyla Branscombe
Austin Flohrschutz (#15), The Effects of Andodal Transcranial Direct Current Stimulation Over Prefrontal Cortex on a Flexible Object Use Task, mentored by Evangelia Chrysikou
Alexandra Fowler (#16), Examining the Impact of Mood on Executive Function Using a Novel Measure of Emotion Regulation Flexibility, mentored by Evangelia Chrysikou
Karynn Glover (#17), Helping WIN (Women’s Intersport Network of Kansas City) Provide a Winning Environment for Girls in their Summer Sport Camps, mentored by Mary Fry
Terrence Harris (#18), Race, Poverty, and the Legitimacy of ‘Stop-and-Frisk’, mentored by Chris Crandall
Scott Curry (#19), Effects of Probabilistic Arrangements of Varied Incentive Magnitudes on Task Performance in a Simulated Work Setting, mentored by Florence DiGennaro Reed

Riley Hess (#20), Understanding what Black Men Want in a Chronic Disease Self-Management Program, mentored by Tamara Baker

Amy Ink (#21), Examining the Role of Income on the Association Between Chronic Illness and HRQOL in Youth, mentored by Christopher Cushing

Yee Ming Khaw, Emily Yoder, Amanda Gerber, & Cory Sessum (#22), Effects of Facial Expression Regulation on Physiological Responses, mentored by Evangelia Chrysikou

Dongyu Li (#23), Mother or Spouse? Filial Piety, Romance, and the Meaning of Love, mentored by Glenn Adams

Austen McGuire (#24), The Utility of Attachment Priming as an Intervention Among Youth with Traumatic Experiences, mentored by Omri Gillath & Yo Jackson

Baylee Owen (#25), The Association Between Adolescent Aggression, Drug Use, and the Role of Family Cohesion, mentored by Christopher Cushing

Shelby Rowley (#26), Subjective Informant Reports On Cognitive Decline In Older Adult Multiple Sclerosis Patients, mentored by Michael Vitevitch

Austin Svancara (#27), Distracted Driving Habits Among Self-Reported ADHD Groups, mentored by Ruth Ann Atchley & Paul Atchley

Hunter Tate (#28), Outcomes of Adopting Anglo Names among Chinese Students in the U.S., mentored by Monica Biernat

Nadia Vossoughi (#29), Racial Prejudice in Age Perception of Black Adolescent Girls, mentored by Chris Crandall

Elizabeth Waldberg (#30), The Effect of American Responsibility for Global Warming on Willingness to Act, mentored by Rachel McDonald

Cece Wolfner & Rucha Kandlur (#31), Depression and Dieting, mentored by Nancy Hamilton

Liran Ziegelman (#32), Cognitive Control in Preadolescent Children With Risk Factors for Metabolic Syndrome: A Longitudinal Examination and Reanalysis, mentored by Joseph Donnelly

Aadil Khan (#33), Social Dominance Hierarchy and Social Stress: The Role of Collective Self-Esteem in BMI and Waist-to-Hip Ratio of Female College Freshmen, mentored by Nancy Hamilton

Drew Belanger (#34), Bullying Intervention and Prevention, mentored by Anne Williford

Jonathan Dudrey (#35), Studying the effects of the Digital Divide both at home and abroad, mentored by Yvonne Chen

Marah Schlingensiepen (#36), Prisoners' Perceptions of Justice, mentored by Shannon Portillo

Paige Englert (#37), Kansas City Hopewell Scraper Study, mentored by Jack Hofman

Dory Tuininga, Jacob Goering, Dustin Patterson, & Cale Johnson (#38), Are You Safe Here? Spatial Perceptions of Safety at KU, mentored by Jay Johnson & Kees Van Der Veen
Taylor Ivey, Eric Lord, Jordan Lienemann, Lyndsey Varella, & Abbey Whisler (#39), A Heated Debate? Assessing KU Student Perspectives on Climate Change, mentored by Jay Johnson & Kees van der Veen
Xingzhe Tao (#40), Culture and Architecture in UAE, mentored by Nilou Vikil

5:30 – Symposium Banquet, Ballroom
For all student presenters, their mentors, and their guests. RSVP requested.

Welcome: John Augusto, Center for Undergraduate Research

Presentation of Awards:
K. Barbara Schowen Undergraduate Research Mentor Award (faculty)
Undergraduate Research Mentor Award (academic staff/graduate students)
Outstanding Presentation Awards (students)
Symposium 101

Is this your first time attending the Symposium? Most people haven't been to anything quite like a research symposium. It's an exciting event full of energetic people who care deeply about the topics they're discussing - that's what makes it so fun! But it can also be overwhelming as a first time attendee. Let's start with the basics:

What happens at the Undergraduate Research Symposium?

Students from a variety of departments and majors will present their projects. Some students will give short talks, while others will present a display of their work and talk with you about it when you stop by. During the opening session, we'll all be in the same room. For the next two sessions, you can choose which presentations you'd like to hear and go to a room of your choice. Ask questions of presenters. They have all worked very hard, and your questions help them improve and let them know that you are interested in what they've done.

What should I do when I arrive?

If you're attending as an audience member, we recommend finding a seat, silencing your phone, and taking a quick glance at the program booklet. Mark sessions, performances, and poster presentations that you want to be sure to attend. This strategy will help you keep your schedule straight as the day goes on. If you're presenting, be sure to check-in at the 5th floor lobby.

What's this booklet you gave me?

The program booklet is your guide to the day. It lists the times and locations for all of the sessions and breaks. You can read more about each presentation today online at ugresearch.ku.edu/symposium (click on “Full Program” to read abstracts and artist’s statements).

What should I do if I want to get involved in research?

- Make sure to go to one of the “Getting Started” panels during Session 2 or 3. We’ll have a group of students there to tell you about their experiences and how to get involved.
- Talk to at least two students about how they got involved in research. Poster sessions are an easy place to have this conversation. You can also
stick around after an oral presentation session to have a one-on-one conversation with a presenter.

- Get on the Center for Undergraduate Research’s website to join our mailing list so you can stay up-to-date about upcoming opportunities.

**What are the unwritten etiquette rules of a research symposium?**

Here are some general rules of thumb to help you avoid a symposium *faux pas*:

**Oral Presentations and Artist’s Talks:**

- If you want to take photos, be sure to get permission from the presenter ahead of time.
- Make sure your phone is silenced and put away.
- Pay attention to the performance or presentation; so don’t whisper to your friend or text your mom.
- Being an active participant by taking notes on intriguing ideas or jotting down questions during each presentation will help you get the most out of the day.
- Applaud the presenter at the end of the talk or performance.
- Ask questions at the end of the talk or performance. You might refer to your notes to help you remember your questions from earlier in the presentation. Questions that spark the best conversation typically follow up on something the presenter talked about; don’t set out with a goal of stump ing someone.
- If you arrive late or need to leave in the middle of a session, wait to move around until the breaks in between presenters. If that’s not possible, try to sit close to the door or at the back of the room.

**Displays or Poster Presentations:**

- If you see a presenter without an audience, don’t just stand there - go find out about that project.
- When you approach a display or poster presentation, introduce yourself and ask the presenter to explain the project.
- Ask questions, especially if the project is about a subject that is new to you. Your questions could just be about how the presenter got involved or what the next steps would be.
- Thank the presenter for telling you about the project.
**Student Awards**

**ACE Research Talks**

The ACE Research Talks are designed to showcase students who can present their research and creative projects in an (A)ccesible, (C)reative, and (E)ngaging way. Students applied for the awards by submitting a short video of themselves talking about their projects. The winners will receive $500 and be featured today during the first session of the Symposium. The ACE Research Talks are funded by the Center for Undergraduate Research.

**Outstanding Presentation Awards**

All student presenters (oral presentations, artist’s talks, and posters) at the Symposium are eligible to win one of the $50 Outstanding Presentation Awards. Judges will evaluate all presentations, and the award winners will be announced at tonight’s Symposium Banquet. All students will be emailed feedback about their presentation next week. The Outstanding Presentation Awards are funded by the KU Office of Research.

Sigma Xi will also be selecting poster and oral presentations in the health, social, behavioral, natural, and mathematical sciences and engineering for best presentation awards. Sigma Xi is an international, multidisciplinary research honor society. Its mission is to enhance the health of the research enterprise, foster integrity in science, and promote the public’s understanding of science for the purpose of improving the human condition. You can learn more about the KU Chapter of Sigma Xi at [community.sigmaxi.org/universityofkansas](http://community.sigmaxi.org/universityofkansas). Awards will be announced via e-mail after the Symposium. Awardees will be invited to attend the Sigma Xi Award and Induction Ceremony on May 6 at 3:00 pm.
Mentor Awards
The mentor awards honor the contribution of outstanding undergraduate research mentors to their students’ development and to their own discipline. Mentors are nominated through a two-part process: students, faculty, or staff submit recommendations for a mentor to be considered for the award, then home departments and supervisors submit full application packets. The 2016 nominees will be honored at the Symposium Banquet tonight. Congratulations to all of this year’s nominees!

2016 K. Barbara Schowen Undergraduate Research Mentor Award
(tenured and tenure-track faculty)

2016 Award Winners
Evangelia Chrysikou, Assistant Professor, Psychology
Shannon Portillo, Associate Professor, Public Affairs & Administration

Honorable Mentions
Jane Barnette, Assistant Professor, Theatre
Derek Reed, Associate Professor, Applied Behavioral Science

Nominees
Jonathon Brumberg, Assistant Professor, Speech-Language-Hearing
Mary Fry, Associate Professor, Health, Sport, & Exercise Science
Kelly Kindscher, Professor, Environmental Studies
Clarence Lang, Associate Professor, African & African-American Studies
Ward Thompson, Professor, Chemistry

2016 Undergraduate Research Mentor Award
(graduate students, postdoctoral researchers, & academic staff)

2016 Award Winner
Eric Welch, Visiting Assistant Professor, Jewish Studies Program

Honorable Mention
Susumu Iwasaki, lecturer, Health, Sport, & Exercise Science

Nominees
Renee Dinsmore, Ph.D. student, Public Affairs & Administration
Nader Hakim, Ph.D. student, Psychology
Kara Hinshaw, Ph.D. student, Molecular Biosciences
Mary Klayder, lecturer & Associate Undergraduate Director, English
Acknowledgements

The Center for Undergraduate Research would like to thank the following individuals and organizations for supporting this year’s Undergraduate Research Symposium:

KU Libraries
KU Office of Research
KU’s Research Ambassadors
Sigma Xi Honor Society
Staff from the KU Unions

The instructors who supported this event by offering extra credit to their classes
The volunteer judges and session presiders for today’s event

Coca-Cola

Finally, we’d like to thank the faculty, postdoctoral researchers, graduate students, and academic staff who mentor undergraduate researchers at KU. Without you, this day would not be possible.
# Student Index

<table>
<thead>
<tr>
<th>Student</th>
<th>Session</th>
<th>Student</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarah Anderson</td>
<td>2F</td>
<td>Paige Englert</td>
<td>3I</td>
</tr>
<tr>
<td>Aaron Anderson</td>
<td>3I</td>
<td>Vincent Fiorentino</td>
<td>2D</td>
</tr>
<tr>
<td>Cornelius Baker</td>
<td>2B</td>
<td>Will Fleming</td>
<td>3C</td>
</tr>
<tr>
<td>Aly Bauer</td>
<td>3I</td>
<td>Austin Flohrschutz</td>
<td>3I</td>
</tr>
<tr>
<td>Eric Becker</td>
<td>3F</td>
<td>Raul Flores</td>
<td>2E</td>
</tr>
<tr>
<td>Drew Belanger</td>
<td>3I</td>
<td>Alexandra Fowler</td>
<td>3I</td>
</tr>
<tr>
<td>Ashley Bennett</td>
<td>3I</td>
<td>Megan Fox</td>
<td>3H</td>
</tr>
<tr>
<td>Mackenzie Bloom</td>
<td>3D</td>
<td>Erin Funk</td>
<td>3A</td>
</tr>
<tr>
<td>Quinton Bockhold</td>
<td>3A</td>
<td>Elise Gao</td>
<td>2D</td>
</tr>
<tr>
<td>Sydney Bolin</td>
<td>2I</td>
<td>Amanda Gerber</td>
<td>3I</td>
</tr>
<tr>
<td>Karthik Bonam</td>
<td>3I</td>
<td>Eilish Gibson</td>
<td>3G</td>
</tr>
<tr>
<td>Hannah Boyd</td>
<td>3I</td>
<td>Matthew Gibson</td>
<td>3F</td>
</tr>
<tr>
<td>Dustin Brockert</td>
<td>3I</td>
<td>Karynn Glover</td>
<td>3I</td>
</tr>
<tr>
<td>Jesse Burbank</td>
<td>ACE Talk</td>
<td>Jacob Goering</td>
<td>3I</td>
</tr>
<tr>
<td>Jonathan Bush</td>
<td>3G</td>
<td>Ricardo Gonzalez</td>
<td>2D</td>
</tr>
<tr>
<td>Emily Campbell</td>
<td>3I</td>
<td>Caelan Graham</td>
<td>2I</td>
</tr>
<tr>
<td>Jacob Chamberlin</td>
<td>3C</td>
<td>Luanne Hale</td>
<td>3C</td>
</tr>
<tr>
<td>Quinton Cheney</td>
<td>3I</td>
<td>Kristina Hansen</td>
<td>2I</td>
</tr>
<tr>
<td>Camille Claro</td>
<td>2I</td>
<td>Terrence Harris</td>
<td>3I</td>
</tr>
<tr>
<td>Madison Cline</td>
<td>2I</td>
<td>Matt Hartenstein</td>
<td>2I</td>
</tr>
<tr>
<td>Sarah Cole</td>
<td>3C</td>
<td>Abigail Hartzell</td>
<td>3I</td>
</tr>
<tr>
<td>Patrick Connelly</td>
<td>2C</td>
<td>Matt Hentges</td>
<td>2I</td>
</tr>
<tr>
<td>Scott Curry</td>
<td>3I</td>
<td>Matthew Herndon</td>
<td>2I</td>
</tr>
<tr>
<td>Shawn Daubert</td>
<td>2B</td>
<td>Riley Hess</td>
<td>3I</td>
</tr>
<tr>
<td>Crystal Dawson</td>
<td>3I</td>
<td>Aaron Hess</td>
<td>2I</td>
</tr>
<tr>
<td>Sofia de la O</td>
<td>2I</td>
<td>Madeline Hoffman</td>
<td>3H</td>
</tr>
<tr>
<td>Aidan Dmitriev</td>
<td>2I</td>
<td>Breanna Hoffman</td>
<td>2I</td>
</tr>
<tr>
<td>John-Patrick Doherty</td>
<td>2C</td>
<td>Andrew Hoxey</td>
<td>2G</td>
</tr>
<tr>
<td>Emily Donovan</td>
<td>2H</td>
<td>Hayley Hume</td>
<td>3I</td>
</tr>
<tr>
<td>Jonathan Dudrey</td>
<td>3I</td>
<td>Nicole Humphrey</td>
<td>2A</td>
</tr>
<tr>
<td>Jeffery Durbin</td>
<td>3B</td>
<td>Amy Ink</td>
<td>3I</td>
</tr>
<tr>
<td>Sarah Eckstein</td>
<td>3I</td>
<td>Taylor Ivey</td>
<td>3I</td>
</tr>
<tr>
<td>Student</td>
<td>Session</td>
<td>Student</td>
<td>Session</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------</td>
<td>--------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Keonya Jackson</td>
<td>3I</td>
<td>Asma Mukadam</td>
<td>2I</td>
</tr>
<tr>
<td>Jordan Jerkovich</td>
<td>2A</td>
<td>Cassidy Nelson</td>
<td>3I</td>
</tr>
<tr>
<td>Heidi Johnson</td>
<td>2H</td>
<td>Halle Nick</td>
<td>3I</td>
</tr>
<tr>
<td>Mackenzie Johnson</td>
<td>3F</td>
<td>Alyssa Ott</td>
<td>3I</td>
</tr>
<tr>
<td>Cale Johnson</td>
<td>3I</td>
<td>Emma Overstreet</td>
<td>2I</td>
</tr>
<tr>
<td>Rucha Kandlur</td>
<td>3I</td>
<td>Baylee Owen</td>
<td>3I</td>
</tr>
<tr>
<td>Philip Kaul</td>
<td>3A</td>
<td>Dustin Patterson</td>
<td>3I</td>
</tr>
<tr>
<td>John Kelsh</td>
<td>2I</td>
<td>Daniel Pham</td>
<td>2I</td>
</tr>
<tr>
<td>Monica Ketchum</td>
<td>2I</td>
<td>Shelbi Polasik</td>
<td>3I</td>
</tr>
<tr>
<td>Aadil Khan</td>
<td>3I</td>
<td>Samuel Powell</td>
<td>2H</td>
</tr>
<tr>
<td>Yee Ming Khaw</td>
<td>2B &amp; 3I</td>
<td>Rachel Prather</td>
<td>3F</td>
</tr>
<tr>
<td>Alec Knutsen</td>
<td>3G</td>
<td>Christopher Rooney</td>
<td>3G</td>
</tr>
<tr>
<td>Ashlie Koehn</td>
<td>3A</td>
<td>Shelby Rowley</td>
<td>3I</td>
</tr>
<tr>
<td>Alex Kong</td>
<td>2D</td>
<td>Helena Salt</td>
<td>2I</td>
</tr>
<tr>
<td>Rebecca Kurtz</td>
<td>3I</td>
<td>Trent Sanders</td>
<td>3H</td>
</tr>
<tr>
<td>Vikram Lakhanpal</td>
<td>2I</td>
<td>Julia Santos</td>
<td>2I</td>
</tr>
<tr>
<td>Dongyu Li</td>
<td>3I</td>
<td>Addison Schile</td>
<td>2G</td>
</tr>
<tr>
<td>Jordan Lienemann</td>
<td>3I</td>
<td>Christian Schillo</td>
<td>2F</td>
</tr>
<tr>
<td>Jeremy Lippman</td>
<td>3D</td>
<td>Abigail Schletzbaum</td>
<td>2A</td>
</tr>
<tr>
<td>Aletha Loeb</td>
<td>2I</td>
<td>Marah Schlingensiepen</td>
<td>3I</td>
</tr>
<tr>
<td>Eric Lord</td>
<td>3I</td>
<td>Cory Sessum</td>
<td>3I</td>
</tr>
<tr>
<td>Emmaline Lorenzo</td>
<td>2I</td>
<td>Emily Smith</td>
<td>2I</td>
</tr>
<tr>
<td>Dina Lyne</td>
<td>2E</td>
<td>Shaina Stasi</td>
<td>3I</td>
</tr>
<tr>
<td>Kristen Manion</td>
<td>2F</td>
<td>Jennifer Stern</td>
<td></td>
</tr>
<tr>
<td>Joshua Marple</td>
<td>ACE Talk</td>
<td>Hannah Stevens</td>
<td>3A</td>
</tr>
<tr>
<td>Mason Marshall</td>
<td>2I</td>
<td>Austin Svancara</td>
<td>3I</td>
</tr>
<tr>
<td>Robert Marshall</td>
<td>2I</td>
<td>Xingzhe Tao</td>
<td>3I</td>
</tr>
<tr>
<td>Nicholas Martinez</td>
<td>2I</td>
<td>Bryce Tappan</td>
<td>2G</td>
</tr>
<tr>
<td>Justin Massey</td>
<td>2I</td>
<td>Hunter Tate</td>
<td>3I</td>
</tr>
<tr>
<td>Jerusha McFarland-Pitney</td>
<td>3A</td>
<td>Miki Teferra</td>
<td>2I</td>
</tr>
<tr>
<td>Austen McGuire</td>
<td>3I</td>
<td>Kevin Tenny</td>
<td>2I</td>
</tr>
<tr>
<td>Justin Mehojah</td>
<td>2I</td>
<td>Claire Tracy</td>
<td>2I</td>
</tr>
<tr>
<td>Joshua Mendoza</td>
<td>3B</td>
<td>Dory Tuininga</td>
<td>3I</td>
</tr>
<tr>
<td>Katherin Morales</td>
<td>2C</td>
<td>Jessica van Loben Sels</td>
<td>3D</td>
</tr>
<tr>
<td>Hannah Morrow</td>
<td>2C</td>
<td>Craig Vandervelden</td>
<td>2E</td>
</tr>
<tr>
<td>Student</td>
<td>Session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lyndsey Varella</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jamie Venzian</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nadia Vossoughi</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elizabeth Waldberg</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abbey Whisler</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mason Wilkinson</td>
<td>3D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madeleine Wilmsen</td>
<td>3B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kayla Wilson</td>
<td>2I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cece Wolfner</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily Yoder</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liran Ziegelman</td>
<td>3I</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EXTRA CREDIT & GIVEAWAY ENTRY FORM

Overview:

By attending three sessions, undergraduate students can enter for a chance to win a $25 gift card and get extra credit if they are enrolled in a participating class or program.

Instructions:

Fill out the information below. At each session you attend, see the session presider to get a stamp. You must be a current KU undergraduate and attend all three sessions to be eligible for one of the $25.00 gift cards. After the third session, turn in this completed form at the information table on the 5th floor of the Kansas Union (you will be asked to show your KU ID). Winners of the gift cards will be notified on Monday, April 25th.

Name: _______________________________________________________
KU Student ID #_______________________________________________
KU Email: ____________________________________________________
Phone #_______________________________________________________

Extra Credit for Classes & Programs:

If you are enrolled in any of the following classes or programs, check the box(es) next to the class/program. These instructors have emailed us to say they would like us to document which of their students attend the Symposium, so please fill in your class information if it is not listed.

Instructors who are offering extra credit will be emailed a list of student attendees by Wednesday, April 27th.

Note: this is not a full list of the classes that are offering extra credit, so please fill in your class information if it is not listed.

ECOE 124 Principles of Physical Geographical Models, MWF 10:00
EVRN 172 Kansas Landscape Projects, MWF 2:00, Al Bronson

GEOG 104 Principles of Physical Geography, MWF 1:00, Stephanie Willis

HIST 101 The Historian's Craft, TR 2:00, Jennifer Rhine
HIST 102 The Historian's Craft, TR 3:00, Jennifer Rhine

LING 100 Introduction to Language, MW 10:00, Annie Tremblay

LMNT 110 Language & Mind, MW 10:00, Michael Vitevitch

MCNAR Scholars Program

PSYC 105 General Psychology, Honors, TR 9:30, Michael Vitevitch
PSYC 200 Research Methods in Psychology, TR 1:00, Jennifer Rhine

SCMT 100 Supportive Educational Services, TR 1:00, Kendyl Siebart

UNIV 101 Orientation Seminar, TR 1:00, Lindsey Jenkings

UNIV 101 Orientation Seminar, TR 2:00, Lindsey Jenkings

UNIV 101 Orientation Seminar, TR 12:00, Lindsey Jenkings

TRIO Supportive Educational Services

Note: this is not a full list of the classes that are offering extra credit, so please fill in your class information if it is not listed.

Instructors who are offering extra credit will be emailed a list of student attendees by Wednesday, April 27th.

Note: this is not a full list of the classes that are offering extra credit, so please fill in your class information if it is not listed.

Instructors who are offering extra credit will be emailed a list of student attendees by Wednesday, April 27th.

Note: this is not a full list of the classes that are offering extra credit, so please fill in your class information if it is not listed.

Instructors who are offering extra credit will be emailed a list of student attendees by Wednesday, April 27th.

Note: this is not a full list of the classes that are offering extra credit, so please fill in your class information if it is not listed.

Instructors who are offering extra credit will be emailed a list of student attendees by Wednesday, April 27th.
<table>
<thead>
<tr>
<th>Session 1: Opening &amp; ACE Talks</th>
<th>Woodruff</th>
<th>1:30 pm to 2:50 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Woodruff</th>
<th>Alderson</th>
<th>Big 12</th>
<th>Centennial</th>
<th>English</th>
<th>Divine Nine</th>
<th>Pine</th>
<th>Jayhawk</th>
<th>Malott</th>
<th>Kansas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3:00 pm to 4:00 pm: Getting Started in Research Panel</th>
<th>2A</th>
<th>2B</th>
<th>2C</th>
<th>2D</th>
<th>2E</th>
<th>2F</th>
<th>2G</th>
<th>2H</th>
<th>2I: Posters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 3</th>
<th>Woodruff</th>
<th>Alderson</th>
<th>Big 12</th>
<th>Centennial</th>
<th>English</th>
<th>Pine</th>
<th>Jayhawk</th>
<th>Malott</th>
<th>Kansas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4:30 pm to 5:30 pm: Getting Started in Research Panel</th>
<th>3A</th>
<th>3B</th>
<th>3C</th>
<th>3D</th>
<th>3F</th>
<th>3G</th>
<th>3H</th>
<th>3I: Posters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Habitat fragmentation is the phenomenon in which a continuous habitat is divided into smaller, isolated areas separated by human-altered land cover. The periodical cicada’s 17-year life span makes it an ideal candidate for examining the long-term effects of habitat fragmentation. During the 2015 emergence Magicicada Cassini were collected at the Kansas Habitat Fragmentation Experiment. The experiment is set up as a matrix of different size patches; we focus on 311 plots within only the large and small patches. Studies in 1998 revealed that cicada oviposition was greatest in large patches and patches closer the forest edge. Density of emerging cicadas in 2015 was highest in large and near patches, matching 1998 oviposition. Oviposition records were also collected from the 2015 emergence for comparison. We used 1,086 metatibia lengths from exuviae as a measure of emerging cicada body size. Cicada body size is largest in the far patches and smaller in the near patches but shows no relationship to patch size or density of emerging cicadas. Variation and body size may be associated with differences in woody vegetation across the site.
Aaron Anderson  
Development of the Adult Caregiver Sensory Profile  

Mentor(s): Winnie Dunn & Evan Dean, Occupational Therapy  

The Child Sensory Profile 2 (CSP2) is a parent-report assessment used to measure a child’s response to their sensory environment. This test is widely used in occupational therapy practice and demonstrates good reliability and validity (Dunn, 2014). The CSP2 is appropriate for children ages 3-14. There is no caregiver report measure of sensory processing for adults. Practitioners need a caregiver report of sensory processing to better serve adults who cannot accurately answer questions about their responses to their environment.  

The aim of this study is to create a caregiver report version of the Sensory Profile 2 using similar methods that the co-investigator used to create the original assessment.
Cornelius Baker

Racially and Ethnically Minoritized Groups and Their Perception of Mental Illness

Mentor(s): Dr. Stephen Ilardi, Psychology

This study examines how racial/ethnic identities of African American and Hispanic/Latino people influence perception of mental illness. Previous studies have shown that the etiology of depression heavily involves the presence of stress which may lead to the development of depressive symptoms. When considering the stress one may experience as a result of racial discrimination or prejudice it could be hypothesized that people in these racially minoritized groups are more susceptible to depression. However the literature has shown that individuals in some of these groups have reported a lack of necessity for mental health care. One possible explanation for why these groups are not seeking professional help may stem from the stigma surrounding mental health in these communities. In the present study participants that self-reported as White, African American/Black, or Hispanic/Latino were recruited. Participants were asked to imagine themselves as the person being described in a series of vignettes relating to a physical illness (i.e. bronchitis) and a mental illness (i.e. clinical depression). Participants then answered a series of questionnaires assessing their perception of the diagnosis. Once the data is collected the language provided by participants in their justification for diagnoses will be analyzed for markers or themes that may be specific to each racial/ethnic group. This knowledge will hopefully aid in the ability to effectively understand the perception of mental health in marginalized racial and ethnic communities.
Aly Bauer

Self-Determination Study

Mentor(s): Susan Palmer, Beach Center on Disability

The purpose of this poster is to illustrate the current data procedures used in developing a new measure of self-determination for youth and adolescents with and without disabilities. The larger study uses student self-report surveys as well as teacher and/or family member survey results to measure the levels of self-determination in the students. In addition, several associated measures are embedded in the student survey to provide convergent and criterion-related validity for the new measure. Upon study completion in several years, this Self-Determination Self-Report measure might be used to help determine how self-determination relates to participants’ quality of life, how self-determination relates to positive psychology, and to extend knowledge about how teachers and families can support student achievement and learning.
Eric Becker

Canthariphilous Insects in Kansas and Costa Rica

Mentor(s): Caroline Chaboo, Ecology and Evolutionary Biology

Cantharidin is a defensive chemical produced by meloids, commonly known as blister beetles. It is a poisonous and acts as a feeding deterrent for both vertebrate and invertebrate predators. Though the ecology of cantharidin is poorly studied, experiments have shown that several insects are attracted to it. Possible explanations for this include these insects taking up the cantharidin to add to their own eggs in order to prevent parasitism and insects mistaking cantharidin for floral chemicals with similar molecular structures. To better understand the ecology of cantharidin, I baited traps with cantharidin at locations in Monteverde, a cloud rain forest in Costa Rica, and the University of Kansas Field Station to discover which insects, if any, are attracted to it.
Drew Belanger

Bullying Intervention and Prevention

Mentor(s): Anne Williford, Social Welfare

Due to advances in technology, bullying in schools has become increasingly more common, demanding action from parents. Bullying causes physical, emotional, and psychological problems for victims, bullies, and bystanders. Understanding the facts about bully-victim dynamics is essential before one can create an intervention program. School personnel plays a key role in determining how safe the school environment is, but more and more are being asked of teachers and faculty. Education plays a key role in both prevention and intervention – students, teachers, and parents need to be aware of the issue and be able to identify bullying behaviors and know the best course of action.
Empathy refers to an emotional response that mimics the expected emotional state or welfare of another. Self-other overlap is a measure of how similar one is able to see themselves as another. By using a series of overlapping circles, it is possible to measure the extent to which one is able to see from another’s point of view; circles with more overlap represents more similarity. Self-other overlap is an important aspect to consider because people tend to empathize only with those deemed worthy. This study implements a 2(self-other overlap vs. control) by 2(ecocentric/animal target vs. anthropocentric/human target). This experiment is designed as a follow up to a previous study, of which found interesting, but non-significant results. In reaction, the manipulation instructions were altered and now require increased participant engagement with the target. Additionally, the target image was placed within a news article discussing climate change, making the link between target suffering and climate change more explicit. Lastly, the follow up allows participants were given the opportunity to share their concerns on climate change policy in a letter to Obama. This study aims to measure the impact of empathy and target on environmental willingness behaviors and climate change prevention efficacy. Also, by coding the response to the letters to Obama, the ratio of positive to negative words and the ratio of suggestions to complaints per letter can be computed. This study hypothesizes that the positive to negative ratio will have a higher correlation with participant political party affiliation then with environmental willingness behaviors.
Mackenzie Bloom

Quantifying Stem Cell Number in Mouse Colon Tissue

Mentor(s): Kristi Neufeld, Molecular Biosciences

The Center for Disease Control identifies colorectal cancer as the second leading cause of cancer-related deaths that effect both men and women. Currently in the Neufeld lab two popular mouse models are used to study colorectal cancer, CD-1 mice and C57 black 6 mice (BL6). Past projects revealed that in 10-13 week old BL6 mice with a specific mutation in tumor suppressor Adenomatous polyposis coli (Apc), about 190 polyps were seen in the intestine, with 1-2 in the colon. These Apc-mutant mice were crossed back to CD-1 mice for 12 generations. The Apc-mutant CD-1 mice only had ~15 polyps in the intestine, with 5 of these being in the colon. This observation leads to many questions as to why one mouse strain is more likely to develop polyps than the other, and why the tissue distribution of polyps is altered. A widely controversial study published in Science describes a correlation between a tissues likelihood of developing cancer and the number of stem cell divisions that occurs in that tissue (Vogelstein 2015). The focus of this project is to quantify stem cell number in the colon and small intestine tissue of each mouse strain by performing in situ hybridization for Lgr-5, a common stem cell marker, using an ACD HybEZ Hybridization System. This data will provide a standard for quantifying stem cell number in colon/ intestinal tissue and reveal information about the correlation between the number of stem cells and the number of polyps in each of these mice strains.
Sydney Bolin

Microplastic Ingestion in Aquatic Invertebrates, A Method for Detection

Mentor(s): James Thorp & Rachel Bowes, Ecology and Evolutionary Biology

Plastic debris, the majority of which is microscopic (<1mm), has been reported in every open ocean and many freshwater lakes and rivers. Microplastics enter aquatic habitats through a variety of sources, and are bioavailable to a wide range of vertebrates and invertebrates, resulting in many adverse health effects. Recently, efforts to quantify the amount of microplastic pollution in aquatic systems has increased, but few studies have explored how microplastic pollution directly affects the amount of microplastics that accumulate in an organism due to ingestion. Here we investigate whether the amount of microplastics available in the environment correlate with the amount of microplastics found in invertebrate tissues, as well as develop a novel method for extracting microplastics (10-38μm) from biological tissues.
Karthik Bonam, Crystal Dawson, Sarah Eckstein & Hayley Hume

Investigating the Effects of Video Games on Attention

Mentor(s): Evangelia G. Chrysikou, Psychology

This study investigated the effects of video games on attentional skills for participants with video game expertise and non-experts. Participants were administered three attention tasks (Stroop, trail making, and hidden object) before and following a 25-minute gaming intervention. During each of the attention tasks, electrooculography (EOG) was used to record eye movements. The number of saccades present in the Stroop data, the mean amplitude for peaks in the trail-making and hidden objects tests, and the time to complete the trail-making and hidden objects tests were recorded. Participants’ scores were compared between the gaming and non-gaming groups and across participants. Our results showed that video game experts had fewer mean saccades in the Stroop test when compared to non-experts, both before and following the gaming intervention. There was a nonsignificant difference with regards to the trail making and hidden object tasks both between and within subjects. This study contributes to our understanding of the effects of video gaming experience on the breadth of attentional selection.
“I think it’s like the surface of never forget is never forget about the people that passed away. But Underneath it, it’s never forget that we let someone invade our country” (participant 10). In the decade since the attacks, people in the United States have socially constructed what occurred during the 9/11 event. For this study, we conducted personal interviews with ten, undergraduate participants and asked them their opinions and various thoughts on images and representations of 9/11, as well as the phrase “never forget”. Then, we asked if they commemorated 9/11 in 2015 and what they thought of the phrase, “never forget”. We then showed them six images that we found from our Internet search for “never forget”. We asked the participants to choose the image they most liked and the one they least liked. Overwhelmingly, the participants most liked the image conveying redemption, and least liked the image conveying loss. The results of our interviews indicate that many of the participants had similar memories and most had strong ideas, even if they had no personal connection to the event. This suggests that, since many of our participants were only three or four years old when the event occurred, their “memories” of the event were built partially from social scripts, or other collective constructions about the event.
Listening to music and songs has many important functions in people’s life (helping with emotion-regulation, resolving developmental tasks, such as identity formation, and providing entertainment). Songs are also thought to play a role in close relationships and mating. In the current study we examined the associations between love songs (preference for, use, and outcomes) and relational individual differences, such as attachment style (levels of anxiety and avoidance) and sexual strategies (short term vs. long term). To test this we recruited one hundred and forty four participants (63 men, 81 women, ages 18-30) and had them complete a battery of self-report online questionnaires. Results suggested that preference and use of love songs can be predicted from relational individual differences. For example, individuals who prefer short-term sexual strategies over long-term ones tend to report preferring love songs involving sex, which can help them get a partner in the mood for sex. Furthermore, people who are insecurely attached reported more negative feelings associated with listening to love songs. However, whereas people high in attachment anxiety reported feeling sad while listening to their favorite love song; people high in attachment avoidance reported feeling afraid while listening to their favorite love song. Finding that relational individual differences can predict the love songs people like, the way they use the songs, and the effects listening to the songs have on people, support a functional explanation for the role of love songs play in people’s life.
Jesse Burbank

Space, Sex, and Race: Public Space as the Setting of Social Conflict in the Desegregation of K.C.’s Swope Park Pool, 1951-1955

Mentor(s): Sheyda Jahanbani, History

This historical research project argues that the struggle to desegregate Kansas City’s Swope Park Swimming Pool was the result of not only a desire to maintain racial separation, but particularly racist fears of miscegenation. Accordingly, Black residents were treated as unworthy of full citizenship and enjoyment of local amenities. In a conflict emblematic of desegregation battles in cities across the Northern and Midwestern United States, civil rights activists succeeded in a legal maneuver to secure the pool’s integration. Further, the legal rulings resultant from this struggle contributed to the Supreme Court’s ultimate overturning of Plessy v. Ferguson and the doctrine of “separate but equal.” The desegregation of the Swope Park swimming pool thus holds implications for the citizenship of Black residents of Kansas City and for the United States’ legal evolution toward de jure racial equality.
Emily Campbell

Mood and Food: The Relationship Between Affect and Food Consumption in Adolescents

Mentor(s): Christopher Cushing, Psychology

Objective: Dietary behavior thought to be associated with emotional states such that negative affect is hypothesized to be positively related to high fat/high sugar foods and negatively related to fruit and vegetable consumption. Conversely, positive affect is hypothesized to be positively related to fruit and vegetable consumption and negatively associated with consumption of high fat high sugar food.

Methods: Participants consisted of 26 adolescents ranging in age from 13-18. (Mean=15.96). Of these 15 were male and 11 were female. Participants were asked to complete a survey assessing affect and diet once per day over the course of twenty days. Affect was measured using the International Positive Negative Affect Schedule—Short Form (IPANAS-SF). Additionally, adolescents were to report on how many healthy and unhealthy foods they ate.

Results: Multilevel models indicated support for the hypothesized association between positive affect and consumption of fruits and vegetables. Specifically, experiencing more positive affect than the average participant or more positive affect than typical for oneself were both positively associated with more fruit and vegetable consumption. Experiencing more negative affect than the typical participant and more negative affect than typical for oneself were both associated with greater consumption of fruits and vegetables. Experiencing more positive or negative affect than typical for oneself was significantly positively associated with consumption of high fat/high sugar foods.

Conclusion: These findings suggest that consumption of calories is associated with affect. Moreover, the current study helps to establish daily mood fluctuations as important variables for understanding consumption of empty calories.
Athletes benefit tremendously from working hard in off-season training (OST) because it sets them up to avoid injuries and perform their best during the season. Ironically, many athletes struggle to stay motivated to participate regularly in this training. Research has highlighted the benefits for athletes perceiving a caring and task-involving climate, where they gauge their success based on their personal effort and improvement, and perceive each member of the team is treated with mutual kindness and respect. Athletes who perceive a caring and task-involving climate on their teams are more likely to report greater adaptive motivational responses. Research has not currently examined athletes’ perceptions of the climate in OST programs. The purpose of this study was to examine the relationship between athletes’ perceptions of the climate in a summer OST program to their motivational responses. Athletes (N = 128; 90 males 35 females; mean age = 15.3 years) participating in high school OST summer programs completed a survey that included measures of intrinsic motivation, commitment, their valuing OST, feeling like it is their decision to participate in OST, their perceptions that their teammates take OST seriously, and attendance. A canonical correlation revealed that athletes who perceived a highly caring/task-involving climate reported higher intrinsic motivation, value of, and commitment to OST, perceived teammates take OST seriously, and greater attendance. Results suggest that creating caring and task-involving climates in OST may help athletes optimize their motivation to participate in important strength and conditioning programs.
Quinton Cheney

Examining The Effects of Positive and Negative Priming on the Desirability of Marriage for Young, Never-Married Women and Men

Mentor(s): Nyla Branscombe, Psychology
Contributors: Mea Benson

We examined gender differences in young, never-married women’s and men’s desire to marry, when positive or negative perspectives of marriage were considered. We predicted that when participants do not consider either the benefits or costs of marriage (control condition) or they do consider the benefits of marriage (positive perspective condition), young, never-married women will express more desire to marry than young, never-married men; however, when participants consider the costs of marriage (negative perspective condition), the gender differences in desire to marry observed in the control and positive perspective conditions will be eliminated. Separate ANOVAs (N = 252) revealed three main effects of gender. Women think about their future marriage significantly more than men, expressed a stronger desire to marry than did men, and felt more societal pressure to marry compared to men. Our expected gender difference in desire to marry was not confirmed by the data. However, the more control, in the form of choice, participants felt that they have over their lives, the more they felt that their future marriage would not end in divorce. In addition, feelings of societal pressure to marry was not related to “thinking” about future marriage but was positively related to desire to marry. Our results are in agreement with previous literature in that although the population of single women is ever increasing, the pressure to be married has a greater impact on the lives of single, never-married women compared to single, never-married men.
Madison Cline, Camille Claro & Aletha Loeb

Co-culture of bacterial hosts *Rhodococcus erythropolis* and *Gordonia terrae* for bacteriophage isolation

**Mentor(s):** Rob Ward & Erin Suderman, Molecular Biosciences

Bacteriophages are the ubiquitous viruses to bacteria that have a highly diverse population due to their evolution over billions of years. Bacteria, such as *Mycobacterium tuberculosis*, are becoming more resistant to antibiotics. Studying these bacteriophages is very essential to numerous fields of biology that can utilize their genes for comparative evolutionary research and to fields of medicine for discoveries in novel therapeutics against the many pathogenic bacteria. Last semester, the class learned the skills to isolate, purify, characterize, and annotated a novel bacteriophage using the host *Mycobacterium smegmatis*. 6,880 *Mycobacterium smegmatis* bacteriophages have been discovered to this date, but only 87 *Rhodococcus erythropolis* and 247 *Gordonia terrae*. *Rhodococcus* and *Gordonia* will be chosen as the new hosts the following year to find novel bacteriophages that will contain unique genetic information that can be used for subsequent studies. The complication with using only a single new host is the increased time and difficulty to isolate bacteriophages. A co-culture is the key to decrease the time and expense for isolation. We will develop a protocol for co-culturing soil samples and isolating new bacteriophage.
Attachment security and glucose: Can relationships increase our energy?

Mentor(s): Omri Gillath, Psychology
Contributors: Sarah Pressman, Dean Stetler, & Jackob Moskovitz

Attachment security has been shown to confer many benefits to the individual, such as increased compassion and altruism (Shaver & Mikulincer, 2005). Research has demonstrated that attachment security can be enhanced via priming procedures and this results in similar benefits (for a review see Gillath, Karantzas, & Fraley, 2016). However, it is still unclear what the underlying mechanism of security priming is. A related line of research focuses on the links between relationships and energy use suggests one explanation—security priming might increase energy levels. Here we investigated this possibility by examining whether enhancing attachment security via priming results in increased peripheral glucose levels. As security priming is thought to help mainly when people deal with stress/threat, we used a stress task to deplete metabolic resources. Participants (N=89) were exposed to either a security or a control prime, and following a stress task and recovery period provided saliva samples. As expected, security primes resulted in higher peripheral blood glucose levels compared with the neutral control prime. These findings suggest that our sense of physical and subjective energy may be enhanced by augmenting attachment security through priming procedures, and by extension, through our positive social interactions and relationships. Our study is the first to examine the links between attachment-specific security primes and glucose, providing a glimpse into the underlying mechanisms of security, and the role relationships play in our energy use.
Patrick Connelly

How Mimetic Expressions in Japanese are Comprehended by Adult Native Speakers

Mentor(s): Utako Minai & Alison Gabriele, Linguistics

It is a basic tenet of linguistics that the relationship between a word’s sound and its meaning is fundamentally arbitrary. Sound-symbolic words – i.e., those words which violate this tenet, also known as “mimetics,” e.g., Japanese uki-uki ‘elated,’ ‘on cloud nine’ – have long been regarded as peripheral. However, recent research has shown that there are languages like Japanese in which mimetic words are systematic linguistic phenomena deserving of analysis as such.

Despite advances, most research into Japanese mimetics remains impressionistic, without substantial empirical support. Akita (2010) attempts to address this by taking an empirical approach at categorizing mimetic semantics: Previous literature has identified three semantic categories of Japanese mimetics, one of which – “psychomimes” – Akita claims to be divided into three subcategories; and, unlike most of the literature, she provides empirical support for this claim.

However, her approach is not without problems: Specifically, it does not directly tap native speakers’ judgments of the naturalness of mimetic-containing sentences, and relies on more open-ended data. Therefore, in this study, we seek to provide more solid empirical support for her claim. To this end, we examined native speakers’ naturalness judgments of sentences containing Akita’s putative subcategories of psychomimes, using a five-point scale. The results will be analyzed according to Akita’s claims.
Scott Curry

Effects of Probabilistic Arrangements of Varied Incentive Magnitudes on Task Performance in a Simulated Work Setting

Mentor(s): Florence D. DiGennaro Reed & Conor M. Smith, Applied Behavioral Science
Contributors: Jason M. Hirst, Matthew D. Novak, Amy J. Henley, & Denys Brand

Previous research has demonstrated the effectiveness of incentive systems for increasing employee performance (Cook, T. Dixon, M. 2006). Because many organizations express interest in ensuring affordable incentive arrangements, research evaluating the modulating effects of incentive magnitude on the effectiveness of intermittent incentive delivery is a worthwhile endeavor. The purpose of this study was to evaluate the effects of probability and incentive magnitude on performance of a simulated work task. Undergraduate students completed a check-processing task for 5-min sessions and earned a probabilistic bonus (5%, 10%, 25%, and 90%) of two magnitudes ($1.50 and $0.75) for meeting performance criterion of 16 correctly processed checks/min. Using a combined multielement and ABAB design, two distinct patterns of behavior were identified. One pattern showed high response rates across both magnitudes and all probabilities. The other pattern revealed differentiated responding. [DRFD1] This pattern showed increased response rates during higher probabilities and the larger incentive condition. A cost-benefit analysis provides a possible explanation for the variable response patterns.
An application of social network analysis

Mentor(s): Michael Vitevitch, Psychology

Social network analysis has been used to understand how people in a group or organization are related to or interact with each other, and how those relationships influence the spread of information or disease among people in that group. In this project I used social network analysis to understand how individuals who were involved in criminal incidents together associated with or were not known by other individuals who were involved in criminal incidents. Mapping out such social networks could provide law enforcement officials with important information regarding crime prevention as well as identifying individuals at risk in those social networks. Law enforcement agencies have successfully used social network analysis to reduce homicide rates. Additionally, social network analysis can be used by law enforcement to help promote positive community policing interactions.
Sofia de la O

Active microrheology to detect changes in viscoelasticity due to palladin-actin binding

**Mentor(s):** Prajna Dhar, Chemical Engineering & Moriah Beck, Chemistry (Wichita State University)

**Contributors:** Coleman Vaclaw

Palladin is a human structural protein that primarily interacts with cytoskeletal components in cells and has been shown to play an important role in embryonic development, wound healing, as well as invasive cancers, and its overexpression correlates with invasive cell motility (Beck). Although there is evidence of palladin’s role in invasive cancers, a mechanistic understanding of palladin’s role is still unknown. The goal of this research is to use active microrheology techniques to study the contributions of different Ig domains of palladin, Ig3, Ig4, and Ig3-4, to palladin/actin interactions. In order to determine the rheological properties of samples, this active microrheology technique tracks the re-orientation of a magnetic nickel nanorod when a magnetic field is applied. Thus far, the microrheology technique has been calibrated doing microrheological experiments on different concentrations of glycerol in order to ensure the microrheological data is accurate. In vitro microrheology, where concentration, protein interactions, and buffer conditions can be controlled, will be used to obtain insight into the role of palladin in regulating mechanical behavior in actin networks and subsequent motility. Understanding cancer metastasis at the protein-protein interaction level will help to better understand cell propagation in a more holistic way.
Aidan Dmitriev

Characterization of the Lipooligosaccharide Transport System of Chlamydia trachomatis

Mentor(s): Scott Hefty, Molecular Biosciences
Contributors: Justin Massey, Michael Barta

Chlamydia trachomatis is a gram-negative intracellular pathogen that is the causative agent of blindness and genital tract illnesses such as Pelvic Inflammatory Disease, ectopic pregnancy and chronic pelvic pain. It is the leading cause of bacterial STI in the United States and blinding trachoma worldwide. As a gram-negative bacterium, C. trachomatis produces lipooligosaccharide (LOS) that has been shown to be essential for generating infectious chlamydia. We hypothesize that LOS is transported to the outer membrane by conserved protein machinery (Lpt – Lipopolysaccharide transport), similar to lipopolysaccharide (LPS) transportation in the model organism Escherichia coli. However, the components that comprise the Lpt system in Chlamydia are only partially known. Recently, we solved a crystal structure for the protein CT253 in C. trachomatis that exhibits structural similarity to the outer-membrane LPS transfer protein LptE in E. coli. In other bacteria, LptE has been shown to interact with LptD (outer membrane protein) and LptA (periplasmic protein). Bioinformatic analysis of chlamydial proteins has provided candidates for LptD and LptA in Chlamydia. To expand the potential Lpt complex, bacterial two-hybrid (BACTH) studies between LptE and these candidates will be performed. Additionally, in vivo association will be performed by affinity pulldown of CT253 (LptE) from Chlamydia lysates.
Recent developments in cartographic approaches to Generative syntax predict strong formal linguistic universals among the ordering of phrases at the clausal edge. Seminal investigations of Rizzi (1997), Cinque (1999), and others have demonstrated a need for an expanded left periphery in clausal structure, opposed to the traditional singular Complementizer Phrase (CP). This expanded CP domain is broken into an array of functional projections that are assumed to be present, when active, in every language’s clauses. This internal structure of the CP assumes at least a Force Phrase, Interrogative Phrase, Contrast Phrase, recursive Topic Phrases enveloping a Focus Phrase, and a Finite Phrase. A basic outline of these projections is laid out in (1) below where recursive phrases are marked with an asterisk:

(1)  [ForceP [InterP [TopP* [FocP [TopP* [FinP [IP…]]]]]]]

I test these strong theoretical predictions with Ibibio, a Niger-Congo language. I argue that on the basis of such diagnostics as focus fronting, topicalization, wh-movement, and polar questions, an expanded CP domain is indeed necessary, and does describe the ordering of many phrases. However, Raising-to-C in relative clauses (Duncan, Major, & Udoinyang 2014) and insertion of adverbials above ForceP presents problems for the necessary configuration in (1). I propose that the cartography of (1) is a bit too rigid for Ibibio, at least regarding these categories.
Be Cool is a collection of six short stories where coed misfits dream up how and fail to act cool. Each of the three protagonists’ two stories uses different narrative techniques. Whitney, a sorority girl who does not want to be caught out of sync with her sorority, is written with magical realism. She wakes up one day to find time has been untethered for her and she is literally out of sync. Paige, an art major with an unrequited love, is written with magical realism and fable elements. She gets relationship advice from the moon. April, a freshman searching for community, is written in the second person. She is/"you are" thrown into being totally lame at a party with her new friends. Magical realism and fable techniques allow readers to feel and discuss conflicts like anxiety/depression (as abstracted by Whitney being literally out of sync) and needing to let go of someone (as paralleled by the moon wishing she could ditch the ungrateful Earth) in humorous and less intimidating terms. Using the second person to narrate April’s party fouls throws the reader into the protagonist’s shoes and forces them to empathize and cringe along with her. Finally, limiting the collection to three protagonists who meet, appear in each others’ stories, and reappear chronologically for a second story makes the collection as a whole cohesive.
Jonathan Dudrey

Studying the effects of the Digital Divide both at home and abroad.

Mentor(s): Yvonnes Chen, Strategic Communication

The purpose of this research is to identify the causes and effects of the digital divide both in the US, and in the city of London. The digital divide is a term used to describe the inequalities between those that have access to information and communication technologies (ICT’s) and those that do not. This has been done by examining documents related to the status of the divide, as well as documents related to what actions are being taken to combat it both here at home and abroad. By showing the effects that the digital divide can have on an individual, this research highlights the importance of understanding and preventing the divide from growing larger in today’s society.
Jeffery Durbin

Are We Our Brains? The Effects of Meta-Scientific Beliefs in Responsibility Assessments

Mentor(s): Christopher Ramey, Psychology

In recent decades, increasing focus has been given to studying the brain as a proxy for understanding what it means to be “human,” eliciting a popular belief that human-ness results from the biological processes of our brains. This so-called “neurocentric” position forces us to consider if everything a person is—their thoughts, emotions, and desires—is just a product of having a brain, then this will affect our perception of ourselves and the responsibility for our actions and, more specifically, how we evaluate individuals for crime. In two experiments, the present study addresses this neuroethical issue through comparing how individuals change their perceptions of a person’s responsibility for criminal behavior when it is explained as either (1) a brain-related issue such as a chemical imbalance in the brain or a deformity, or (2) a psychological issue such as inadequate sleep, changes in diet, and a lack of focus. As data collection is ongoing, the study hypothesized that differences will arise between these two competing explanations such that individuals will more readily dismiss responsibility for the individual with a brain defect rather than a psychological issue. The emergent results of the study will be used to examine our perceptions of ourselves and others, and the consequent implications these perceptions have in scientific and legal domains.
Paige Englert

Kansas City Hopewell Scraper Study

Mentor(s): Jack Hofman, Anthropology
Contributors: Mary Adair

The purpose of this scraper study is to compare and contrast the style and use of scrapers found within the Kansas City Hopewell Complex. This can give insight to the possible differences within a culture, or demonstrate the strong similarities within a cultural complex. The sites from the Kansas City Hopewell Complex chosen for the scraper study are the Young site (23PL4) and the Trowbridge site (14WY1). Throughout the process of obtaining and interpreting data, it became clear that there were a greater amount of similarities among the scrapers between the two sites than differences.
Vincent Fiorentino

Detection of Amino Acid Neurotransmitters in *C. elegans* via Capillary Electrophoresis

**Mentor(s):** Susan Lunte, Pharmaceutical Chemistry & Nate Oborny, Pharmacology & Toxicology  
**Contributors:** Brian Ackley, Caitlin Schupp

This project focuses on analyzing the components of mutagenic *Caenorhabditis elegans* versus their wild type counter parts in order to better comprehend the modes by which the amino acid neurotransmitters are produced in the brain. Specifically the interest of this work is focused on the neurotransmitter GABA and its production via the enzyme glutamic acid decarboxylase (GAD). So far studies have only confirmed that GABA can be produced through this enzyme after GAD has been transcribed by its correlating gene *unc-25*. However analytical research with mutant *C. elegans* that have this specific gene, *unc-25* omitted from expression have shown signs that GABA is still able to form. Thus this project aims to determine if this neurotransmitter is still able to form with the GAD pathway shutdown. Should the study conclude these mutagenic worms are still able to produce GABA then we would hypothesize alternative biological pathways exist for GABA to form, which would lead to further research on this new process.

To know such information about this model organism is to our advantage as the tiny roundworms have a neurological anatomy that mirrors ours. Therefore any knowledge gained from studying their neurophysiology can help guide other research efforts in humans. High beneficiaries from this would include those that look at preventative and therapeutic measures for neurological conditions.
Will Fleming

Delay Discounting on the Miskitu Coast

Mentor(s): David Jarmolowicz, Applied Behavioral Science & Laura Herlihy, Center for Latin American and Caribbean Studies
Contributors: Josephine Kapicka Marlon & Cassanova Darr Castro

Substance-use disorders pose a serious threat to the Miskitu, an indigenous group in Nicaragua. In order to properly allocate sparse resources, research is needed to identify which peoples are at the highest risk for substance-use disorders. As individuals who prefer smaller, immediate rewards have been shown to have higher rates of substance-use disorders than those who prefer larger, delayed rewards, the current study examined risk by assessing how the Miskitu make monetary decisions.
Austin Flohrschutz

The Effects of Andodal Transcranial Direct Current Stimulation Over Prefrontal Cortex on a Flexible Object Use Task

Mentor(s): Evangelia G. Chrysikou, Psychology

Previous studies suggest that certain complex tasks may benefit from a reduction in high-level cognitive control and the filtering of bottom-up information supported by prefrontal cortex (PFC). Past work has shown that cathodal (inhibitory) transcranial direct current stimulation (tDCS), a noninvasive brain stimulation technique, over left PFC improved performance on a creative, flexible object use task, relative to anodal (excitatory) or sham (placebo) stimulation. Moreover, past work has shown that the right hemisphere is involved in creativity and the formation of remote associations. Some tDCS studies have found that excitation of the right PFC alone may lead to improvements in similar tasks, suggesting a possible difference in hemispheric contribution when participants have to rely on bottom-up-driven cognitive processes. On the other hand, tDCS studies have also shown that concurrent left PFC inhibition with right PFC excitation or the reverse neurostimulation montage are not significantly different than sham for creativity. In this study participants viewed 60 pictures of everyday objects and they were asked to state a common use or an uncommon use for each item while receiving either excitation of the left PFC, excitation of the right PFC, or sham stimulation. A forward digit span (FDS) task was used as a negative control task. In contrast to past literature, the data suggest no significant differences in reaction time or number of omissions on the uses task or FDS between groups. This suggests that, although left PFC inhibition via tDCS may facilitate performance, excitation of the left or right PFC has no effect on this creative object use task.
Raul Flores

Synergistic mixed solvent effects on the conversion of fructose to 5-hydroxymethylfurfural for bio-fuel applications

Mentor(s): Aaron Scurto & David Minnick, Chemical & Petroleum Engineering

Global climate concerns have galvanized interest in green energy technologies. Carbon-neutral bio-fuels derived from agricultural by-products are prime energy source candidates. 5-hydroxymethylfurfural (5-HMF) is a valuable chemical product with potential use in bio-fuel applications. In this perspective, high yields (>80%) of 5-HMF from fructose (a bio-mass derivative) were obtained. The reaction was conducted in a mixed solvent system consisting of the ionic liquid (IL) 1-ethyl-3-methylimidazolium diethyl phosphate (EMIM DEP) and dimethyl sulfoxide (DMSO), with hydrochloric acid as the catalyst at 100 °C. Reaction performance was investigated across the IL:DMSO composition range. Pure DMSO exhibits the fastest kinetics, with 98% conversion of fructose in <30 seconds, although this system suffers from poor 5-HMF yields (~20%) and stability. Small additions of EMIm DEP were found to improve the yield of 5-HMF to 80% without dramatically increasing the required reaction time. Increased IL composition, beyond 20% further decreased the reaction rate and eventually decreased the maximum yield after an EMIm DEP weight percent of 40%. Mixed solvent systems are thus much more effective at promoting the formation of 5-HMF when compared to pure solvents. Additionally, these solvents offer much more flexibility as important kinetic parameters can be fine-tuned with solvent composition. To elucidate the role of synergistic solvation effects on the reaction kinetics, the kinetic rate constants were regressed and correlated to empirical solvation parameters.
Alexandra Fowler

Examining the Impact of Mood on Executive Function Using a Novel Measure of Emotion Regulation Flexibility

Mentor(s): Evangelia Chrysikou, Psychology

The ability to regulate one’s emotional responses to different situations (emotion regulation, ER) has been at the center of much cognitive and affective neuroscience research on frontal lobe function, due to the potential significance of different ER strategies for the treatment of different psychopathological disorders. Although past research has largely focused on the neural correlates and efficacy of such regulatory strategies (e.g., expressive suppression, cognitive reappraisal), recent findings have shown that executive function may also involve ER flexibility, namely, the ability to implement ER strategies that match particular contextual demands. Despite extensive research on cognitive flexibility (i.e., the regulation of cognitive strategies depending on context) much less work has examined ER flexibility. The aim of this study was to develop a novel measure of ER flexibility based on the widely accepted measure of cognitive flexibility, the Wisconsin Card Sorting Task (cWCST). We examined the strength of this new emotion regulation measure (eWCST) to capture ER flexibility in healthy adults and depressed individuals who are characterized by cognitive and ER flexibility impairments. Behavioral and psychophysiological (facial electromyography) data showed that individuals with depression were less flexible on emotional sorting in the eWCST relative to healthy controls, results that mirrored their performance on the cWCST. These findings contribute to the developing literature on ER flexibility, while allowing for novel comparisons between cognitive and emotion regulation domains.
Megan Fox

The Third Murderer Mystery: An Editorial Genealogy

Mentor(s): Jonathan P. Lamb, English

During Shakespeare's time plays were only just beginning to be printed. Many of Shakespeare's plays, in fact, were not written down in an official capacity until years after his death. Macbeth is one of those plays: printed originally in the 1623 First Folio, commissioned by some of Shakespeare’s friends and fellow actors, Macbeth contains an interesting mystery that has confused editors and scholars for hundreds of years: when Macbeth first talks to the mercenaries that he has hired to kill his rival Banquo, there are two of them; but when the night of the murder comes there are three people there to do the job. The question of who the third murderer is, why he or she wasn’t mentioned earlier or in the play, and how to perform this mysterious character has been discussed predominantly from the 1800s onward. In my research, I examine what various theories people have had, what their reasoning was, how other people reacted to those theories, and how editors labeled this character - and revealing some of their theories in the process - in various editions of Macbeth dating back to the first printed edition. This research has opened up an interesting question: how did Shakespeare editors, scholars, and actors relate to each other? By examining a relatively small issue in the realm of Shakespearean studies, I can see how the relationship of broad scholarly field have played out throughout history.
Elise Gao

The Synthesis of Electrophilic Sultams as Potential Modifiers of HuR-mRNA Binding

Mentor(s): Paul Hanson & Qin Zang, Chemistry
Contributors: Maria Khan

We propose to synthesis a variety of electrophilic sultams as cysteine covalent modifiers for the study of disrupting HuR-mRNA binding. The targeted sultams are designed based on the recently identified [nM] sultam hits in a HuR-mRNA assay. The synthesis is based on a one-pot sulfonylation, SNAr/Micael addition, and coupling protocol. The products will be examined for cysteine reactivity profiling and screened for their ability of disrupting HuR-mRNA binding in our collaborator’s lab.
Eilish Gibson

Nuclear Interactions in the CMS Detector

Mentor(s): Phil Baringer, Physics & Astronomy

The CMS detector at the Large Hadron Collider (LHC) is a complicated machine that can precisely measure particles as they pass through the detector material. The first layer of CMS is the silicon tracking system that measures the paths of charged particles. As the particles pass through the silicon detectors, they deposit a small amount of charge, which the detector records. Reconstruction software then assembles the individual points into tracks that originate from the original collision point. The ability of the reconstruction software to accurately reconstruct tracks depends on how well we know the position of the beam pipe and tracking systems. However, there is no way to directly measure the position of the components of the detector once they are in place. Instead, we use nuclear interactions with the detector material to measure the position of the detector components. We use the interactions of pions with the nuclei of the detector material to create a map of the inner components of the innermost tracking system.
Matthew Gibson

Connecting the Breeding System to Mating Patterns in Macaronesian *Tolpis* Using Next-Generation Genomics

**Mentor(s):** Mark Mort, Ecology & Evolutionary Biology

Islands constitute only 5% of the Earth’s surface yet harbor nearly 25% of all recognized species. The diverse ecosystems and natural isolation of islands present unique opportunities for studying evolution and represent areas in need of further conservation research. Understanding the patterns of mating within and among natural populations is critical for such studies as these patterns determine the partitioning of genetic diversity, from the genomic diversity within individuals to the spatial structuring of diversity across the range of a species. On the Macaronesian archipelago Madeira, populations of two species in the genus *Tolpis*, *T. succulenta* and *T. macrorhiza*, have previously been found to be highly self-incompatible, but able to self-fertilize at low levels. Understanding how this ability translates to the actual mating patterns within populations is central to investigations of the origin and distribution of these island species as well as to ongoing conservation efforts. Not only are mating system studies of island plants rare, none have been performed on the island of Madeira or with either of these species. As well, while mating system studies are often limited in power by their number of genetic markers, this study uses a novel approach to bypass these limitations by taking advantage of next-generation genomic tools. Preliminary results have demonstrated the suitability of genomic data in estimating mating system parameters and have provided exciting evidence for the presence of a “mixed-mating’ system in populations of *Tolpis succulenta*. 
Karynn Glover

Helping WIN (Women’s Intersport Network of Kansas City) Provide a Winning Environment for Girls in their Summer Sport Camps

Mentor(s): Mary Fry, Health, Sport, & Exercise Science

Young girls have one of the highest risks of living an unhealthy life due to the decrease in physical activity that occurs across the childhood years leading to adolescence (Sarrazin, Guillet, & Curry, 2001). In addition to the low physical activity levels that some girls experience, they often report low confidence because of constant comparisons and pressures to do or be better than others that are encouraged and reinforced by significant adults, their peers, and the media. In the Kansas City area a group by the name of WIN for KC, or the Women’s Intersport Network of Kansas City, host Camp WIN for young girls, ages six to twelve. The purpose of this camp as stated in their mission is to ignite and boost the confidence of young girls and women through advocating the value of sport and fitness. In the summer of 2015, students and faculty in the KU Sport and Exercise Psychology Lab partnered with WIN to conduct a study to examine the campers’ and volunteer leaders’ perceptions of the camp. The research team conducted focus groups with the high school leaders and administered surveys to the campers to measure the motivational climate within the camp. The findings revealed that, overall, campers perceived the camp to be positive and supportive, but there were a number of areas that could be enhanced by better preparing the leaders to create a more positive climate during the training sessions. The WIN administrators are committed to utilizing and employing the feedback they received to enhance the camp experience for the leaders and campers in 2016. The purpose of this study is to assess the effectiveness of the changes made to the camp to help leaders create a more positive climate within the camp for the girls. Specifically, the enhanced leader training is hypothesized to better produce a caring/task involved climate, and girls who are exposed to this climate are expected to have a better global experience at Camp WIN.
Ricardo Gonzalez

Detection of Peroxynitrite in Macrophage cells using HKGreen-4 and Microchip electrophoresis with laser induced fluorescence

Mentor(s): Susan M. Lunte & Joseph Siegel, Chemistry
Contributors: Paige M. Skillett

Macrophage immune cells can generate excess nitric oxide and superoxide. These species can react together to produce peroxynitrite, a substance that is known to react with proteins, DNA, and lipids in cells, and has been linked to neurodegenerative and cardiovascular diseases. Peroxynitrite is extremely difficult to directly detect because it is highly reactive and unstable under physiological conditions. Therefore, reacting peroxynitrite with the fluorescent probe HKGreen-4A and using microchip electrophoresis with laser-induced fluorescence (ME-LIF), we are able to indirectly detect peroxynitrite. HKGreen-4A contains an acetyl group that allows the probe to freely travel across cell membranes. Upon entering a cell, intracellular esterases cleave off the acetyl group to produce HKGreen-4. HKGreen-4 then specifically reacts with peroxynitrite produced in the cell to generate N-methylrhodol, a highly fluorescent molecule. The reaction between HKGreen-4 and peroxynitrite was studied using SIN-1, a donor that generates peroxynitrite through a series of decomposition reactions. When HKGreen-4A and esterase were added to a sample of SIN-1, we observed an increase in the intensity of the N-methylrhodol peak until the signal plateaued, indicating the reaction has completed. Next, HKGreen-4A was added to a flask containing RAW 264.7 macrophages, which absorbed the probe and converted it into HKGreen-4. Thereafter, the cells were stimulated with LPS and PMA to produce peroxynitrite. They were then harvested and lysed in run buffer. The lysate was then filtered and analyzed with ME-LIF to determine the amount of peroxynitrite produced. In the future, the stimulation of other cell lines and other methods for peroxynitrite stimulation, such as beta amyloid, will be investigated.
Caelan Graham

German Kultur in World War I: Poetry and the Graphic Arts

Mentor(s): Lorie A. Vanchena, European Studies Program

My project focuses on the concept of German Kultur, originally a reference to late 18th-and early 19th-century German Classicism as best embodied by the literary works of Goethe and Schiller. Kultur is, therefore, a positive word that reflects a zenith of German cultural production. During the World War I era, writers and artists found this concept a particularly effective vehicle for criticizing Germany and its role in the conflict. The critics, whom I explore in this project, include a British poet, and French and Czech artists; I also explore the juxtapositional perspective of the publisher of a pro-German, German-American periodical. Using select prints from the Spencer Museum of Art’s extensive WWI collection, this project explores the relationship between visual and literary depictions of German Kultur. As I will demonstrate, the anonymous author of “English ‘Kultur’” (1915) and the French print, Kultur au Printemps (Culture in Spring, 1915), for example, used Kultur in a highly ironic manner, negating all positive connotations associated with the word. These literary and artistic representations of Kultur presume general knowledge of the significant historic and cultural period to which the word refers, making such works powerful critiques of Germany during WWI.
Luanne Hale

Delayed Reward Value in Animal Models of Obesity

Mentor(s): David Jarmolowicz, Applied Behavioral Science

Fatty Zucker rats have been used as models of obesity because they produce a synthetic model of obesity. Although delays of reinforcement disproportionally impact their choice, delay discounting (i.e., choice for smaller immediate rewards in lieu of larger delayed rewards) rates are higher in this obesity model than in genetically similar controls. These elevated discounting rates mimic what is seen in clinical samples. Scientists have concluded that this may be due to controls being unable to value delayed reward. The valuation of delayed reinforcement remains understudied in animal models of obesity, therefore little is known if the Fatty Zucker rats’ high delay discounting rates because they fail to value delay rewards. Progressive ratio (PR) schedules are widely used to study reward value in animal models. During a single session the number of responses required to earn reinforcement increased after each completed ratio, with sessions ending when the subject stops responding (i.e., the breakpoint). PR schedules paired with a delay after the completion of a ratio proved to decrease breakpoints on PR’s (Jarmolowicz and Lattal 2014). The current study examined if this delay based decrease in PR breakpoints was more pronounced in Fatty Zucker rats – whom are thought to have problems valuing delayed rewards. The value of food as a reinforcement was studied using 6 Fatty Zucker rats and 6 control Zucker rats. During baseline the rats completed a PR schedule until there was stability within the break points. The delay condition was similar to baseline, once a ratio requirement was completed it resulted in a signaled delay that increased between sessions. Mean break points were calculated for each group of rats and were consistently higher in Fatty Zucker rats when compared to the control. These results may indicate variables other than delayed reward valuation cause Fatty Zucker rats to excessively discount delayed rewards.
Kristina Hansen

Model of Lateral Jetting Stimulation - A Reservoir Simulation Study Under Varying Reservoir Conditions

Mentor(s): Reza Barati, Chemical & Petroleum Engineering

Lateral jetting stimulation is a technique used to form maximum 2 in. diameter boreholes up to 100 m into an oil reservoir. A self-propelled nozzle ejects a high powered jet stream of fluid that cuts through rock forming an accurately placed tight borehole. It is being used by industry professionals to bypass damaged rock and can be applied in formations where hydraulic fracturing might be problematic. This study aims to compare the effectiveness of radial drilling, under varying reservoir conditions using Computer Modelling Group (CMG), a reservoir modeling software. A base case was built and alternative cases were constructed from it to demonstrate the effects of hydraulic and physical damage. Hydraulic damage was modeled by simulating the injection of 500 gallons of water, then returning the well to production. Cases representing the effects of skin, as well as deeper invaded damage, were created to simulate physical damage. Each variable case was compared with the base case to determine which conditions resulted in significant improvements in oil production. This paper discusses a novel approach to evaluating the production of lateral jetting stimulation techniques using reservoir simulation software under varying reservoir conditions. There was very little difference in cases of hydraulic damage. The model successfully predicted that positive skin as well as increasing damage degree and zone radius decreased the cumulative oil production in each case. Finally, there was a reduction in production when applying the technique to injector wells in an inverted 5-spot waterflood pattern.
Terrence Harris

Race, Poverty, and the Legitimacy of ‘Stop-and-Frisk’

Mentor(s): Chris Crandall, Psychology

In 2015, the police stopped New Yorkers 22,939 times; 65% were members of minority group. In New York City, there are 8 million New Yorkers; since 2002 there have been more than 5 million police stops. In nine out of ten cases, no evidence of any crime was found. Why do these tactics persist if they almost never find anything? I propose that the perception of the legitimacy of ‘stop-and-frisk’ tactics—and the criminal justice system—is largely dependent upon both the race and the socioeconomic status of the individual being stopped. Participants will be presented with a police report detailing an officer’s encounter with a criminal belonging to one of four categories: Rich-black, rich-white, poor-black, or poor-white. The report will describe how the citizen was stopped, questioned, and frisked; the police officer finds a small amount of marijuana. The report will describe an arrest and charge for possession. The participant will be asked about the legitimacy of this arrest, the legitimacy of drug arrests in general, and the legitimacy of ‘stop-and-frisk.’ I will also ask several questions about the arrested person, including whether or not the criminal is bound to repeat his crimes.
Matt Hartenstein

Analysis of an Artificial Bee Colony Algorithm Through Constrained Optimization of the Knapsack Problem

Mentor(s): Kyle Camarda, Chemical & Petroleum Engineering

Since the discovery of Penicillin, bacteria have evolved to become resistant to many of the antibiotics we use against them. In order to effectively fight off these increasingly drug resistant bacteria, it is essential to stay ahead of them with newer, more effective antibiotics (Magiorakos et al.). One way to achieve this is through computer-aided molecular design to build antibiotics with the appropriate biochemical properties while keeping the toxicity low and molecular size within acceptable range. The creation of a molecule can be represented as an expansion of the knapsack problem to decide which functional groups to put on a base molecule backbone. To start on this difficult chemical design problem, I began with the creation of an Artificial Bee Colony (ABC) algorithm to solve the Knapsack Problem, a discreet, multimodal combinatorial problem in mathematics. The effectiveness of the algorithm was tested on two sets of available items and avenues of continuation are discussed.
Abigail Hartzell

Sound Localization in Reverberant and Noisy Settings

Mentor(s): Kostas Kokkinakis, Speech-Language-Hearing: Sciences & Disorders
Contributors: Shadi Pirhosseinloo

This study investigates the use of interaural level differences (ILDs) and interaural timing differences (ITDs) by means of a virtual localization task. Normal hearing listeners were tested in environments of noise and reverberation to determine whether ILDs or ITDs were used more faithfully. ILDs and ITDs were presented to participants through a head related transfer function model. The study had three filtering conditions: ILDs and ITDs presented together, ILDs presented alone, and ITDs presented alone. Under each filtering condition there were four listening conditions: quiet anechoic, quiet reverberant, anechoic with noise in the center, and reverberant with noise in the center. Participants (n=8 per filtering condition) relied on a sound localization figure to complete the task of localizing in two successive trials of four listening conditions. Responses were compared to the correct location of each probe. When ILDs and ITDs were tested together, results show the lowest root mean square localization error. When ILDs are tested alone, there is a lower root mean square localization error than when ITDs are tested alone. In all three filtering conditions, the quiet listening condition was the easiest to localize. Further research is needed to determine the effectiveness of ILD and ITD in localization tasks by patients fitted with bilateral cochlear implants. To investigate, normal hearing individuals listening through vocoded speech will be tested under the same conditions. Implications of this study include understanding how to better engineer future cochlear implant processors to obtain greater sound localization benefits.
Atmospheric [CO₂] affects resource allocation and growth in *Nicotiana tabacum*

**Mentor(s):** Joy Ward & Katie Becklin, Ecology & Evolutionary Biology  
**Contributors:** Danielle Way & Spencer Whitney

Changes in atmospheric [CO₂] may alter growth and resource allocation within plant species. With atmospheric [CO₂] expected to reach 700 ppm in the near future, it is critical to understand plant responses to rising [CO₂]. Additionally, atmospheric [CO₂] was as low as 180 ppm during the recent geologic past. Characterizing plant growth and resource allocation under low [CO₂] establishes a baseline for predicting plant responses to rising [CO₂] in the future. We examined plant growth and resource allocation (i.e. biomass, specific leaf area, and allometry) in *Nicotiana tabacum* across a [CO₂] gradient of 180-700 ppm. We found that plant biomass increased while specific leaf area (SLA) decreased in [CO₂] treatments of 180-400 ppm. Further increases in [CO₂] had little to no effect on plant biomass or SLA. Additionally, root and leaf biomass were positively correlated with total biomass, however, plants invested proportionally more resources into producing leaves under low [CO₂]. The significant growth depressions under low [CO₂] indicate that carbon availability limited plant growth in those treatments. Under low [CO₂], high SLA and allocation to leaf biomass could be beneficial strategies for maximizing CO₂ capture. The minimal change in plant growth under elevated [CO₂] suggests that *N. tabacum* may be less responsive to rising [CO₂] in the future. Overall, this study provides insight into how plants may adapt to environmental changes by altering resource allocation.
Riley Hess

Understanding what Black Men Want in a Chronic Disease Self-Management Program

Mentor(s): Tamara Baker, Psychology

There is a rising amount of questions concerning why Black men suffer health disparities. Black men has a lower life expectancy, greater instances of disease, and less fortunate prognosis compared to other gendered race groups. Specifically, Black men have higher death rates of heart diseases, cancer, and chronic mental illness. This study aimed to evaluate the content and delivery approach of a chronic disease self-management program (CDSMP) among community-dwelling Black men 21+ years of age. Participants were surveyed on measures of demographic characteristics, health perceptions, medical history, active coping, depressive symptomatology, and ways of delivering a disease self-management program. Data shows that hypertension, diabetes, and pain are the most reported comorbidities. Additionally, participants agreed there is a need for a CDSMP specifically for men, because "it would ensure [medication] compliance" and "prevent illnesses from getting progressively worse". Others responded that "Black men don't have a good understanding of [health], nutrition, and mental health". Results further showed that Black men preferred the CDSMP to be delivered by someone with an illness similar to theirs, but with no preference in it being delivered by a (Black) man or woman. The men were responsive to the aspects of programs we presented. Many of the participants believe that programs of this nature are essential and will be immensely beneficial. Focusing exclusively on Black men increases our understanding of this adult population, while recognizing factors that change actions at the individual and community levels.
Aaron Hess

**Geologic Mapping and Geochemical Analysis of the Chimney Rock Fault and associated fault zone mineralization, Capitol Reef National Park, Utah**

**Mentor(s):** Diane Kamola, Geology

A major fault running through the Chimney Rock area of Capitol Reef National Park is a prominent feature of the park. Although the main fault is mapped, fault features are currently undocumented and the details of a mineralization emplacement event near the fault are unknown. Cursory work has identified areas of hydrothermal alteration near the main fault, as well as numerous fault splays. This area is utilized by a number of geology field camps. A better understanding of the fault system can be integrated into field camp curriculum and the results will also be made available to CRNP. To carry out this project, detailed geologic mapping was performed over the course of four days using a computer-mapping program (ArcGIS), and hand samples were collected for further analysis. Fault features were mapped in detail and the spatial relationship of the fault breccia indicates that the Chimney Rock area is structurally more complex than previously thought. The breccia outcrops along a slight north-dipping plane striking to the southeast. This may be due to a spatial problem created by the high angle normal faults running through the area.
When the Fine Bros announced their plans for React WorldTM, there was an immediate uproar from the youtube community. The basis of the protests represent the values and activities of the larger creative culture fostered on social media platforms such as YouTube, Reddit, and Tumblr. The protest took many forms: meming on the idea of copyrighting all “reaction” content; mass unsubscriptions from the Fine Bros channel; critiques, threats, and spamming; and most fittingly, counter-reaction videos. The attitudes expressed in these protest have profound implications for the creative economy. The creative world of online media has led to a culture where initial creation does not necessarily indicate ownership. Parodies, memes, reaction videos, responses, fanart, etc. can all be spawned off of an original creation while still being the result of a separate entity’s creative power, and are credited as such. Ownership becomes an issue primarily in relation to profit. The conflict that emerges between creative culture, ownership, and capitalist profit is the main focus of this study. It explores the interconnected fields of creative economy, art culture, collective creativity, social media, copyright law, and ownership in the digital age. The recent Fine Bros debacle serves as the basis for this analysis in order to examine the unique culture produced by creative social media. Furthermore, the study will explore possibilities for new approaches to intellectual ownership and profit within the creative economy that could challenge the current approach.
Andrew Hoxey

Variation in Channel Steepness as Evidence for Uplift in the Western Nepal Himalaya

Mentor(s): Michael Taylor, Geology
Contributors: Clay Campbell

The Himalaya of Western Nepal offer an advantageous study area for understanding the mechanisms for mountain building and active collisional tectonics. Kinematic models suggest Indo-Asian convergence is accommodated in a crustal ramp and decollement surface at the plate boundary. Position of this ramp and variation along strike can be inferred based on seismicity and surface topography. Utilizing SRTM Digital Elevation Models (DEMs) and Geographic Information Systems, variations in surface topography are readily identified and analyzed. Generating longitudinal channel profiles and maps regional channel steepness indicate areas where Himalaya drainage networks have deviated from predicted incision geometries. Longitudinal channel profiles in the region indicate over-steepening across the range front, followed by a shallowing moving toward the headwaters. A series of concave-up to convex-up knickpoints highlights the region of the channel adjusting to tectonic activity. The reduction in stream power associated with this channel shallowing produces a series of low-relief areas characterized by sediment accumulation and reduced canyon wall steepness. The geomorphological features in the region suggest it is experiencing uplift causing drainage reorganization. Headword incision and stream integration results in a series of capture points and windgaps, suggesting a significant reduction in the catchments associated with the low-relief areas. This division of catchments could further explain the reduction in stream power and sediment accumulation.
Of every level of government, local government has the most direct impact on the day-to-day lives of its constituents. With the authority to direct, form, and manage municipal policy (Demir and Reddick 2012), chief administrative officers (CAOs) have the ability to define who and what matters in their local communities through their decisions regarding policy implementation. These patterns of decision-making carried out by appointed municipal officials demonstrate how public values are enacted at the local level and what influence these values have on social equity and community outcomes. This project examines how non-elected government leaders – charged with administrating and achieving social equity at the local level – conceptualize and operationalize social equity in the communities they lead. Based on interviews with local government leaders, I find that perceptions of social equity held by local government officials have implications on the resources and policies produced by municipal governments, as well as impact citizens residing in these jurisdictions. Due to the substantial impact local government can have on the well-being and prosperity of citizens, exploration regarding policy at the local level is essential.
Amy Ink

Examining the Role of Income on the Association Between Chronic Illness and HRQOL in Youth

Mentor(s): Christopher Cushing & Tarrah Mitchell, Clinical Child Psychology

Introduction
Children and adolescents with chronic illnesses often report lower health-related quality of life (HRQOL), or lower physical, emotional, social, and academic functioning, than their healthy peers. The aim of the current study was to examine the possible moderating effect of income on the association between chronic illness status and HRQOL in youth. It was hypothesized that income would moderate the association between chronic illness status and HRQOL, such that low-income youth with a chronic illness would have lower HRQOL.

Methods
Participants included 87 youths ages 11-14 (M age = 12.23, SD = .78; 87.1% female; 58.1% African American) who were enrolled in a summer dance camp located in a Midwestern community. Prior to the camp, participants self-reported on their health-related quality of life (Pediatric Quality of Life Inventory; PedsQL), and parents completed demographic questionnaires to assess for family income and chronic illness status. A moderation model was conducted using SPSS.

Results
Chronic illness status (B = -3.95, p > .05), income (B = -.95, p > .05), and the interaction between chronic illness status and income (B = 2.00, p > .05) were not significant predictors of HRQOL in the current sample. These factors predicted 4.94% of the variance in HRQOL.

Conclusions
In the current study, no relationships were observed between the hypothesized independent and dependent variables. Therefore, HRQOL does not vary based on family income or disease status in the current sample. This likely has to do with the low proportion of children with a chronic illness in the current study.
Despite concrete scientific evidence supporting anthropogenic climate change, this topic has received mixed opinions among political elites and American citizens alike. Understanding student perspectives on climate change is important because those perspectives will be applied to influence future decisions and policy actions. The purpose of this project is to determine how education at KU and political affiliation impact attitudes about climate change. No previous climate change polls have focused specifically on the perspectives of college students in the Midwest, which was the main intent of our research. Most studies focus on the opinions and knowledge of students in primary or secondary school, as well as working adults, while studies focusing on university students are often too narrow and mostly represent students in the sciences. In order to fill this gap, we constructed a survey modeled after the Pew Research Center’s survey on climate change that was conducted in 2015. The results of our survey do not line up precisely with the Pew results, indicating that KU students have different perspectives on climate change than the general American public. The data did show a consistent opinion that climate change is happening, but there was a partisan divide between liberals and conservatives in terms of its severity, and there were differing views between majors within the university.
Keonya Jackson

Tongue Twisters in Arabic speakers learning English as a second language

Mentor(s): Joan Sereno, Linguistics & Michael Vitevitch, Psychology
Contributors: Faisal Aljasser

Arabic and English speakers read lists of 4 words that were designed to induce speech errors. For example, participants quickly repeated lists like “pounce bounce bound pound” several times in a row. Some word lists contained sounds that were found in both Arabic and English, whereas other lists contained sounds that were found only in English. It was predicted that Arabic speakers learning English as a second language would make fewer speech errors (saying, for example “pounce pounce pound pound” instead of “pounce bounce bound pound”) on the words with sounds found in both languages and more speech errors on the words with sounds found only in English. These results indicate that newly acquired sounds (i.e., those found only in English) are not represented as strongly as sounds that have been previously acquired in the native language.
Jordan Jerkovich

The Road to a Sustainable Future: Renewable Energy in Kansas

Mentor(s): Paul Stock, Sociology, Environmental Studies & Ward Lyles, Urban Planning

Kansas has the opportunity to facilitate a new level of state-wide prosperity through the sustainable development of renewable energy. The purpose of this report is to facilitate discussion about a total energy transformation in the state of Kansas. By analyzing and comparing international and domestic case studies, this report argues that a 100 percent transition to renewable energy in final energy consumption is possible by the year 2050 using existing policy instruments currently implemented in China, Denmark, Germany, the United States and Kansas. In the end, it posits a portfolio of renewable energy policies, based on best case practices, that is designed to facilitate thought and conversation on the topic.
Heidi Johnson

In Pursuit of Happiness

Mentor(s): Meg Jamieson & Madison Davis Lacy, Film & Media Studies
Contributors: Sara Riscoe & Shaina Winston

My project is a documentary that is an anthropological look at a culture group called Furrys. It is a misunderstood, vast and interesting world that I have loved exploring. I only wish others could see how interesting and unique this culture is.
Mackenzie Johnson

Clonal interference: the effect of detrimental mutations and finite genome size on the rate of evolution

Mentor(s): Maria Orive, Ecology & Evolutionary Biology

In the absence of genetic recombination (asexual reproduction), each new beneficial mutation that arises must compete with other beneficial mutations in the population, and fix sequentially. This phenomenon, known as clonal interference, slows down the rate of evolution, and thus affects the population’s ability to adapt. Currently, two general models of clonal interference have been proposed. The first considers the effect of beneficial mutations from a distribution of selective strength, while the second allows for multiple, equally beneficial mutations to arise within the same clonal lineage. This study aims to create a new model that investigates both the relative importance of varying selective effects and the number of loci undergoing mutation. A computer simulation model that tracks the change in mean fitness of an asexual population with varying numbers of loci and fixed selection coefficients was developed, and compared to existing models under similar parameters. Future expansions of the model will incorporate a distribution of selection coefficients, and investigate the effect that various combinations of parameters have on mean fitness of the population.
John Kelsh

Probing the Senescence Associated Secretory Phenotype (SASP) in human follicular fluid: A potential marker of reproductive aging

Mentor(s): Francesca Duncan, Anatomy and Cell Biology
Contributors: Susmita Jasti, Shawn M. Briley, Stacy Kujawa, Saurabh Malpani, John Zhang, & Mary Ellen Pavone

The female reproductive system is the first to age and is associated with infertility. Senescent cells fuel aging through secretion of cytokines, chemokines, growth factors and proteases that alter the tissue microenvironment and are referred collectively as the Senescence Associated Secretory Phenotype (SASP). We hypothesized that senescent cells increase in the human ovary with advanced reproductive age and assume a SASP which disrupts the ovarian microenvironment, thereby impacting gamete quality and fertility. To test this hypothesis, we analyzed the SASP in human follicular fluid using a cytokine antibody array that has been used previously to assess the SASP in human cells. We obtained de-identified follicular fluid samples from women ranging in age from 27 to 44 (N=16) who underwent Assisted Reproductive Technology cycles at Northwestern University. For each participant, follicular fluid from the first follicle was run in duplicate on Human Cytokine C5 Antibody Arrays (Ray Biotech), which detect 80 unique cytokines. Probed arrays were developed, intensities were quantified, and data were normalized and analyzed. Several cytokines increased significantly with participant age (IL-7, IL-15, VEGF, BDNF, FGF-9, GCP-2, IGFBP-3, LIF, MIF, PIGF, TGF-b1, TGF-b2, and TGF-b3). As expected, participant age was inversely correlated with Anti-Mullerian Hormone (AMH) levels, a marker of the ovarian reserve. Interestingly, IL-7, IL-15, and TGF-b1 all showed a significant decrease with AMH, suggesting that these specific cytokines may be strong predictors of both chronological and reproductive age. Studies are ongoing to further validate these findings and determine how these cytokines correlate with fertility outcomes.
Acute lung injury (ALI) affects nearly 200,000 people each year in the United States, while neonatal respiratory distress syndrome (NRDS) is one of the leading causes of death in infants. These conditions are caused by a defect in or lack of surfactant, an intricate mixture of lipids and proteins in the lungs, that allows the surface tension to be essentially zero at compression. This deficiency leads to a higher surface tension and an inability for lungs to expand properly, causing an overall distress in breathing due to the greater energy required to inflate the lungs. Currently, treatment, known as Surfactant Replacement Therapy (SRT), uses animal derived surfactants as replacement, which creates the risk of negative immunological response. Therefore, a synthetic alternative is necessary to counter this threat. Based on previously obtained data of Surface Pressure vs. Mean Molecular Area isotherms at air-water interface obtained using Langmuir-Blodgett technique, we knew that a synthetic analog of the naturally occurring Surfactant Protein, SP-B, called MiniB, enhanced surface activity when in a 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC): palmitoyl-2-oleoyl-sn-glycero-3-phosphatidylglycerol (POPG) environment. This study was done to test MiniB in alternative lipid environments and determine what attribute of MiniB causes this increase in surface activity. In assessing the role of electrostatic interactions, we used the same Langmuir-Blodgett technique with a 1,2-dipalmitoyl-sn-glycero-3-phospho-(1’-rac-glycerol) (DPPG):(POPG) environment, which revealed an appreciable enhancement of surface activity. To evaluate whether this is true for all highly electronegative environments, we tested the interactions of MiniB with DPPG: palmitoyl-2-oleoyl-sn-glycero-3-phosphatidylserine (POPS). The isotherms show that DPPG:POPS has greater surface activity than DPPG:POPG, however, in the presence of MiniB, DPPG:POPG becomes more surface active than DPPG:POPS. From our data we conclude that it is not the electrostatic interactions alone, but the head group that most effectively alters the activity of MiniB.
Aadil Khan

Social Dominance Hierarchy and Social Stress: The Role of Collective Self-Esteem in BMI and Waist-to-Hip Ratio of Female College Freshmen

Mentor(s): Nancy Hamilton, Psychology
Contributors: Natasia Adams

Research on female primates entering new social groups documented that social position affected how adipose tissue was deposited. Female primates in subordinate statuses displayed far more visceral adipose tissue, an indicator of chronic stress. Similar to non-human primates, female freshmen college students enter new social groups and may encounter social stress. Depending on social position within the group (Social Dominance: SD) and psychological investment and security with group membership (Collective Self-Esteem: CSE) freshmen females may be vulnerable to changes in body mass (BMI) and Waist to Hip ratio (WHR). The purpose of this study is to test the hypothesis that SD and CSE will prospectively predict BMI and WHR in first semester freshman women. To test this hypothesis we gathered data at three time points: T1, within the first month of the semester; T2, midterm; T3, the week before finals. T1 included self-report data collected via questionnaire (Qualtrics) and consisted of an online questionnaire battery including SD and SDS and in-lab measurement of BMI, WHR. T2 consisted of a re-administration of these questionnaires. T3 included both questionnaires and measures of BMI and WHR. There was also a significant positive correlation between the measures of SD and CSE, which indicates social position is correlated with psychological investment and security within the group. The results also showed a negative correlation between Membership facet of CSE (T2) and BMI (T2) but not BMI (T3). However, the Membership facet of CSE (T3) was significantly negatively correlated with BMI (T3). No significant relationship was found between CSE or SD and WHR. These results indicate a significant negative correlation between how the individual views his/her importance to the group (membership facet) and BMI at a particular time point in a strictly correlational fashion (non-predictive). The findings are inconsistent with the hypothesis, but do introduce a potential negative relationship between Membership CSE and BMI. More research needs to be performed to determine the validity of this relationship.
Yee Ming Khaw, Emily Yoder, Amanda Gerber & Cory Sessum

Effects of Facial Expression Regulation on Physiological Responses

Mentor(s): Evangelia Chrysikou, Psychology

Using the common sense model of emotions, we understand that a stimulus leads to an emotion, which then leads to bodily arousal. The current study investigates the relationship between the antecedent facial-expression-focused regulation of emotions and physiological response. We tested for parallelism of elevated expression in correlation to elevated Electrodermal Activity (EDA) and Heart Rate as our main hypothesis. This is because EDA and HR are signs of sympathetic activation. The hypothesis was supported by previous studies carried out with different models of manipulation. In the study, twenty participants were shown visual images of positive, negative, and neutral types while their physiological responses were recorded. Respondents were told to either (a) suppress their emotions (b) exaggerate their emotions (c) react naturally. We found significantly lower physiological responses in the suppression condition and greater physiological responses in the exaggeration condition. However, the measures of physiological responses are not significantly different between manipulation conditions specific to each type of visual stimuli. A discovery in main effect warrants further rigorous investigations to understand how the control of facial expression confers benefits in mood regulation. More research should be done to determine the long-term implications of the paradigm for behavioral therapy purposes.
Yee Ming Khaw

Familiarity and Affiliation with Anglo Names Affect Purchase Decisions of Chinese Food

Mentor(s): Xian Zhao & Monica Biernat, Psychology

Chinese cuisine has become an undeniable part of American food culture but little is known about the effective strategies of catering Chinese food to the American public. Drawing on the self-categorization theory and labeling effects, this study aims to examine how the familiarity of Chinese dish and the affiliation of Anglo names affect purchase decisions. U.S. participants from online survey populations were randomly assigned to view a poster of a Chinese dish (familiar dish: orange chicken vs. unfamiliar dish: black chicken) associated with the name of a chef (original name: Xiao Wang vs. Anglo name: Alex Wang), and then they were asked questions to reveal purchase intention, perceived trust, and multiculturalism attitudes. For participants endorsing anti-multiculturalism attitudes, the affiliation of a food product with original/foreign names reduced purchase intentions, relative to affiliation with an Anglicized name. The familiarity of the product (orange vs. black chicken) did not moderate this effect, suggesting that affiliating a foreign produce with an Anglicized name may be a general strategy for increasing sales, at least in areas where people do not favor multiculturalism.
Alec Knutsen & Jonathan Bush

The Discrete-Time Kalman Filter and Its Applications

Mentor(s): Bozenna Pasik-Duncan, Mathematics

The discrete-time Kalman Filter is a recursively defined algorithm that can unbiasedly and optimally estimate the next state of a noisy discrete-time control system; the algorithm is named after one of its primary developers, Rudolf Kalman, who developed the algorithm in the 1960s. The Kalman Filter quickly emerged as a preeminent algorithm in control theory due to the optimality of the filter and its wide range of applicability and cross-disciplinary nature. For example, the Kalman Filter appears in position and navigation tracking, robotics, economics, medicine, and signal processing. Furthermore, one of the first implementations of the Kalman Filter concerned trajectory estimation of spacecrafts for NASA’s Apollo Project. In our research paper, we formulated the Kalman Filter that was first derived by Rudolf Kalman exactly fifty-six years ago. Then, we implemented two examples of the Kalman Filter in physics settings to demonstrate the utility of the algorithm in applications.
Ashlie Koehn

Testing the Porter Hypothesis in Transition Economies

Mentor(s): Dietrich Earnhart, Economics
Contributors: Randy Bluffstone

The Porter Hypothesis suggests that environmental regulation can lead to innovation and higher overall profits for firms. While this theory has been tested in mature market economies, such as the United States, my research explores the Porter Hypothesis in the transition economies of Central and Eastern European during the 1990s. This period of market restructuring was an economically tumultuous time for many firms and it was accompanied by new environmental regulation, spurred on by increased citizen participation and a desire to join the European Union.
Establishing Kinetic Profiles and Degradation Pathways for the Tetracycline Destructases

**Mentor(s):** Tim Wencewicz, Chemistry (Washington University in St. Louis)

The tetracyclines are a class of broad-spectrum antibiotics that have been used for a number of purposes in the last several decades from treating infections in humans and plants to promoting animal growth. Due to their widespread use, tetracycline resistance has emerged over the years, and scientists now face the daunting task of developing new generations of tetracyclines before resistance can render these molecules ineffective. In many observed cases of antibiotic resistance, such as with the widely-used β-lactam antibiotics, resistant bacteria inactivate the drugs through enzymatic degradation. The tetracyclines are a unique class of antibiotics in that enzymatic degradation has not been widely documented in the clinic. Previously, only the flavoenzyme Tet(x) demonstrated enzymatic inactivation of tetracycline antibiotics in vitro.

Nine additional flavoenzymes, coined the “tetracycline destructases,” were recently discovered through genomic analysis of tetracycline-resistant bacteria in grassland and agricultural soils. While these enzymes originated in soil bacteria, it is not uncommon for antibiotic resistance to be transferred from environmental microbes to pathogenic bacteria, stressing the importance of elucidating this resistance mechanism. After sub-cloning the genetic sequences coding for these flavoenzymes into *Escherichia coli*, our lab was able to produce sufficient quantities of these enzymes to test in vitro. We sought to establish a kinetic profile for each tetracycline destructase to identify key features for successful enzymatic interaction. Through this process, we hope to gain critical information that will aid in the development of tetracycline destructase inhibitors before this mechanism of resistance becomes clinically prevalent.
Dongyu Li

Mother or Spouse? Filial Piety, Romance, and the Meaning of Love

Mentor(s): Glenn Adams & Xian Zhao, Psychology

Mainstream research portrays prioritization of love/care in mating versus kin relations as a standard of adult functioning. A cultural psychology perspective proposes that this “standard” pattern is not a context-general law, but instead reflects ecologies of relational mobility (RMob) that afford opportunities to form new (and terminate old) connections. To investigate, we conducted studies in the U.S (Study 1 & 2) and China (Study 3) in which we measured RMob, filial piety (FP), and responses to an imaginary dilemma that forced participants to prioritize care between spouse and mother. In Study 1, RMob correlated negatively with the authoritarianism component of FP, positively with the affection component of FP, and both components of FP predicted negative priority of spouse over mother. In Study 2, the authoritarianism component of FP mediated the relationship between the voluntary component of RMob and priority of spouse over mother. In Study 3, the affection component and the authoritarianism component of FP mediate the association of country difference with personal belief about mother priority.
Jeremy Lippman

Influence of Childhood Obesity on Motor Unit Behavior of the Plantar Flexors

Mentor(s): Trent Herda, Health, Sport, & Exercise Science

PURPOSE: Obesity is a major health crisis in America with the rate of childhood obesity doubling in the last 30 years. In theory, motor unit (MU) behavior in obese children could be different as a result of poor muscle quality of the muscle. However, no study has compared the MU behavior between obese and lean children.

METHODS: 16 lean (age=8.55±1.00 yrs, BMI=15.94±1.30) and 14 obese (age=8.71±0.83 yrs, BMI 21.42±1.90) individuals volunteered for this study. Participants performed three maximal voluntary contractions (MVC) in an isokinetic dynamometer fitted for isometric plantar flexor action. Subjects performed isometric trapezoid contractions plateauing at 40±3.6% of their MVC values. An electromyographic (EMG) sensor was placed on the medial gastrocnemius (MG). EMG signals were decomposed for firing rates and action potential data of individual MUs. Recruitment thresholds (REC) and mean firing rates at the steady force (MFR) were found for each MU. REC vs. MFR relationships were calculated with the y-intercept and slope for each relationship used for further statistical testing. Independent samples t-tests were performed between lean and obese children on the slopes and y-intercepts from the REC vs. MFR relationships. Alpha was set at 0.05

RESULTS: There were no significant differences between obese (-0.892 ±0.906 pps/MVC, 33.23 ±8.10 pps) and lean (-0.616 ±0.321 pps/MVC, 32.33 ±10.85 pps) for the slopes (P=0.41) or y-intercepts (P=0.91) of the MFR vs REC.

CONCLUSIONS: There are no differences in motor unit behavior between obese and lean children in a moderate intensity contraction of the plantar flexors.
Emmaline Lorenzo

Non-Resonant Two-Photon Excitation of p-Hydroxyphenacyl Diethyl Phosphate

Mentor(s): Christopher G. Elles, Chemistry
Contributors: Amanda L. Houk, Sanjeewa N. Senadheera & Richard S. Givens

Photocaged compounds can be selectively activated to release certain chemicals, and are inert until activated by the proper type of light. We study the molecule p-hydroxyphenacyl diethyl phosphate (pHP DEP), which releases its DEP group. This compound is a model for p-hydroxyphenacyl adenosine triphosphate (pHP ATP), and other compounds. ATP is ubiquitous in biological systems as an energy source; therefore, controlling the pHP uncaging reaction allows us to work towards in vivo applications. Typically, photocaged compounds need to be excited by a high energy photon in order to react, i.e. in the ultraviolet (UV) region. However, overexposure to UV light is harmful to biological systems. One alternative is to create compounds that require a lower excitation energy from visible light. Unfortunately, these compounds often have inefficient uncaging reactions, making them a poor choice for biological applications. To solve this problem, we take compounds with a high excitation energy and use a technique called non-resonant two-photon excitation, which allows us to use longer wavelengths that are optimal for biological systems. This method uses an ultra-fast pulsed laser source that is extremely intense and focused so the compound can absorb two photons simultaneously, meaning each photon only needs to supply half of the total energy. We use UV-vis and NMR spectroscopy to monitor the formation of products following two-photon excitation to demonstrate the successful uncaging reaction of pHP DEP and its conjugate base at longer wavelengths. We are also measuring the two-photon reaction quantum yield to determine the efficiency of the reaction.
Dina Lyne

Calcium-Based Microspheres Containing PLGA for Sintering into 3D Scaffolds

Mentor(s): Michael Detamore, Chemical & Petroleum Engineering

Poly(lactic-co-glycolic acid) (PLGA) microsphere-based scaffolds loaded with calcium phosphate raw materials enhance bone regeneration. Previous studies, however, have been limited to concentrations of hydroxyapatite (HAp) and tricalcium phosphate (TCP) below 30% (wt/wt) in the PLGA microspheres. The purpose of this study was to determine whether it would possible to construct a scaffold exclusively of PLGA microspheres that were themselves predominantly composed of TCP and HAp. Although various microsphere sintering methods were ruled out, a methylene chloride vapor treatment was an efficient and effective means to sinter scaffolds at 70% HAp:TCP (1:1) concentrations. The analysis for the performance of the scaffolds will include scanning electron microscopy, mechanical stress, calcium release, differential scanning calorimetry, and PCR after a two-week in vitro study. The results of this study will build upon the foundation of microsphere-based scaffolds for bone regeneration. Future studies can optimize concentrations of PLGA and calcium phosphate materials for use in the body and eventually move to optimization of scaffold concentrations for cartilage regeneration.
Kristen Manion

Diversity of fungi on grasshoppers in urban and rural environments is similar in species richness and community structure

Mentor(s): Benjamin Sikes, Ecology & Evolutionary Biology
Contributors: Seth Bollinger & Anish Kulshrestha

Urban grasslands are often treated with pesticides, herbicides, and fungicides to maintain aesthetically desirable spaces for humans, while rural/wild grasses are left untreated. Fungi in these localities are often affected by this human desired environmental control – and the insects interacting with the fungi and vegetation in these areas are impacted as well. Grasshoppers are an abundant group of insects that reside in both urban and rural grasslands. It is thought that grasshoppers sampled from rural locations would display greater species richness due to the absence of pesticides, herbicides, and fungicides. The results indicate that species richness on the exoskeleton of grasshoppers is not impacted by the presence of these chemicals. Additionally, the results indicated that the fungal community structures on the grasshoppers are not impacted by the presence of pesticides, herbicides or fungicides.
Joshua Marple

An Alternative Eye Tracking System

Mentor(s): Jonathan Brumberg, Speech-Language-Hearing: Sciences and Disorders
Contributors: Christine Perinchery, Wesley Hoffman, Perry Gowdy, Bridget Davis, Paydon Wilson & Josh Werner

Pupil based eye tracking methods are letting a significant amount of data slip by them. While pupil based methods have worked well in the past for helping people determine where a person is looking on a screen, they are unable to work when someone wants to look outside of that screen. For instance, marketing researchers might want to know how eye-catching a new product is. Someone else may wish to develop a game using a VR headset, where a camera cannot be fit inside the headset to track the eyes. For many others who suffer from Locked In Syndrome, an eye tracking method that doesn't require constant computer interaction can aid communication and help present a more natural and less obtrusive way to interact with others. The research presented will show an expansion of these options using electrodes to record movement of the eye (EOG, or electro-oculography). This is done through the use of a Kalman filter, which transforms noisy signals into a useful metric by which to determine gaze position. Through this research, we have been able to develop a product that takes in pictures from a Google glass and tells you what object a person is looking at. This system recognizes whether you’re looking at a water bottle, a computer, or maybe a set of keys and allows you to draw statistics and useful information from them.
Corticotropin-releasing hormone receptor 1 mediates the interaction between low monoamine oxidase A activity and early stress in aggression.

Mentor(s): Sean Godar & Marco Bortalato, Pharmacology and Toxicology
Contributors: Cori Jones & Laura Mosher

Aggression is a detrimental neurodevelopmental malfunction that has characteristic symptoms such as over-exaggerated and recurring violent behavior caused by responses to perceived threats. Compelling scientific evidence has shown that exposure to early stressful situations in male carriers of low activity polymorphisms of monoamine oxidase A (MAOA), the primary metabolic enzyme of serotonin, predisposes individuals to both aggressive and antisocial phenotypes. Our lab has recently developed a model of this gene by environment interaction using transgenic mice featuring low MAOA activity (MAOANeo). While these animals do not exhibit aggression because of their genotype alone, exposure to stress (ES, consisting of daily maternal separation and saline injections) during the first postnatal week elicits a drastic increase in aggressive behaviors in MAOANeo mice, but not their wild-type littermates subjected to the same early environmental manipulation. We explored the mechanism of early stress in aggression by focusing on corticotropin-releasing hormone (CRH), a mediator of the stress response cascade. Our group found that ES-MAOANeo mice display increased CRH levels in the brain, in addition to higher levels of its main receptor CRHR1. To investigate the functional impact that CRHR1 has in our model, ES-MAOANeo mice were treated with antalarmin (10 mg/kg, IP), a CRHR1 antagonist, during the first postnatal week of their lives. CRHR1 blockade resulted in a reduction in antisocial and aggressive behaviors in ES-MAOANeo mice. These results elude that CRHR1 may play a crucial role in mediating the impact of early stress on lasting aggression and antisocial behaviors in vulnerable populations.
Robert Marshall

Sea Level Rise and Guam: The U.S. Military’s 'Unsinkable' Aircraft Carrier

Mentor(s): Jay Johnson, Geography and Atmospheric Science & Cornelis Van Der Veen, Geography

Sea level rise manifests as an observable concern that correlates with climate change and presents an imminent problem for small islands in the Pacific Ocean such as Guam. The island of Guam, a US Territory, located in the Northwest Pacific is the home of Andersen Air Force Base and US Naval Base Guam. The island functions as a critical component to implementing United States policy, existing as a forward operating base for contingency humanitarian and military operations in the Pacific. The National Oceanic and Atmospheric Administration, or NOAA, operates numerous observation stations across the Pacific that record monthly sea level change throughout the year, however NOAA does not collect sea level data on Guam presently. Through the use of information from other observation stations in the region data could be gathered to create a representation of a mean sea level rise trend in order to assess the threat of sea level rise on Guam. Understanding how sea level rise affects Guam will influence the United States continuing capability to project foreign policy in the Pacific region.
Nicholas Martinez

Generation and Crystallization of Human Cytochrome P450 Enzymes Involved in Cancer Therapeutic Activation

Mentor(s): Emily Scott, Medicinal Chemistry & Aaron Bart, Molecular Biosciences

Human cytochrome P450 enzymes (P450) are crucial in the clearance of foreign compounds such as pollutants and drugs. Besides their roles in clearance, certain P450 enzymes can also process some compounds into toxins. This process has been exploited as a potential cancer therapy, where non-toxic compounds (duocarmycin analogs) are converted into potent toxins by P450 1A1 and 2W1 enzymes located in tumor cells. The specific structural interactions of how these promising cancer therapeutics bind in the P450 enzymes is not known. The objective of this project is to obtain a detailed structural view of P450 1A1 and 2W1 bound to duocarmycin analogs through X-ray crystallography. Towards this goal, human P450 1A1 and 2W1 were produced in E. coli, subsequently purified, bound to the duocarmycin analogs, and formed into crystals. The next step, is determination of the atomic-level structures of the P450/duocarmycin complex from these crystals, which will provide valuable guidance in the further development of these potential cancer therapeutics.
Justin Massey

**Guilt by Association: Protein-Protein Interaction Screens in Chlamydia trachomatis**

**Mentor(s):** P. Scott Hefty, Molecular Biosciences

A major challenge in studying bacteria is the significant number of proteins that lack adequate sequence similarity to assign functional annotation (hypothetical proteins). *Chlamydia trachomatis* is a medically important obligate intracellular pathogen that is characterized by a large portion (approximately 35%) of proteins with unknown function. In this study, we have applied the Bacterial Adenylate Cyclase-based Two Hybrid (BACTH) System to undergo a large-scale protein-protein interaction screen on a substantial number of chlamydial open reading frames. By identifying interactions between hypothetical and functionally annotated proteins, the overall biological role of these unknown proteins may be better understood. We have successfully constructed and implemented a comprehensive plasmid library of approximately 90 chlamydial open reading frames in the BACTH vector system. Early observations support that reproducible interactions are detected including a number of hypothetical proteins with Type III Secretion System apparatus proteins, as well as several metabolic components. BACTH screens are ongoing to determine the source of more of these interactions with the aim to construct a chlamydial protein interaction network.
Jerusha McFarland-Pitney

The Iraqis of Lawrence: Identifying factors of Iraqi immigration to Lawrence, Kansas through interviews


The resettlement of Iraqi refugees in Kansas has seen heated political debate in recent years, but who are the immigrants and refugees living here now, and what is their experience? What factors caused them to leave their country of origin, and why did they choose to resettle in the city of Lawrence? The purpose of my research was to identify factors effecting Iraqi immigration to Lawrence, Kansas. Along with relevant literature review and collection of demographic data, I conducted anonymous interviews with Iraqi residents of Lawrence to determine their reasons for leaving Iraq and reasons for choosing to live in Lawrence. Iraqi residents for this research were defined as Iraqis living in Lawrence for four or more years or Iraqis who arrived as refugees. Firstly, I found that Iraqi international students at the University of Kansas often want to live in the city of Lawrence after graduating but are prevented from immigrating due to strict contracts in their government scholarships requiring them to return to Iraq for employment. Secondly, Iraqi refugees are usually not resettled in the city of Lawrence by various Kansas refugee programs; however, Iraqis living in Lawrence have sponsored the immigration of several Iraqi refugee families to Lawrence. In conclusion, I found that Iraqi government scholarships act as a major barrier for Iraqi immigration to Lawrence, and that the city of Lawrence has a growing Iraqi refugee community.
Austen McGuire

The Utility of Attachment Priming as an Intervention Among Youth with Traumatic Experiences

Mentor(s): Omri Gillath & Yo Jackson, Psychology

Youth in the United States are frequently exposed to potentially traumatic events. Research has consistently shown a relationship between experiences of trauma in childhood and negative consequences, including various internalizing and externalizing mental health problems. Without proper intervention, these negative consequences can have lasting effects. To help youth cope with the potential negative consequences of traumatic experiences, researchers have developed various interventions, but most of these interventions are not theoretically based. Attachment is a well-studied theory focusing on close relationships and affect regulation. Attachment-based interventions (ABIs) have shown potential to successfully improve youth’s well-being and decrease their trauma related symptomatology through increasing attachment security. However, current ABIs tend to be time consuming, have high costs, and require a professional and infrastructure to be carried out. The current study tested the efficiency of repeated attachment security priming, a potential low cost, easy to administer, attachment based intervention to reduce symptomatology among youth with traumatic experiences. Seventy-six non-clinical adolescents were repeatedly exposed to either attachment security or neutral primes over the course of two weeks. It was hypothesized that attachment security primes as compared with neutral primes would result in increased attachment security and decreased levels of depression, anxiety, and interpersonal sensitivity from pre- to post-assessment. Although not all outcomes were significant, trends were observed in the direction hypothesized, suggesting that repeated attachment priming may be a useful intervention among more clinical samples of youth with experiences of trauma.
Justin Mehøjah

Ewsa inhibits TP53-mutation dependent tumorigenesis in zebrafish

Mentor(s): Mizuki Azuma, Molecular Biosciences
Contributors: Richard Galbraith & Hyewon Park

Ewing sarcoma is a pediatric cancer of bone and soft tissue. The common molecular abnormality identified in this disease is a chromosomal translocation, which results in the expression of a chimeric fusion protein containing EWS (Ewing sarcoma breakpoint region 1)-derived sequences in the amino terminus fused to the carboxyl-terminus of an ETS transcription factor (FLI1, ERG, ETV1, ETV4, or FEV). Despite that the loss of EWS allele is a common character observed in this sarcoma, whether it contributes to the pathogenesis of Ewing sarcomas is unknown. To address this question, we utilized a zebrafish mutant for ewsa (a homologue of human EWS). Both ewsa/wt, Zygotic ewsa/ewsa and Maternal-Zygotic (MZ) ewsa/ewsa did not develop tumors. The MZ ewsa/ewsa mutants displayed a higher percentage of cells with aneuploidy at 27 hpf, compared to wildtype zebrafish. These results suggest that Ewsa maintains chromosomal stability. Because Ewing sarcoma is often associated with an impaired P53 pathway, we further generated a double-mutant line by intercrossing ewsa/wt and tp53(M214K)/wt mutants. As a result, the incidence of tumorigenesis in the tp53/wt;ewsas/ewsas line and the tp53/wt;ewsas/ewsas line was higher than in the tp53/wt;wt/wt line. The result suggests that endogenous Ewsa inhibits tumorigenesis in tp53/wt zebrafish. Moreover, the tumor samples obtained from (tp53/wt;ewsas/ewsas) or (tp53/wt;ewsas/ewsas) zebrafish were converted to (tp53/tp53;ewsas/wt) or (tp53/tp53;ewsas/ewsas). The result suggests that zebrafish from the (tp53/wt) line developed tumors by undergoing LOH (Loss of Heterozygosity) to the (tp53/tp53), and wildtype Ewsa plays a role in inhibiting LOH induction. Here, we propose that the loss of EWS allele as a result of formation of EWS-fusion gene may play a role in the pathogenesis of Ewing sarcoma development.
Joshua Mendoza

Making Music Speak: Simulated Cochlear Implant sounds and the Speech-to-Song Illusion

Mentor(s): Michael Vitevitch, Psychology
Contributors: Nichol Castro

In this presentation I will: (1) report on an experiment testing the speech-to-song illusion, and (2) perform the musical composition that working on this project inspired. In the auditory illusion known as the Speech-to-Song illusion, a spoken phrase is repeated and transitions to a song-like percept (Deutsch et al., 2011). One proposed account of the illusion suggests that central processing mechanisms in the brain rather than peripheral processing mechanisms in the ear are responsible for the illusion. To test this account, we manipulated sound files to simulate the sounds heard by Cochlear Implant (CI) users; CIs can be thought of as an implanted hearing device. Despite the manipulation of the peripheral sound, the illusion was still perceived, casting doubt on the peripheral processing mechanism in the ear as an account for the illusion. In designing this experiment, I found myself wanting to illustrate to normal hearing listeners how a CI processes music. As a music composition major, the best way to show this was to create a piece integrating acoustic and CI-simulated sounds. Using the same software used to manipulate the experiment’s sound files, I manipulated an audio file of an originally composed piano part, and overlaid other audio files, such as traffic and water-sounds to simulate other sounds which may be lost through a CI. Together this experiment and creative piece emphasize the need for continued innovation of CI technology and increasing our understanding of the connections between music and speech perception.
Katherin Morales

Effects of Early Life Stress on Adult Neuronal Morphology

Mentor(s): Cara Wellman, Psychological and Brain Sciences, Indiana University
Contributors: Rachel Skipper

The stress response is an evolutionary adaptation that allows humans and animals to prepare for a fight or flight response. Furthermore, unpleasant memories acquired during stress are remembered with higher recollection than neutral stimuli, which suggests an enhanced encoding of memories during stress. Therefore, chronic stress can have strong effects on subsequent anxiety-like behaviors. Early life stress in humans can be a key risk factor for the development of psychiatric disorders, which are more prevalent in women. The amygdala, a brain structure critical for emotional learning and processing, is believed to play a central role in stress mechanisms. In recent studies of adult male rats, dendritic spines on pyramidal neurons in the amygdala increased in density after acute exposure to stress. Here we examined the effects of early life stress (15 mild footshocks on post-natal day 17) on spine density in the basolateral amygdala of adult male and female rats. We predicted that stressed rats would show an increase in spine density in the basolateral amygdala, with female rats exhibiting a more robust increase in spine densities compared to male rats. Spines were counted on terminal branches and were classified as thin, stubby, mushroom, or branched, according to standard morphological criteria. Although stress did not alter spine density overall, early life stress increased branched spine densities in female, but not male rats. This may indicate that females have the ability to more easily learn stress-induced fear, and could help explain why women have higher rates of psychiatric disorders than men.
Hannah M. Morrow

The Effects of Motor Engagement on Semantic Retrieval for Flexible Object Use

Mentor(s): Evangelia G. Chrysikou, Psychology

Cognitive neuroscience research on the organization of semantic memory for objects has revealed that different object attributes (e.g., color vs. function), different stimuli (e.g., visual or verbal), and different tasks (e.g., naming vs. object use) can influence the retrieval of semantic information about objects. For example, past work in healthy adults and patients with semantic dementia has shown that certain aspects of object knowledge (e.g., the object’s function or mode of manipulation) can be accessed independently of more abstract properties of the object (e.g., its name) and faster when participants are presented with three-dimensional objects relative to stimuli in pictorial format. However, the majority of these studies have focused on the retrieval of canonical object attributes. Nevertheless, frequently in daily life, one is required to solve a problem or satisfy a goal under unexpected or emergency circumstances, when an object may have to be used in a manner different from its typical use. Here we examined whether visual and manual experience with three-dimensional objects, relative to two-dimensional pictures of these objects, would allow for differential access to semantic memory under conditions of impromptu goal achievement (i.e., when a participant has to come up with an unusual, relative to a typical, use for a common object). Our results showed that participants who engaged with three-dimensional object stimuli during the flexible object use task showed facilitated access to sensorimotor object properties, yielding slower responses on this task. We discuss these implications of these results for theories of object knowledge retrieval.
Asma Mukadam, Matt Hentges, Emma Overstreet & Breanna Hoffman

Pollen foraging of Kansas Native Bees, *C. inaequalis*

**Mentor(s):** Deborah Smith & Daphne Mayes, Ecology & Evolutionary Biology

We are interested in the *C. inaequalis* bee species and their pollination habits. The goal of this research project is to determine what local plant species in Lawrence benefit the bees. We will be analyzing the pollen on bees and the pollen from different plants on the Lawrence campus.
The goal of this study is to look at positive and negative affect before and after a 3-week treatment of moderate intensity exercise (MICE protocol) or high intensity exercise (HIT protocol) in participants with BDI (Beck Depression Inventory) scores that indicate that they are depressed. Utilizing the PANAS (Positive Affect Negative Affect Survey), the difference in affect scores between groups can be examined. Participants are randomly assigned to the MICE or HIT protocol. Once assigned, participants are given the PANAS and are then trained on how to execute their exercise protocol. Participants do their protocol for 3 weeks and fill out daily surveys to track adherence to their protocol. Participants return on the final day to retake the PANAS. It was hypothesized that participants in the HIT protocol would experience a more dramatic improvement in positive and negative affect than the MICE participants. However, using a one-way T-test, preliminary data indicates a trend in which both groups feel more negative after their 3-week protocols are finished. On average, participants in the HIT protocol feel 3 points more negative than when they began, while people in the MICE protocol feel .4444 points more negative. It appears that the more intense exercise makes participants feel worse than the less intense exercise. In addition, there is no trend in the preliminary data to suggest that with more power a significant difference in positive affect would be seen, meaning HIT participants do not feel significantly more positive than MICE participants.
Halle Nick

The influence of word overlap on the speech-to-song illusion.

Mentor(s): Michael Vitevitch, Psychology

In the speech-to-song illusion, spoken words that are repeated appear to be sung. In this experiment we examined three conditions: words that overlapped in the beginning of the words (rag-root-right-rain; the onset condition), words that overlapped in the end of the words (pack-rack-back-lack; the rime condition), and words that had no overlap whatsoever, to see which sounded more song-like when repeated. Participants heard a list of four words that was repeated 10 times and rated on a scale of 1-5 whether the repeated words were more speech-like or more song-like. Preliminary results will be presented to address this question. Our findings will increase our understanding of speech and language processes, and the relationship between music and language.
Alyssa Ott, Jamie Venzian, Shelbi Polasik, & Rebecca Kurtz

They did what? A Systematic Review of Music Intervention Reporting in Healthcare Research

Mentor(s): Deanna Hanson-Abromeit, Music Therapy
Contributors: Allison Rager, Alyssa Beloat, Sarah Daugherty, Oladele Oyedele, Emily Storkman, Megan McCluskey, Lindsey May, Eugenia Hernandez-Ruiz, Sheri Robb

Public interest in, and publication of, music intervention studies are increasing; over 1,000 articles published in healthcare journals in the last twenty years. Concomitantly, concerns have surfaced about inadequate intervention descriptions and inconsistent terminology, which limit cross-study comparisons, interdisciplinary communication, and integration of findings into practice. Purposes of this systematic review were to describe music intervention reporting for patients with medical conditions including intervention content, outcomes of interest, interventionist qualifications, and intervention labels and terminology. Our review is based on published Reporting Guidelines for Music-based Interventions, which specify 7 areas: theory, content, delivery schedule, interventionist, treatment fidelity, setting, and unit of delivery. We identified experimental studies published 2010 - 2014, using MEDLINE, PubMed, CINAHL, and PsycINFO databases. Our initial search identified 620 articles, with 133 retained based on inclusion/exclusion criteria. Five nurse/music therapy student dyads reviewed full articles and abstracted data for analysis. Faculty mentors conducted interrater reliability checks and resolved discrepancies through discussion/consensus. Data are summarized based on the Reporting Guidelines. Areas poorly reported: 1) intervention theory (i.e., mechanisms of action), 2) references for sound recordings/musical arrangements, 3) decibel level/sound controls, 4) interventionist qualifications and training. Two hundred music terms were cited (84 terms defined; 116 terms not defined), and often misapplied. The interdisciplinary approach provided a rich context for exploration of differences in intervention descriptions/terminology based on background and training. Improved reporting will allow better cross-study comparisons, replication, and translation to practice. Additionally, standardization of terminology will improve interdisciplinary communication, delineation of music interventions across disciplines, and implementation.
Baylee Owen

The Association Between Adolescent Aggression, Drug Use, and the Role of Family Cohesion

Mentor(s): Christopher Cushing & Amy Noser, Psychology
Contributors: Tarrah Mitchell

Background: The aim of the current study is to examine the association between adolescent aggression and drug use, and whether this association varies depending on the level of family cohesion. First, higher aggression was hypothesized to be associated with higher drug willingness, and that family cohesion would serve as a protective factor for children at risk for high drug willingness. Methods: Participants were 139 adolescents (88.5% girls; 74.8% African American) aged 11 to 15 years old (M age = 12.26, SD = .78) participating in a summer dance camp located in a Midwestern community. The Proactive and Reactive Aggression Questionnaire (PRA), Drug Willingness, and Family Functioning Measure (FFM) scales were used to assess aggressive acts, willingness to try drugs, and family cohesion. Results: Covariates of age and reactive aggression were entered on Step1 of a hierarchical regression, main effect terms of proactive aggression and family cohesion were entered on Step2, and the two-way interaction of these main effects were entered on Step3. There was a main effect for family cohesion (β = -0.208, t = -2.145, p = 0.034). Family cohesion was associated with drug willingness for individuals with high levels of proactive aggression (β = -0.427, t = -2.921, p = 0.004), but not for those with low levels of proactive aggression (β = -0.007, t = -0.049, p = 0.961). Conclusions: The findings of the current study suggest that family cohesion can buffer aggression as a risk for drug willingness.
Daniel Pham

Studying Musashi-1 Function in Human Cancer Cells

Mentor(s): Lan Lan & Liang Xu, Molecular Biosciences

In 2016, approximately 50,000 lives are estimated to be claimed by colorectal cancer. The goal of this research project was to determine the effects of inhibiting a key protein, Musashi-1 (Msi1), in mammalian cell cultures. Msi1 is a protein normally expressed in colon stem cells but has been found to be overexpressed in cancer cells. Msi1 stimulates two signaling pathways that promote cell proliferation: Wnt pathway and Notch pathway. Clustered regularly-interspaced short palindromic sequences (CRISPR) and small interfering RNA (siRNA) were used to study the effects of knockout or knockdown expression of Msi1 in human carcinoma cell lines. CRISPR is a genome-editing technique that uses guide RNA (gRNA) and endonuclease Cas9 to sever genomic DNA at a specific sequence, inactivating a target gene. siRNAs are small molecules that bind to target mRNA and mark them for breakdown, preventing translation of a target protein while keeping the genome intact. After treatment, the cells then underwent colony formation assay which quantifies the number of colonies formed after a period of time. We observed that cells with Msi1 knockdown grew fewer colonies than the control. These findings suggest that Msi1 is a promising target for molecularly targeted cancer therapy.
Samuel Powell

Smother

Mentor(s): Meg Jamieson & Madison Davis Lacy, Film & Media Studies

'Smother' is a horror screenplay currently in development about a mysteriously impregnated teenage lesbian struggling to give birth to an unwanted child while living under the roof of her narcissistic and maniacal Catholic mother. In addition to producing this script I am also writing an essay that focuses on the depiction of the “feminine monster” in horror film by comparing her level of agency in becoming the monster to the oppressive pressure placed on them by hegemonic paternal ideology in order to determine whether the feminine monster positively depicts women.
Rachel Prather

Social abilities of *C. familiaris* and the related capacity for interspecies bonding

**Mentor(s):** Jennifer Gleason & Kaila Colyott, Ecology & Evolutionary Biology

The relationship between dogs and humans accompanies the existence of a number of distinct behavioral and physiological traits which govern social bonding behaviors in modern domesticated dogs (*Canis familiaris*). Behaviorally, dogs differ from their closest extant relatives, wolves (*Canis lupus*), in terms of i) tolerance of outsiders, ii) tolerance of conspecifics, iii) relative frequency of submission response, and iv) level of adherence to an established dominance hierarchy. Because these behaviors have been studied in dogs considered comparable to early dog-like canines, I infer that behavioral responses related to tolerance and dominance hierarchy simultaneously fueled the development of the human-dog bond and the species divergence of dogs and wolves. *Canis familiaris* also possess physiological traits that indicate high sensitivity to humans’ emotions and behavioral cues, including the capacity for empathy, which humans share. Oxytocin regulation and hormonal synchronization are mechanistic traits which operate via similar pathways in humans and dogs, and make us uniquely well-suited interspecies cooperators. Whether such commonalities were precursors to human-canine interaction or are instead the result of our long-standing cooperative relationship has yet to be fully understood. These combined behavioral and physiological traits make *Canis familiaris* highly adapted to social bonding and interspecies cooperation, relative to closely related species, and additionally affect dogs’ relationships with non-human animals. However, impediments exist that have the potential to greatly hinder dogs’ ability to bond equally deeply with non-humans and must be considered in analysis of such relationships.
Christopher Rooney

Motions of the Universe: The Velocity Correlation Function

Mentor(s): Hume Feldman, Physics & Astronomy
Contributors: Yuyu Wang

The velocity correlation function is a common method of statistically analyzing flows in fluids. It can also be applied to galaxies to study the behavior of large-scale motions in the universe. However, the velocities of galaxies are difficult to measure because they depend on the measurement of the distance to the galaxy. To know the effects that distance errors will have on the correlation function, we start with a set of simulated galaxies, and then change their distances randomly using several different methods. The correlation function can then be computed using the changed sample of galaxies to see the effects that real measurement errors would have.
In order to identify cognitive dysfunction and decline, healthcare providers typically rely on patient self-reports about their memory ability and performance. Recent research has found that relying on these subjective memory reports is problematic since they are influenced by a number of underlying symptoms, such as depression and fatigue, which are both commonly experienced in people with multiple sclerosis (MS). In this study, an Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) was given to a close friend or family member who has known the older adult with MS for 10 years or more. Results indicated that unlike self-reports, the IQCODE was not affected by the patient’s mood, but it was significantly related to objective measures of memory performance. Furthermore, the IQCODE was more successful at predicting performance on memory tasks than demographic, clinical, or self-reported mood measures. These results support the hypothesis that an informant’s report is more representative of an older adult MS patient’s memory functioning than their own self-reports. Thus, the IQCODE may prove to be a useful and more reliable tool for physicians, rather than relying on the patient to accurately assess their own cognitive functioning.
Helena Salt

Development of mechanically-tunable gelatin-alginate hydrogels to promote stem cell osteogenic differentiation

**Mentor(s):** Arghya Paul, Chemical & Petroleum Engineering  
**Contributors:** Settimio Pacelli, Madeline Fang & Cecilia Kurlbaum

Hydrogels have several possible applications in the biomedical field such as scaffolds for tissue engineering or as carriers of drugs and bioactive molecules. In this study, a gelatin alginate interpenetrated network (IPN) was fabricated using different amounts of N-hydroxysuccinimide (NHS), and ethyldicarbodiimide (EDC) as crosslinkers to produce tunable scaffolds for human adipose mesenchymal stem cell (hAMSCs) differentiation into bone lineage. High and low crosslinked hydrogels were obtained and characterized for their ability to swell, degrade and resist different mechanical stimuli. In addition, the surface of the scaffolds was coated with polydopamine as a bonding layer for bioactive molecules to promote hAMSCs differentiation. Preliminary results showed a higher absorption of dexamethasone can be achieved using a polydopamine coating respect to the uncoated hydrogels. Further studies will be carried out to evaluate their potential in vitro as osteogenic scaffolds.
My project explores the value of a liberal arts education at the University of Kansas by focusing on the physical space I studied in and the texts I read in a genre called literacy autobiography. The space at KU conveys an ethos that compelled me to ask, what is the good life? My project views Watson Library, Wescoe Hall, and the space between these buildings as a metaphor for students’ lives: Watson represents our lives as learners, Wescoe represents our lives as teachers, and the grave placed between them represents our shared destiny, which ultimately, as Ecclesiastes taught me, leads to death. Pericles’ Funeral Oration and E.B. White’s Obituary for Katherine Sergeant White taught me not to reduce life to platitudes amidst great national loss and personal suffering. Shakespeare gave me insight into an experience I describe as brain-splitting. In The Merchant of Venice, Shylock, a Jew, captures both the essence of de-colonial texts such as Fanon’s Wretched of the Earth and the Western moral wrongs that inform our shared history as Americans. Shylock pleaded with me, “Hath not a Jew eyes?” in order to teach me of a universal brotherhood. And the Monster from Shelley’s Frankenstein taught me that humanity is not found in the color of our skin, the shape of our face, or the tone of our voice, but that humanity is our common bond of shared experience that we more fully grasp as we study the writings of both our past and present.
Julia Santos

**Design, synthesis, and cytotoxicity study of short peptide analogues of anticancer agent cemadotin**

**Mentor(s):** Abu Gafar M. L. Hossion & Blake R. Peterson, Medicinal Chemistry

A few class of peptide molecules have high cytotoxicity profile to conjugate with antibody. One such class is cemadotin, a derivative of the natural product dolastatine 15. This compound selectively disrupts tumor vasculature and potently inhibits the polymerization of tubulin. An aim to assist the development of novel cemadotin analogues, a new class of short peptide analogues of cemadotin were designed and synthesized. We are investigating the biological properties of these agents against human cancer cell line. These agents are cytotoxic against leukemia (Jurkat) cell line with IC50 values about 1 µM. The synthesis and properties of these compounds will be described.
Addison Schile

On the Breakdown of Linear Response: An Investigation of the Dipole Flip Model Through the Lens of Gaussian Statistics

Mentor(s): Ward Thompson, Chemistry

In any experimental or computation study of chemicals, it is important to fully understand the underlying theory, which drives chemical processes. Many of these chemical processes are well described by existing theories. There are however, many real systems, which exhibit deviations from these theories. We have explored deficiencies in linear response theory, a dominant theory to describe the chemical dynamics of liquids, to better understand why this theory fails for certain systems and how to overcome these pitfalls. We have applied techniques of molecular dynamics simulations to the dipole flip model, a diatomic molecule with equal and opposite partial charges, immersed in water, methanol, and mixtures of water and methanol. We have found that understanding linear response under the framework of Gaussian statistics gives a clearer picture of how linear response fails. In particular, it has been noted that large fluctuations in solvation patterns—specifically hydrogen bonding networks—roughly predict nonlinear response.
Christian Schillo

WHITETAIL DEER POPULATIONS AT THE UNIVERSITY OF KANSAS FIELD STATION

Mentor(s): Robert Hagen, Environmental Studies & Lloyd Fox, Kansas Department of Wildlife

Whitetail deer are a key part of ecosystems in eastern Kansas and the eastern US. Since 2008, evening spotlighting surveys have been used to estimate whitetail deer populations in and around the University of Kansas Field Station (KUFS), located north of Lawrence, Kansas. Our population estimate based on the evening surveys ranges from a high of 45.8 in 2010 to a low of 10.4 in 2015 deer per square mile. In fall 2015, the Kansas Department of Wildlife, Parks, and Tourism (KDWPT) partnered with KUFS and the KU Environmental Studies Program to set up twelve baited trail camera stations at KUFS to better understand the whitetail deer herd. One goal was to get an independent estimate of deer population density for comparison with spotlight survey results. A second goal was to obtain information on movement and behavior of individual deer at KUFS.

We obtained over 10,000 photos during the 2 weeks of camera placement. We then used a new software program (DeerLab), to tag and sort the photos by content. Individual bucks were identified from the photos, based on unique antler patterns or other features. We recognized at least 16 unique bucks, which appeared in 3200 photos from the 12 camera stations. Analysis of the photos suggests that individual bucks tend to remain in the same area of the field station during this fall period. Results from our study demonstrate the promise of trail camera studies for whitetail deer research in Kansas.
Abigail Schletzbaum

A Critical Analysis of NGO Operations in Post-Earthquake Nepal

Mentor(s): Brian Lagotte, Global & International Studies & Kala Stroup, University Honors Program

The 2015 Nepal Earthquake was an anticipated crisis that caught Nepal at a time where disaster management agencies were underprepared and political tensions were high. When the 7.8 magnitude earthquake struck Nepal it claimed thousands of lives and millions of livelihoods. As humanitarian operations began, the broken state of the nation impeded relief efforts. It is critical to assess and analyze the aftermath, and how current relief efforts are meeting the short and long term needs in order to ensure that underfunded relief efforts are as effective as possible. These relief efforts have been slow and inadequate, often stalled by bureaucratic processes and limited transportation. Despite the vast need for humanitarian assistance, the Nepali government and international community have an increasingly strained relationship to address. This research was conducted through analyzing and synthesizing conclusions from a combination of interviews with disaster management professionals, disaster reports from the Nepal public sector and reportage from major news stations. I conclude that the next steps for relief begin with addressing corruption and encouraging collaboration within Nepal’s public sector through incentivizing the limited relief funds. To prevent catastrophe when the next earthquake occurs, Nepal must analyze and implement policies to address the failures of the current relief operations, repair the economy through restoring tourism and agriculture, and construct a new international airport to allow for more relief to reach the country.
Marah Schlingensiepen

Prisoners’ Perceptions of Justice

Mentor(s): Shannon Portillo, Public Affairs & Administration
Contributors: Lori Sexton

My analysis explicitly examines prisoners’ perceptions of justice through their descriptions of their daily lives and experiences of punishment while incarcerated. We coded 80 existing prisoner interviews that were done in three different Ohio state prisons for an earlier project. My analysis will reveal the relevance of organizational factors to prisoners’ perceptions of justice. Preliminary findings show that prisoners link to the construct of procedural justice issues of access to specific resources and reform opportunities. They discuss the ways in which their arrests, court experiences, sentences, prisoner-staff relationships, treatment, programming, family dynamics, and perceived voice and control all influence their perceptions of justice. This research aims to determine which facets of the carceral experience shape prisoners’ perceptions of justice within the prison as an organizational structure. This research also aims to clarify why society needs to hear the prisoners’ voices, why society should care about their perceptions of justice. A better understanding of procedural justice within a prison setting has implications for the legitimacy of prison regimes as understood and experienced by the people who are (involuntarily) served by them.
Emily Smith

The search for electroweak production of a new vector-like quark T, decaying to a top quark and Higgs boson

**Mentor(s):** Phil Baringer & Alice Bean, Physics & Astronomy  
**Contributors:** Eilish Gibson, Devdatta Majumder, Erich Schmitz, Robert Stringer & Graham Wilson

The search for a vector-like top quark partner T of charge +2/3 produced through electroweak interaction in association with a bottom or top quark, and decaying to a top quark and a Higgs boson, is performed using proton-proton collision data at a center-of-mass energy of 13 TeV collected by the CMS experiment. Hadronic decays of the top quark, and the Higgs boson decaying to a bottom quark-antiquark pair are considered. For a T quark of mass above 1 TeV, the top quark and the Higgs boson from its decay are highly Lorentz-boosted and their decay products can be reconstructed using one hadronic jet each. Jet substructure and b-tagging techniques are used to identify the highly boosted top or Higgs jets, and to suppress the standard model background which is comprised of top-antitop pairs and multijets. The total number of events is found to be consistent with predictions of the standard model. The findings are interpreted as upper limits on the production cross sections of single T quarks of different assumed masses and couplings to the third generation standard model quarks.
To produce vocalized speech, there must be a source of airflow, acoustic energy, and a filter to modify the air. The larynx, including vocal folds, is a primary component of the voice source (Fant, 1981). The larynx creates an unfiltered tone with complex acoustic characteristics. As air flows through the glottis and moves superiorly through the vocal tract, the air is shaped by the speech articulators. Air flows through the pharyngeal, oral and nasal cavities to be filtered and modified to create a unique sound that is perceived as a voice. (Gauffin 1989, Chu 2013). The importance of the harmonic characteristics of unfiltered acoustic glottal source will be examined on speech perception of one’s own production. Glottal source waveforms with the same fundamental frequency (f0) but with different harmonics will be presented to participants while we record brain activity via electroencephalographic (EEG) signals. Differences in brain responses to the altered speech stimuli will be assessed using the P300 event-related potential (ERP).
Jennifer Stern

Recurrent Evolution of Venomous Spines in Cartilaginous Fishes

Mentor(s): Leo Smith, Ecology & Evolutionary Biology

Venom, a phenomenon commonly associated with snakes and spiders, is used across the animal kingdom for varying purposes. While most animals use their venom offensively, bony and cartilaginous fishes tend to utilize venom defensively. Shark venom, documented in the dorsal spines of six different families, is thought to be defensive and widespread across cartilaginous fishes. By combining anatomical and molecular phylogenetic data, there is significant morphological variation present both between and within families. We document variation in the size and shape of dorsal spines and their associated venom glands. The morphology, connectivity, and evolution of elasmobranch spines is relatively understudied in the literature. By using anatomical and molecular data, we developed a hypothesis of the recurrent evolution and impact of dorsal spines, and likely venom, in cartilaginous fishes.
Hannah Stevens, Quinton Bockhold, Erin Funk & Philip Kaul

Effects of Pullout Interventions on Beginning Band Students’ Range, Embouchure Development, Breath Support, and Articulation: A Multiple Baseline Study

Mentor(s): Martin Bergee, Music Education and Music Therapy

Four undergraduate music students interned in a local middle school and carried out an experiment with 6th-grade a beginning band students. A multiple baseline design was employed. Small groups of students worked with the interns on the music from their beginning band class. The interns identified performance challenges shared by several of the students. One of the interns worked with flutists’ accuracy on upper-register pitches. Her intervention focused on proper embouchure and use of air. The multiple baseline graph demonstrated a marked improvement in Flutists 1 and 2; Flutist 3, however, had an unstable baseline, and her improvement during intervention was no so marked. A second intern focused on range in beginning trumpeters. She composed a 3-line etude that encouraged embouchure development and a controlled extension of range. Two of her participants demonstrated better consistency. A third trumpeter improved, too, but showed evidence of improvement during the baseline phase as well. Another intern taught low brass players exercises intended to improve breath support and tone production. All of his students improved; two of the three, however, had begun to improve while still in the baseline phase. The fourth intern helped alto saxophonists to improve their performance of articulation patterns. He composed an etude incorporating patterns of tongued and slurred notes. All three of his participants improved immediately after introduction of the treatment. We concluded that the one-on-one treatment interventions generally were successful. But some of the participants had begun to improve before the treatment was introduced.
Austin Svancara

Distracted Driving Habits Among Self-Reported ADHD Groups

Mentor(s): Ruth Ann Atchley & Paul Atchley, Psychology

Secondary tasks, such as text messaging or talking on a cellular phone, have been identified as major sources for distraction and, thus, vehicular crashes. Despite the large efforts directed towards restrictive laws against text messaging while driving, studies seem to indicate that overall these laws have little to no effect, particularly among younger drivers (McCartt and Geary, 2004; Foss et al., 2009; Vlingo Corporation, 2010). Additionally, researchers observed higher rates of vehicular crashes among individuals with attention deficit hyperactivity disorder (ADHD). Participants will either be collected through Amazon Mechanical Turk (MTurk) or from an introductory psychology course. The participants will complete a survey composed of the UPPS-P (a measure of impulsivity), the Boredom Proneness Scale (a measure of boredom proneness), the Wender Utah Rating Scale (a retroactive measure of ADHD symptomatology), and a short survey on text messaging behaviors. Impulsivity, proneness to boredom, and ADHD symptomatology are predicted to have a strong influence on the frequency of text messaging while driving. A structural equation model (SEM) is being used to examine the relationship of these variables. Data is still being collected at this time, but a strong relationship of the aforementioned variables on the frequency of text messaging while driving is predicted. This data will not only provide insight into why people tend to text message and drive, but may help us understand why some populations with higher levels of impulsivity, such as populations with ADHD, possibly experience more car crashes than the average driver.
Xingzhe Tao

Culture and Architecture in UAE

Mentor(s): Nilou Vikil, Architecture

As new concept of beauty and technology develops, different approach of architecture is developed. One of the modern approach to architecture is believing that there is a universal beauty, and we can design structure that can be appreciated all over the world. The other approach believes that architecture should express its own culture. It should not be just a cool structure but also holds something that only belong to certain culture group. This research project focus on the culture aspect of architecture. We looked at United Arab Emirates to see how mid-east world express their culture through the form of architecture.
Bryce Tappan

Gold(I) Complexes of Azulenyliothiolates: Molecular and Electronic Structures, Photoluminescence, and Reactivity Profiles

Mentor(s): Mikhail Barybin, Chemistry
Contributors: Andrew D. Spaeth, Orlando Torres-Texidor & Nikolay Gerasimchuk

Materials that exhibit tunable electronics and emissions from multiple excited states are well-suited for application in photoluminescent optical sensing. Azulene (C10H8) is a nonbenzenoid aromatic hydrocarbon consisting of fused five- and seven- membered carbon rings. Azulene and its derivatives often exhibit properties that are uncharacteristic of most aromatic hydrocarbons, including a substantial molecular dipole, absorption of visible light, and emission from the second singlet excited state. Such emissions violate Kasha’s rule, which maintains that radiative decay should occur from the lowest-energy excited state. In this presentation, the chemistry and physicochemical properties of novel azulenlythiolate-gold(I) compounds developed by Barybin et al. will be discussed.
Acculturation has manifested into two distinct categories throughout the advancement of civilization. Societies choosing to eliminate diversity have a melting pot perspective, and societies choosing to embrace diversity have a multicultural perspective. Throughout history, America has been advocating its multiculturalism, believing that those who choose to stay in America can uphold the traditions and worldview of their original ethnic culture. However, the reality may not reflect what Americans believe in. In this study, we aim to test how adopting Anglo names (which reflects the assimilationist perspective) rather than keeping original names (which reflects the multicultural perspective) among international students affect their well-being and cultural adaptation. Hypotheses were derived based on the self-categorization theory and partial ingroup membership framework. We predicted that members from ethnic minority groups may experience less discrimination if they use Anglo names (perceived as partial ingroup members by the majority) than using original ethnic names (perceived as double outgroup members by the majority). And discrimination may lead to decreased health, well-being, and cultural adaptation. To test this hypothesis, participants will be asked to complete a questionnaire, responding to their levels of loneliness, controllability of life, self-esteem, mental and physical health, well-being, and cultural adaptation. The structural equation model will be used to estimate how adopting Anglo names affect their well-being and cultural adaptation through the mediation of perceived discrimination.
Miki Tefera

Mitochondrial genome sequence variation, mutation accumulation, heteroplasmy, and haplogroups associated with Alzheimer’s Disease

Mentor(s): Eli Michaelis & Xinkun Wang, Pharmacology & Toxicology
Contributors: M.A. Florez, L. Jiang, J.D. Mahnken, J. Burns & R. Swerdlow

Alzheimer’s disease (AD) is a progressive neurodegenerative disease that affects an estimated 5 million Americans and is the 6th leading cause of death among adults in the U.S. One in nine people age 65 years or older has AD, increasing to one in three after age 85. Research on the genetics of the disease tends to be focused primarily on the nuclear genome, and as a result much is left to understand about the role of mitochondria in the etiology of AD. Our study cohort contained over 400 AD cases that were age-matched with healthy controls and recruited to the University of Kansas Alzheimer’s Disease Center. We applied Illumina HiSeq next-generation sequencing (NGS) to identify mtDNA variants that are significantly associated with AD. The distribution pattern of mutations and the resultant sequence heterogeneity (i.e., heteroplasmy) were also examined. As a result of our analysis we were able to identify new mtDNA polymorphic sites that are significantly associated with AD and lead to mutations within subunits of NADH dehydrogenase and Cytochrome bc1 complex. In addition, mtDNA-based haplogroups were also examined for their association with the disease, and it was found that the incidence of AD was significantly reduced among certain haplogroups. We were able to conduct highly multiplexed sequencing with 96 or more samples being sequenced in a single lane because of the small size of the mitochondrial genome. Our NGS approach affords opportunities for the study of AD and other diseases characterized by mitochondrial deficits.
Kevin Tenny & Vikram Lakhanpal

**Process for Electro-Depositing Cobalt onto Carbon Substrates for Carbon Nanotube Growth for PEM Fuel Cells**

**Mentor(s):** Trung Van Nguyen, Chemical & Petroleum Engineering

As the demand for clean energy increases, efforts toward employing electrochemical processes have shown promise. Specifically, proton exchange membrane (PEM) fuel cells are of significant interest due to their capacity to store and generate electricity. Within the PEM fuel cells, a carbon electrode of high porosity and high surface area is employed to improve transport phenomena within the PEM fuel cell. Currently, the surface area of carbon paper has been shown to increase through direct electrocatalytic-deposited carbon nanotube growth on the substrate and has been implemented in PEM fuel cells. The purpose of this study is to highlight the process of growing carbon nanotubes promoted by electro-deposited cobalt metal. Future studies will be done with growing carbon nanotubes on different substrates and subsequent testing in PEM fuel cells.
Amphibians in island archipelagos, and across the world, are experiencing documented population declines and even extinctions. In order to apply effective conservation efforts in areas of high biodiversity, such as the Philippines, conservationists and wildlife managers need accurate species accounts. This project is centered on the larval biology of Philippine frogs, which are so often overlooked by researchers in the field. Many frog species in the Philippines exhibit very little morphological differentiation between each other at the adult stage, leaving primarily molecular data as the source of distinguishing similar species. Amphibian larval forms (tadpoles) also exhibit distinct, species-specific morphologies, which potentially can provide information that may help researchers in efforts to differentiate the species. However, due to a lack of basic literature on the larvae of Philippine amphibians, their varying microhabitats, natural history, and larval morphologies cannot be utilized to their full extent. The lack of literature and knowledge of tadpoles also results in inaccurate species accounts that do not take into consideration the many conspicuous larval forms present at any one site, stream, or island. This project will take unidentified tadpoles collected from the Philippines, archived in the Herpetology collection in the KU Natural History Museum, and isolate larval DNA sequences that will then allow us to identify these currently unknown forms. These identifications will be published along with their descriptions in a manuscript that will also include a summary of all previously published information on the larvae of each species.
Psychologies of fear and safety have been studied widely, but safety on campus can be grounded not only in the science of the mind but also in the study of place and in the geography of safety. How do the experiences in places on a college campus translate to perceptions of safety by the students who inhabit it? National concerns about campus safety encompass issues from gun violence, to sexual assault, to racial inequality. How can we better understand these issues through an examination of the spaces and places in which they occur? This project examines how people at the University of Kansas perceive and maintain feelings of safety on campus, and how these feelings are reflections of the landscape of the University. We collected survey data about experiences of feeling unsafe and safe in general at KU in specific areas on campus, and comparatively analyzed this data with available crime statistics, including the University’s Clery report. Our findings show that although there are commonalities, safety is an intensely personal construct. What is ‘safe space’ to one person is a place to be feared and avoided by another. Places that should be safe are often believed to be unsafe, and respondents of different genders had very different experiences of the same places. Understanding the role of place in how safety is perceived and maintained can and should be part of broadening the narrative of campus safety that KU is currently engaged in, and this research seeks to contribute to that discourse.
Herpes simplex virus type 1 (HSV-1) infects sensory neurons in humans and establishes lifelong infections, which lie latent until viral replication is reactivated by stress-related stimuli. Among the first proteins to be expressed when HSV-1 infects a cell is infected cell protein 0 (ICP0). ICP0 is key to reactivating and enhancing viral replication through several of its functions. One such function is impairing the antiviral effects of the cellular factor, interferon (IFN)-β. The mechanism(s) by which ICP0 impairs IFN-β restriction on HSV-1 replication remain largely unknown. Consequently, the purpose of the present study was to determine which region(s) of ICP0 contribute to HSV-1 resistance to the antiviral effects of IFN-β. To identify one or more domains, a series of ICP0 truncation mutants was used in replication and gene expression assays in untreated cells and cells pretreated with IFN-β. We determined that the first 388 N-terminal amino acids of ICP0 confer significant resistance of HSV-1 to IFN-β while efficiently stimulating viral gene expression; specifically, amino acids from 312 to 388 are crucial for mediating this resistance. We hypothesize that this N-terminal domain of ICP0 plays a role in counteracting the IFN-β-induced restriction on viral replication through ICP0-host protein interactions. Overall, we conclude that the N-terminal half of ICP0 enables HSV-1 to resist an established IFN-β response with residues from 312 to 388 being required for this function.
Craig Vandervelden

Using Modeling to Reduce the Time Required for Immunostaining Cells Encapsulated in Hydrogels

Mentor(s): Stevin Gehrke, Chemical & Petroleum Engineering

Immunostaining cells encapsulated in hydrogels has the potential to more accurately represent antigen-antibody interactions that occur in vivo. However, the diffusion of antibodies through hydrogels is a time limiting step that is not accounted for by current protocols. Therefore, there is a need to determine roughly how long each step of the gel immunostaining process takes. This work models the diffusion antibodies through hydrogels and the kinetics of antigen-antibody interactions through the continuity equation and finite element analysis to determine what conditions will fully stain the encapsulated cells in the shortest amount of time and require the least amount of antibody. The time required to leach out excess, unbounded antibodies after a specified time was then determined to prevent background noise. This is done using parameters (diffusion coefficient of an antibody in a hydrogel, antibody/antigen initial concentrations, and binding/dissociation kinetics) that can be used for a generalized gel-cell-antibody system. It is found that systems with low diffusion coefficients and fast binding kinetics allowed for the quickest immunostaining. In general, all systems simulated were able to be immunostained within roughly 12 hours.
Nadia Vossoughi

Racial Prejudice in Age Perception of Black Adolescent Girls

Mentor(s): Chris Crandall & Mark White, Psychology

In America Black youth are seen as older, more mature, and more responsible for their actions (compared to White youth). Previous work has attributed these effects as being a result of dehumanization. An alternative hypothesis is that these effects can be better explained by balance theory. If the dehumanization perspective is supported, participants should perceive Black girls as older than White girls regardless of situation. Alternatively, according to balance theory prejudice or dislike of Blacks should cause people to perceive them as older (compared to Whites) but only when older age has negative consequence for the target. The current study tests this alternative hypothesis through an experimental design that presents participants with either a Black or White girl in a situation where being perceived as older either has negative consequences (such as in a statutory rape case) or positive consequences (such as when seeking to be on birth control) and then measures the dependent variables of age, responsibility, and harm to the girl. In accordance with balance theory predicted results are: Black girls will be perceived as older than White girls when older age has negative implications for the girl (statutory rape case), but Black girls will be perceived as younger when older age has positive implications for the girl (birth control usage). This study uses an old theory and a new hypothesis to demonstrates the real world implications that negative perceptions of Blacks has on Black adolescent girls in legal and health care settings.
Elizabeth Waldberg

The Effect of American Responsibility for Global Warming on Willingness to Act

Mentor(s): Rachel McDonald, Psychology

This experiment takes an in-depth look at the relationship between social norms and environmental action. Participants were drawn from the University of Kansas student population, and were asked to complete a survey that measured their responses across multiple variables, such as their political group identification, feelings about participating in environmental actions, personal valuation of social norms, and relevant aspects of personality. The study took place during the Fall 2015 semester. Early results seem to indicate that there is not a strong relationship between the variables of social norms and environmental action, but further analysis will be completed by the presentation date.
Mason Wilkinson

Characterization of the Interaction of Yersinia Type III Secretion System Chaperone LcrG to Tip Protein LcrV

Mentor(s): Roberto De Guzman, Molecular Biosciences
Contributors: Kawaljit Kaur

The T3SS is a highly conserved multi-protein complex found in many pathogenic Gram-negative bacteria, such as those responsible for dysentery, typhoid fever, and bubonic plague. This complex assembles to form a syringe-like structure, or needle apparatus, that facilitates the transfer of virulence factors into a host cell. The parts of the needle apparatus include a base that spans the bacterial membranes, a needle, a tip that contacts the host, and a translocon pore that forms in the host cell membrane. My project involves the characterization of bacterial Type III Secretion System (T3SS) proteins using NMR methods. I used E. coli models to grow and purify recombinant mutants of Yersinia pestis T3SS tip protein LcrV for NMR analysis in order to identify the residues of LcrV (specifically isoleucines, leucines, and valines) involved in interaction with its chaperone, LcrG, and other T3SS proteins in Yersinia sp. Following this research, a small molecule assay can be used to identify inhibitors of the interaction between LcrV and LcrG. Finding such a molecule could be the starting point for developing stronger T3SS inhibitors as potential novel antibiotics. Furthermore, due to the highly conserved nature of the T3SS between species, successfully inhibiting the structure found in Yersinia pestis may provide insight into developing new antibiotics effective against a wide array of Gram-negative bacteria.
Madeleine Wilmsen

The influence of the number of syllables in a word on the speech-to-song illusion

**Mentor(s):** Michael Vitevitch, Psychology

In the speech-to-song illusion, spoken words that are repeated appear to be sung. In this experiment we examined lists containing only one-syllable words, or lists contain one- and two-syllable words. Participants heard a list of four words that was repeated 10 times and rated on a scale of 1-5 whether the repeated words were more speech-like or more song-like. Preliminary results showed that lists of one-syllable words were more likely to sound speech-like, but the lists of one- and two-syllable words were more likely to sound song-like. We believe the inconsistent stress pattern found in the lists of one- and two-syllable words produces a more song-like percept, but the consistent stress pattern in the lists of one-syllable words is perceived as a monotonous and therefore less song-like. Our findings will increase our understanding of speech and language processes, and the relationship between music and language.
Control of tissue specific growth in the larval trachea of *Drosophila melanogaster*

**Mentor(s):** Robert Ward, Molecular Biosciences  
**Contributors:** Erin Suderman

In humans and some animals, post-embryonic development is achieved through allometric growth. Allometric growth is a systematic pattern of growth where organs and tissues grow at different rates relative to each other. While it is known that the growth of each tissue is dependent on its function in development, the mechanisms that control this growth are not well understood. In order to elucidate these mechanisms, we are using the larval trachea in *Drosophila melanogaster* as a model to study tissue specific growth. The trachea is a gas exchange organ in *Drosophila*, which is composed of a tubular epithelial network and, that shows allometric growth in the larval stages. Larval trachea growth is an appropriate model to study tissue specific growth because the trachea can be easily imaged and measured, gene expression in the larval trachea can easily be manipulated, and genes such as *uninflatable (uif)* and *Matrix metalloproteinase 1 (Mmp1)* have been identified to negatively control tracheal growth. By screening through EMS-induced larval lethal mutations, we were able to identify several larval mutants that have either an increased or decreased ratio of body length to trachea and show the lethal phenotype of hypoxia. In order to identify the genes that caused the overgrown trachea in these various mutants we used the 3rd chromosome deficiency kit and identified the region between 99b5 and 99c2 (Df(3r)bsc547) to be the region of interest. Also, we performed immunohistochemistry experiments on the mutant lines to quantify the number of nuclei found in the tracheal mutants.
Body image affects both mental and physical aspects of women's daily lives. The pressure to be thin, or conform to the thinness "ideal," may lead normal weight (BMI<25) individuals to think they need to lose weight, with added vulnerability at certain times in life. Consistent with these suppositions, it was predicted that distress levels of normal weight, female freshmen (measured by the Beck Depression Inventory-II (BDI) and Perceived Stress Scale (PSS)) would be related to believing that one needed to lose weight. As part of a larger study of weight status and social relationships, data was gathered in a sample of female, first-semester freshmen women (N=45). Participants completed questionnaires and body measurements (i.e., height and weight) were objectively measured using medical grade equipment. Results showed that among healthy weight college freshman (n=35) women, those who reported currently trying to lose weight had higher depression levels and perceived stress scores (BDI: M =9.12, SD =9.02; PSS: M=19.3, SD=5.9) than those who said they were not trying (BDI: M =2.57, SD =2.32; PSS: M=12.3, SD=6.2). BDI t(34) =3.05, p<.01, PSS t(34) =3.46, p=.001. This suggests that distressed, healthy weight women may want to lose weight even when their BMI is within the normal range. The implications of these findings may suggest a predisposition to disordered eating or diagnosable depression/stress-related disorder. Limitations include lack of racial diversity, restricted age range, and a small sample size. However, these results are important because they add to our understanding of body image norms and issues and psychological distress in emerging adulthood.
Liran Ziegelman

Cognitive Control in Preadolescent Children With Risk Factors for Metabolic Syndrome: A Longitudinal Examination and Reanalysis

Mentor(s): Amanda Szabo-Reed & Joseph E. Donnelly, Internal Medicine
Contributors: Mark R. Scudder & Charles H. Hillman

Previous studies indicate that children without MetS risk factors exhibit superior cognitive control. Purpose: The goal of this study was to expand upon a previously published manuscript, “Cognitive Control in Preadolescent Children with Risk Factors for Metabolic Syndrome” (Scudder et al, 2014) by examining the relationship between cognitive control and metabolic syndrome (MetS) risk factors over the course of a 3 year period in 2nd and 3rd grade students, when controlling levels of aerobic fitness and weight status. Methods: Anthropometric data, aerobic fitness data, and cognitive data was collected from 861 participants at baseline and years 1 through 3. Bloodwork was collected from a subsample of 206 participants at baseline only. Anthropometric data consists of weight, height, arm circumference, and blood pressure. Aerobic fitness data is measured using pacer laps. Cognitive data consists of the Flanker test and the n-back test. Bloodwork was used to determine cholesterol-lipid levels, glucose levels, high-density lipoprotein- lipid levels, insulin, and triglyceride levels. Data was analyzed using regression analysis and latent growth curve analysis. Regression and latent growth curve analyses were selected due to their ability to express correlated trends, and in the case of latent growth curve analysis, trends over time. Conclusion: The Scudder manuscript, in conjunction with previous literature, found that participants without any MetS risk factors exhibited superior cognitive control. We suspect that these findings will be confirmed in this study, with longitudinal confirmation of the relationship between cognitive control and MetS.