



UNDERGRADUATE
RESEARCH
SYMPOSIUM

APRIL 10
2018

Be inspired



20th Annual Undergraduate Research Symposium

Schedule of Events

Tuesday, April 10th, 2018

9:00 a.m. – 3:00 p.m.	Check-In Coffee and Snacks Available	CSU Ballroom
10:00 – 11:30 a.m.	Poster Session A Biological Sciences, Chemistry, Construction Management, Geology, Environmental Sciences, Statistics, Manufacturing Engineering Technology, Automotive Engineering Technology, and Physics	CSU Ballroom
10:00 – 11:00 a.m.	Oral Session 1 Anthropology	CSU 201
10:00 – 11:00 a.m.	Oral Session 2 Communication Studies, Philosophy, and Business Law	CSU 202
10:00 – 11:00 a.m.	Oral Session 3 Educational Studies: Elementary and Early Childhood	CSU 203
11:05 – 12:05 p.m.	Oral Session 4 German and Dance	CSU 204
11:05 – 12:05 p.m.	Oral Session 5 Anthropology and Psychology	CSU 201
11:05 – 12:05 p.m.	Oral Session 6 Art	CSU 255
11:05 – 12:05 p.m.	Oral Session 7 Educational Studies: K-12 and Secondary Programs	CSU 202
12:05 – 1:05 p.m.	BREAK	

Sessions resume at 1:05 p.m.



1:05 – 2:05 p.m.	Oral Session 8 Family Consumer Science, Human Performance, and Recreation, Parks, and Leisure Services	CSU 201
1:05 – 2:05 p.m.	Oral Session 9 Automotive Engineering	CSU 203
1:05 – 2:05 p.m.	Oral Session 10 Environmental Sciences and Biology	CSU 202
2:00 – 3:30 p.m.	Poster Session B Communication Disorders, Psychology, Health Science, Human Performance, Nursing, Family Consumer Science, Dental Hygiene, German, and Economics	CSU Ballroom
2:10-3:20	Oral Session 11 Integrated Engineering and Automotive Engineering	CSU 203
3:00 – 4:45 p.m.	Creative Works Exhibit Coffee and Snacks Available	CSU Gallery Lower Level
5:00 p.m.	Celebration Dinner Music by MNSU's Jazz Combo Speakers: President Davenport, Foundation Board President Paul Hanson, 2017 Outstanding Mentor of the Year Michael Bentley Awards Presented: 2018 URS Outstanding Presenters, 2018 Outstanding Mentor of the Year	CSU Ballroom

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Greetings from the President

It is my distinct honor to welcome you to the 20th Annual Undergraduate Research Symposium at Minnesota State University, Mankato. Talented scholars have been assembled for your intellectual and personal enjoyment. What an exciting year of productivity for our students and faculty. On February 28th, four of our students presented at the 5th annual Posters at St. Paul held at the Minnesota State Capitol. Additionally, 32 students traveled to University of Central Oklahoma to make 21 presentations earlier this month at the National Conference of Undergraduate Research.

Today's symposium is a celebration of intellectual exploration, creativity, hours of labor and collaboration across students, faculty, and staff. Enjoy your time today as you listen to oral presentations, engage in meaningful discussions with students at posters, and view presentations of visual and performing arts. It is, in part, because of these sorts of scholarly showcases that Minnesota State Mankato has come to be known for its Big Ideas and Real-World Thinking.

I want to express my appreciation for the efforts of the Undergraduate Research Center Council under the leadership of Dr. Kuldeep Agarwal. I also want to recognize the many contributions of our faculty and staff that have made this enriching opportunity possible for our students. Your contributions to the intellectual development of these young scholars and their pursuit of excellence will last a lifetime.

Once again enjoy your day as you are exposed to big ideas and real-world thinking in action.



Richard Davenport
President
Minnesota State University, Mankato



Foundation Grant Winners

Stirling Adrian	Quincey Krein
Shveta Agarwal	Jenna Macziewski
Steven Arriaza	Natosha McClain
Alexandria Dobson	Brennah McCorkell
Caitlin Foley	Erik Olson
Mehedi Hasan	Anjola Onadipe
Oishik Hasan	Rebecca Osborn
Michaela Hauer	John Ruprecht
Brittney Hjelmeland	Katie Schleper
Courtney Jensen	Paige Shoutz
Madison Jewell	Briana Spicer
Jacob Jones	Samuel Warriari
Brooke Jones	Kellie Wong
Rohil Kayastha	

Name	Last Name	Title
Naomi	Abraham	Comparison of Media for Intermediate-term Storage of Brewer's Yeast <i>Timothy Secott</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Stirling	Adrian	Persons with recently diagnosed Alzheimer's Disease: An exploration comparing quality of life indicators across three time points Aspen Curtis, Co-Presenter
Shveta	Agarwal	Diversity and amalgamation of Indian subcontinent through wall throw clay art: A cultural perspective <i>Todd Shanafelt</i> , Faculty Mentor, Art (Arts and Humanities)
Katherine	Albers	Curriculum Research in a Private Studio Setting: A Search for Inclusivity when Teaching Dance <i>Julie Kerr-Berry</i> , Faculty Mentor, Dance (Arts and Humanities)
Cody	Allen	Determining Secondary Structure Relation to Singlet Oxygen Reaction Rates with Eye Lens Protective Proteins α-Crystallin, β-Crystallin, and γ-Crystallin. <i>John Thoemke</i> , Faculty Mentor, Chemistry (Science, Engineering and Technology)
Leah	Anderson	Bored Millennials: How Do Young Adults View Leisure Time and Play Tess Leland, Emily Schoeller, Allison Anderson, and Kayla Anderson, Co-Presenters <i>Heather Von Bank</i> , Faculty Mentor, Family Consumer Science (Allied Health and Nursing)
Maria	Ardanova	Underlying Morality in Snow White: a Fairy Tale for Adults <i>Nadja Kramer</i> , Faculty Mentor, German (Arts and Humanities)
Jonathon	Arndt	Starting level of inter-cultural competency among undergraduates at MSU, Mankato Sean O'Rourke, Co-Presenter <i>Elizabeth Sandell</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)
Steven	Arriaza	Politics, Personality, and Poor Decision-Making? Assessing Psychological Variables' Impact on Changing False Knowledge Sungjin Kim and Isabella Cock-Villafane, Co-Presenters <i>Karla Lassonde</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Logan	Back	Solar Windows <i>Brian Wasserman</i> , Faculty Mentor, Construction Management (Science, Engineering and Technology)
Erin	Baker	Effect of Estrogen on Brain Development in the Green Anole Lizard (<i>Anolis carolinensis</i>) <i>Rachel Cohen</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Sara	Baranczyk	African American History presented in Monuments and Museums from Select Cities in Southern United States <i>Angela Cooley</i> , Faculty Mentor, History (Social and Behavioral Sciences)
Ryan	Bennett	Identification of proteins interacting with the alpha subunits of actin capping protein <i>Marilyn Hart</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Brandon	Bentley	Investigating Shading as a Viable Control Method for <i>I. pseudacorus</i> Seed Establishment. <i>Matthew Kaproth</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Zachary	Berkebile	Photosensitizer Induced Oxidation of Protein via Common Sunscreen Ingredients <i>John Theomke</i> , Faculty Mentor, Chemistry (Science, Engineering and Technology)
Samuel	Biljan	Electric Utility Vehicle Isaac Leonard, Co-Presenter <i>Bruce Jones</i> , Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)
Yuseina	Brito Lino	Impact of service learning on inter-cultural competence of pre-service teachers Andrea Faye Aguila, Co-Presenter <i>Elizabeth Sandell</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)
Shannon	Bruce	A Study of Decomposition Based on Body Wrappings in Cold Climates <i>Kathleen Blue</i> , Faculty Mentor, Anthropology (Social and Behavioral Sciences)
Sarah	Cain	Content Analysis of gender stereotypes in video games <i>Jim Dimock</i> , Faculty Mentor, Communication Studies (Arts and Humanities)

Grant	Conner	Linking above and below ground allometric growth patterns in oak species <i>Matthew Kaproth</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Derrick	Connor	Obesity is the Symptom of a Much Greater Social Malaise Larissa Chapman, Nancy Christianson, and Courtney Fruchey, Co-presenters <i>David Bissonnette</i> , Faculty Mentor, Family Consumer Science (Allied Health and Nursing) <i>Brooke Burk</i> , Faculty Mentor, Recreation, Parks and Leisure Services (Allied Health and Nursing)
Arliah	Cox	Are we scaffolding? Using teams for problem-based learning in child development and family studies Tess Leland, Micah Link, Geneva Kachinske, and Timnit Yikealo, Co-presenters <i>Daniel Moen</i> , Faculty Mentor, Family Consumer Science (Allied Health and Nursing)
Tiana	Dixon	Semantic Diversity: Differences Between Narrative and Expository Language Sample Tasks Jessica Boespflug, Co-Presenter <i>Megan Mahowald</i> , Faculty Mentor, Communication Disorders (Allied Health and Nursing)
Alexandria	Dobson	Assessing Current Supports for LGBTQ+ Students in Rural and Semi-Rural Schools in Central and Southern Minnesota <i>Jeffrey Brown</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Jannine Ray</i> , Graduate Mentor, Psychology (Social and Behavioral Sciences)
Jessica	Eul	Lie Detection in Employment John Walker, Co-Presenter <i>Emily Stark</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Brock	Fobbe	Paper Insulation (Cellulose) <i>Brian Wasserman</i> , Faculty Mentor, Construction Management (Science, Engineering and Technology)
Caitlin	Foley	The effect of exercise on neurogenesis and BDNF levels in the green anole lizard brain <i>Rachel Cohen</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Samuel	Forde	Formula SAE Electric powertrain Storm Lenz, Mitch Boike, and Wichai Yang, Co-Presenters <i>Bruce Jones</i> , Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)
Jacklyn	Gehling	Assessing and Improving Learning Strategies in the Typical MSU, Mankato Student to Increase Student Persistence and Retention in the Academy Rebecca Osborn, Co-presenter <i>Karla Lassonde</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Katlyn	Gieseke	MicroRNA regulation of APOBEC3A and APOBEC3B <i>Allison Land</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Elizabeth	Guss	MSU-M Social Work Students' Perceptions of Sexual Assault Reporting <i>Debra Gohagan</i> , Faculty Mentor, Social Work (Social and Behavioral Sciences)
Elizabeth	Hall	The effect of living abroad on the beginning of inter-cultural competency of pre-service teachers Mariah Adams, Co-presenter <i>Elizabeth Sandell</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education) <i>Lori Piowski</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)
Jonathon	Harrington	Converting Dams to Produce Power <i>Brian Wasserman</i> , Faculty Mentor, Construction Management (Science, Engineering and Technology)
Christopher	Hartea	Ackermann Testing <i>Gary Mead</i> , Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)
Mehedi	Hasan	Biocompatibility of Hydroxyapatite and Cobalt-Chrome Alloys Bethany Haus and Eryn Zuiker, Co-Presenters <i>Michael Bentley</i> , Faculty Mentor, Biology (Science, Engineering and Technology) <i>Kuldeep Agarwal</i> , Faculty Mentor, Automotive & Manufacturing Engineering Technology (Science, Engineering and Technology)
Oishik	Hasan	Investigation of Maximum Operating Voltage of a Van de Graaff Accelerator Lukas Halberg, Co-Presenter <i>Andrew Roberts</i> , Faculty Mentor, Physics (Science, Engineering and Technology)
Michaela	Hauer	The Effects of Mandibular Orthopedic Re-Positioning Appliances on Resistance Training Performance in College-aged Men Jason Hoerle, Co-Presenter <i>Mary Visser</i> , Faculty Mentor, Human Performance (Allied Health and Nursing)
Taylor	Hedberg	Self-Healing Concrete <i>Brian Wasserman</i> , Faculty Mentor, Construction Management (Science, Engineering and Technology)

Elizabeth	Herrick	<p>Does chronic dieting lower resting energy expenditure below that estimated by predictive equations, thereby increasing an individual's risk of becoming overweight or obese? Brenna Oberg and Elizabeth Rummel, Co-presenters <i>Brooke Burk</i>, Faculty Mentor, Recreation, Parks and Leisure Services (Allied Health and Nursing) <i>David Bissonnette</i>, Faculty Mentor, Family Consumer Science (Allied Health and Nursing)</p>
Zachery	Heyne	<p>Cellulose Insulation <i>Brian Wasserman</i>, Faculty Mentor, Construction Management (Science, Engineering and Technology)</p>
Amanda	Hinde	<p>Correlation of calmodulin susceptibility and cardiac arrhythmia mutations <i>Rebecca Moen</i>, Faculty Mentor, Chemistry (Science, Engineering and Technology)</p>
Brittney	Hjelmeland	<p>An Educationally Relevant Investigation of Spaced Practice <i>Shawna Petersen-Brown</i>, Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Carlos Panahon</i>, Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Ashlee Lundberg and Iwalani Dela</i>, Graduate Mentors, Psychology (Social and Behavioral Sciences)</p>
Mitchell	Hribar	<p>Increasing Air Flow Velocity at Low-Mid RPMs in a Restricted Engine Khansaa Myran, Co-Presenter <i>Gary Mead</i>, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)</p>
Sarah	Huttner	<p>Sustainability in Art <i>Joshua Winkler</i>, Faculty Mentor, Art (Arts and Humanities)</p>
Courtney	Jensen	<p>Validating the Instructional Hierarchy Stephanie Winter, Co-presenter <i>Shawna Petersen-Brown</i>, Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Carlos Panahon</i>, Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Mary Jane (MJ) Gunderson</i>, Graduate Mentor, Psychology (Social and Behavioral Sciences)</p>
Amber	Jones	<p>Native American Women in Media <i>Chelsea Mead</i>, Faculty Mentor, Anthropology (Social and Behavioral Sciences)</p>
Brooke	Jones	<p>Subcellular Localization of FAM171B in Mouse Neurons <i>Geoffrey Goellner</i>, Faculty Mentor, Biology (Science, Engineering and Technology) <i>Maddi Bauer</i>, Graduate Mentor, Biology (Science, Engineering and Technology)</p>
Jacob	Jones	<p>Effects of Fiber Percentage and Orientation on Fixtures Manufactured by Nylon Carbon Fiber 3D Printing Travis Goss, Co-presenter <i>Kuldeep Agarwal</i>, Faculty Mentor, Manufacturing Engineering Technology (Science, Engineering and Technology)</p>
Melissa	Jones	<p>Antibiotic Resistant Escherichia coli (E. coli) in Minneopa Creek Collected During Two Storm Events in 2017 Caitlin Flynn, Co-Presenter <i>Beth Proctor</i>, Faculty Mentor, Environmental Sciences (Science, Engineering and Technology)</p>
Gretah	Kangas	<p>College students' perceptions of sex work and sex trafficking Sedona Kintz, Co-presenter <i>Eric Sprinkle</i>, Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Alexander Twohy and Machensey Shalgren</i>, Graduate Mentors, Psychology (Social and Behavioral Sciences)</p>
John	Kauphusman	<p>Population modeling for the reintroduction of Mexican gray wolves as predators to decrease the feral hog populations in the Southern United States (i.e. Texas). <i>John Krenz</i>, Faculty Mentor, Biology (Science, Engineering and Technology)</p>
Rohil	Kayastha	<p>Mineralogical and Elemental Composition of Carbonaceous Meteorite Allende by microRaman Spectroscopy and SEM/EDS <i>Analia Dall'Asén</i>, Faculty Mentor, Physics (Science, Engineering and Technology)</p>
Eunwon	Kim	<p>Expression of Follistatin-Like 1 (Fstl1) in the Cochlea: A Potential Deafness Gene Lauren Hesser, Co-presenter <i>David Sharlin</i>, Faculty Mentor, Biology (Science, Engineering and Technology)</p>
Lauren	Kizlik	<p>Academic and Non-Academic Stress of College Students Enrolled in Physical Activity Classes <i>Jessica Albers</i>, Faculty Mentor, Human Performance (Allied Health and Nursing)</p>
Jill	Knepprath	<p>Effect of non-nutritive sweeteners (artificial sweeteners) and nutritive sweeteners on fat mass (FM) and fat free mass (FFM) in rats <i>Penny Knoblich</i>, Faculty Mentor, Biology (Science, Engineering and Technology) <i>Mary Hadley</i>, Faculty Mentor, Chemistry (Science, Engineering and Technology)</p>
Berry	Kone	<p>The language of signage <i>Chelsea Mead</i>, Faculty Mentor, Anthropology (Social and Behavioral Sciences)</p>

Quincey	Krein	Evaluating Public Speaking Performance: A Quest to Discover an Empirically-Supported Public Speaking Task <i>Jeffrey Buchanan</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Samuel Spencer</i> , Graduate Mentor, Psychology (Social and Behavioral Sciences)
Quincey	Krein	YWCA - Ready To Learn Program Review and Data Analysis Project <i>Linh Hoang</i> , Co-Presenter <i>Jeffrey Brown</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Kaitlyn	Kuehn	The impacts of UV-B radiation and litter placement on the microbe community structure of <i>Typha angustifolia detritus</i> <i>Timothy Secott</i> , Faculty Mentor, Biology (Science, Engineering and Technology) <i>Christopher Ruhland</i> , Faculty Mentor, Biology (Science, Engineering and Technology) <i>Erin Moseman</i> , Graduate Mentor, Biology (Science, Engineering and Technology)
Elliott	Kunerth	Sex Trafficking and Misleading Research: A Critical Analysis <i>Kelsi Pettit</i> , Co-presenter <i>Eric Sprankle</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Alexander Twohy</i> , Graduate Mentor, Psychology (Social and Behavioral Sciences)
Emily	LaCasse	Impact of Recreational Activity Before Literacy Intervention with Elementary Students <i>Meghan Gavin</i> , Co-presenter <i>Megan Mahowald</i> , Faculty Mentor, Communication Disorders (Allied Health and Nursing)
Benjamin	Lindquist	Comprehensive Modelling of the Microwave Plasma Biomass Gasification Process Utilizing the COMSOL Multi-Physics Platform <i>Gustavo Lahoud</i> , <i>Tressa Marquardt</i> , <i>Carl Hobus</i> , Co-presenters <i>Jacob Swanson</i> , Faculty Mentor, Integrated Engineering
Jenna	Macziewski	Applying Tootling to Special Education <i>Carlos Panahon</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Alexandra Panahon</i> , Faculty Mentor, Special Education (Education) <i>Jannine Ray and Kennedy Alstead</i> , Graduate Mentors, Psychology (Social and Behavioral Sciences)
Natosha	McClain	The Importance of Leader Confidence for Group Member Satisfaction <i>Emily Stark</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Brennah	McCorkell	A Comparison of Mindfulness Techniques to Reduce Anxiety in a University Setting <i>Shawna Petersen-Brown</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Carlos Panahon</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Megan Johnson</i> , Graduate Mentor, Psychology (Social and Behavioral Sciences)
Kyle	Mercer	Steroid Hormone Induced Plasticity in the Forebrain Region of Green Anole Lizards <i>Mohannad Alhuwaish</i> , Co-Presenter <i>Rachel Cohen</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Madison	Mueller	Exploring How Recreation Impacts Behavior and Outcomes of Literacy Intervention <i>Mackenzie McCarthy</i> , Co-Presenter <i>Megan Mahowald</i> , Faculty Mentor, Communication Disorders (Allied Health and Nursing)
Hannah	Murphy	Vascular Morphology in Normotensive and Hypertensive Rat Eyes <i>Keshari Sudasinghe</i> , Co-presenter <i>Michael Bentley</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Matthew	Nemitz	The Effects of Foreign Trade on Real Wages: The Case of the United States and Canada <i>Ken Park</i> , Faculty Mentor, Economics (Social and Behavioral Sciences)
Omoleso	Ogunnowo	Personal Identity <i>Julie Wulfemeyer</i> , Faculty Mentor, Philosophy (Arts and Humanities)
Erik	Olson	Bromoxynil octanoate affect on bacterium <i>Acidovorax facilis</i> <i>Steven Mercurio</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Ayan	Omar	Racial Microaggression and Discrimination: The experiences of a Muslim African Female Immigrant <i>Wade Davis</i> , Faculty Mentor, Business Law (Business)
Anjola	Onadipe	Dissecting the Role of serum Growth Hormone in the Regulation of Brain Igf-1 <i>Madison Burandt</i> , Co-presenter <i>David Sharlin</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Collin	Palmer	Biofilm Activity in Methicillin Resistant Coagulase Negative Staphylococci <i>Ofelio Zavala</i> , Co-presenter <i>Timothy Secott</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Dasha	Person	Iconographic Influences on Russian Avant-Garde Art <i>Curt Germundson</i> , Faculty Mentor, Art (Arts and Humanities)

Stephanie	Peterson	Quantifying Cochlear Nerve Myelination in Mice Lacking Thyroid Hormone Transporters Marissa Swenson, Co-Presenter <i>David Sharlin</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Melissa	Printup	Who is a Liar? Using Behavioral Cues to Detect Deception <i>Emily Stark</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Alysia	Przybilla	A Visual Representation of the Stages of Tooth Development <i>David Sharlin</i> , Faculty Mentor, Biology (Science, Engineering and Technology) <i>Giovanna Walters</i> , Faculty Mentor, Honors
Carleigh	Pula	Cyberbullying In Adolescents <i>Brooke Burk</i> , Faculty Mentor, Recreation, Parks and Leisure Services (Allied Health and Nursing)
William	Qualls	Genesis of the Magenta Zone, Northmet Copper-Nickel-PGE Deposit, Minnesota <i>Steven Losh</i> , Faculty Mentor, Geology (Science, Engineering and Technology)
Jacob	Rachuy	Using Co-Immunoprecipitation to Assay Binding Between Vpx and APOBEC3A Jacob Rachuy <i>Allison Land</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Brandon	Ranum	Spray Polyurethane Foam in Remodeling and New Construction <i>Brian Wasserman</i> , Faculty Mentor, Construction Management (Science, Engineering and Technology)
Lauren	Reiman	Women and Goals in 2016 Hollywood Films <i>Laura Harrison</i> , Faculty Mentor, Gender & Women Studies (Social and Behavioral Sciences)
Joshua	Rem	Is Critical Thinking Critical <i>Emily Stark</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Callie	Rohlik	Dynamic vs. Static Stretching on Vertical Jump Performance <i>Jessica Albers</i> , Faculty Mentor, Human Performance (Allied Health and Nursing)
Amanda	Rousemiller	Can One Multi-cultural Course Impact Inter-cultural Competency? David Edwards, Co-presenter <i>Elizabeth Sandell</i> , Faculty Mentor, Education (Education)
Alyssa	Roushar	Der Alte Fritz: Rendition of a Prussian King in Contemporary German Society <i>Nadja Kramer</i> , Faculty Mentor, German (Arts and Humanities)
John	Ruprecht	Scaffold Manufacturing by 3D Printing: Cobalt Chrome - Hydroxyapatite Biocomposite <i>Kuldeep Agarwal</i> , Faculty Mentor, Automotive & Manufacturing Engineering Technology (Science, Engineering and Technology)
Bethany	Rykhus	A Culture of Memorialization: Examining Public Grief through Funeral Programs <i>Chelsea Mead</i> , Faculty Mentor, Anthropology (Social and Behavioral Sciences)
Alexander	Salazar	The effects of diet on resource value in invasive <i>Pholcus manueli</i> <i>Christopher Ruhland</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Shelbi	Schadendorf	An autoethnographic exploration into the experience of a low-income student in an institute of higher learning <i>James Dimock</i> , Faculty Mentor, Communication Studies (Arts and Humanities)
Katie	Schleper	Using Site Directed Mutagenesis to Describe the SIV Vif Interaction with APOBEC3B <i>Allison Land</i> , Faculty Mentor, Biology (Science, Engineering and Technology) <i>Oumar Sanogo</i> , Graduate Mentor, Biology (Science, Engineering and Technology)
Samuel	Schmid	Assessing the role of UV B radiation and litter position on UV absorbing, bulk soluble phenylpropanoid concentrations in <i>Typha angustifolia</i> <i>Christopher Ruhland</i> , Faculty Mentor, Biology (Science, Engineering and Technology) <i>Erin Moseman</i> , Graduate Mentor, Biology (Science, Engineering and Technology)
Casey	Schneider	Assessment of Clearing Methods for Confocal Microscopy of Eye Tissue Caylin Steinberg, Co-presenter <i>Michael Bentley</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Kafile Kaab	Shamoon	Nuclear Power: The Solution to The Energy Crisis <i>Brian Wasserman</i> , Faculty Mentor, Construction Management (Science, Engineering and Technology)
Paige	Shoutz	Improving Idea Selection in Brainstorming using GLOMO <i>Elizabeth Fillion</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences)
Courtney	Sill	

Knowledge & Perceptions of ASD

Krystal Klicka, Devon Charlier, and Sydney Orr, Co-presenters

Randall	Simonson	Qualitative analysis of the volatile organic components in beer by gas chromatography mass spectroscopy and solid phase micro extraction <i>Brian Groh</i> , Faculty Mentor, Chemistry (Science, Engineering and Technology)
Jonathan	Smith	Warrior or Guardian? - Training in German Law Enforcement <i>Nadja Kramer</i> , Faculty Mentor, German (Arts and Humanities)
Tori	Smith	How do changes in inter-cultural competency (ICC) compare among pre-service teachers at three data collection points? Chandler Gooding, Co-Presenter <i>Elizabeth Sandell</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)
Briana	Spicer	Student Perceptions of an Interprofessional Collaboration in an Experiential Learning Setting <i>Brooke Burk</i> , Faculty Mentor, Recreation, Parks and Leisure Services (Allied Health and Nursing)
Elizabeth	Stensland	Not Your Everyday Glaze Elizabeth Stensland <i>Todd Shanafelt</i> , Faculty Mentor, Art (Arts and Humanities)
Hallie	Uhrich	What happens when a museum does not have ownership of abandoned collections? <i>Ronald Schirmer</i> , Faculty Mentor, Anthropology (Social and Behavioral Sciences)
Rachel	Uwimbabazi	Knowledge on Sexually Transmitted Infections (STI) Shreya Koirala and Rachel Uwimbabazi, Co-Presenters <i>Joseph Visker</i> , Faculty Mentor, Health Science (Allied Health and Nursing)
Ekaterina	Voytsekhovskaya	Computational Analysis of Adduct Formation between Benzaldehyde Derivatives and DNA <i>Danae Quirk Dorr</i> , Faculty Mentor, Chemistry (Science, Engineering and Technology) <i>Josh Marell</i> , Faculty Mentor, Chemistry (Science, Engineering and Technology)
Shelby	Vukich	Improving Students' Writing Skills By Providing Choice and Performance Feedback Madison Jewell, Co-Presenter <i>Carlos Panahon</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Shawna Petersen-Brown</i> , Faculty Mentor, Psychology (Social and Behavioral Sciences) <i>Carrington Riss</i> , Graduate Mentor, Psychology (Social and Behavioral Sciences)
Samuel	Wariari	Designing and Building An Effective Muffler for FSAE <i>Bruce Jones</i> , Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)
Brittany	Wickoren	The effect of living abroad on the beginning of inter-cultural competency of pre-service teachers Mariah Adams, Co-presenter <i>Elizabeth Sandell</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education) <i>Lori Piowlski</i> , Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)
Mahala	Wolff	Rearrangement of cell-cell junctions in metastatic cells Lauryn Hardt, Co-Presenter <i>Marilyn Hart</i> , Faculty Mentor, Biology (Science, Engineering and Technology)
Kellie	Wong	Arachidonic Acid and Oxidation in the Myosin II Motor Domain <i>Rebecca Moen</i> , Faculty Mentor, Chemistry (Science, Engineering and Technology)
Liya	Yemiru	The Relationship between Quality of Life and Physical Activity <i>Joseph Visker</i> , Faculty Mentor, Health Science (Allied Health and Nursing)
Kylie	Zellman	Beginning Readers and the Impact of Recreation on Literacy Growth Angela Tell, Co-Presenter <i>Megan Mahowald</i> , Faculty Mentor, Communication Disorders (Allied Health and Nursing)

Diversity and amalgamation of Indian subcontinent through wall throw clay art : A cultural perspective

Shveta Agarwal

Todd Shanafelt, Faculty Mentor, Art (Arts and Humanities)

Ceramics using clay is a traditional process which uses hand building and wheel throw. These processes however involve a lot of steps like the use of pug to make clay, wheel and kilns. All these steps are energy intensive and require lot of electricity and time. Art has a deeper meaning which should not depend on resources like electricity to express itself. In third world countries, electricity is a very expensive and scarce resource. Thus, a new kind of ceramic art was developed in India by tribal and villagers which uses a special type of clay which can be “thrown” on the wall and shaped by hand. This clay does not require any kiln to dry (can be dried in sun) and form and thus does not need any electricity. The clay is completely organic and uses no harmful chemicals. In this project, I recreated this clay and art form (called “wall throw”) and depicted the multicultural and diverse culture of India in a novel manner. My art will show the different prints and motifs used in the architecture, clothes and jewelry of the different regions of India.

Curriculum Research in a Private Studio Setting: A Search for Inclusivity when Teaching Dance

Katherine Albers

Julie Kerr-Berry, Faculty Mentor, Dance (Arts and Humanities)

Private dance studios are a place where children, teens, and adults learn about their bodies and how to perform different styles of movement. However, current private studios in southern Minnesota are not doing enough to promote inclusion and are limited on teaching a variety of dance styles. I have analyzed various southern Minnesota dance studio websites to determine which classes are being offered and who they are offered to. This investigation has pointed out the gaps in current private studio education, and I have learned what needs to be altered in order to create a new curriculum that is based on inclusion. This information on several different studios has helped me gain an overall picture of how private studios operate in southern Minnesota, and what components should be adjusted to help more people have access to a greater variety of dance classes. With these adjustments, students can learn how to feel comfortable in his/her own body, how to appreciate different ranges of movement ability, and how to work with people who differ from his/herself.

Underlying Morality in Snow White: a Fairy Tale for Adults

Maria Ardanova

Nadja Kramer, Faculty Mentor, German (Arts and Humanities)

Abstract: Snow White is a well-known 19th century fairy tale by the Grimm Brothers. What is not known to everyone is that Snow White and many of other Grimms' fairy tales that were first published in 1812 were not intended for children. This fairy tale is about a young girl named Snow White whose vain stepmother tries to kill her because she is more beautiful than her. On three different occasions an attempt on Snow White's life is made until she finally succumbs to a poisoned apple. Only upon arrival of a prince, the girl is resurrected back to life. To readers of the fairy tale and to those familiar with Disney's cartoon version, Snow White is an enchanted, charming story in which good overcomes the evil, and in which Snow White lives happily ever after with the prince, while the wrongdoing evil stepmother receives a punishment for her actions. However, to say that the fairy tale is simply about the themes of good and evil, and good prevailing, is not enough. In fact, a lot of questions come to mind: Why is the stepmother jealous of a child? Why does the tale emphasize characteristics of the protagonist such as innocence and beauty? Why does there need to be a prince at the end to rescue Snow White? This research analyzes the fairy tale's underlying sexual morality and tension, and what it tells us about the culture and society at the time it was published.

Starting level of inter-cultural competency among undergraduates at MSU, Mankato

Jonathon Arndt and Sean O'Rourke

Elizabeth Sandell, Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)

The U.S. Bureau of the Census estimates America's whites will become a minority in 2043. All in all, minorities, now 37 percent of the U.S. population, are projected to comprise 57 percent of the population in 2060. The total minority population would more than double, from 116.2 million to 241.3 million over the period.” (U.S. Bureau of the Census, 2016). As the population changes, everybody will need to become more inter-culturally competent, including MSU graduates. Therefore, this study examined the starting level of inter-cultural competency (ICC) among undergraduates at MSU, Mankato. According to Hammer & Bennett (2010), ICC is "the capability to accurately understand and adapt behavior to cultural differences and commonality.” Cultural competency is “the ability to communicate and behave in appropriate ways with those who are culturally different - and to co-create shared spaces, teams, and organizations that are inclusive, effective, innovative, and satisfying.” This research analyzed pre-existing, archived data from about 800 MSU students enrolled in the course, Human Relations in a Multicultural Society (EEC222W). ICC was assessed by the Intercultural Development Inventory (Hammer & Bennett, 2010). Results indicated that individuals perceived they had a high level of inter-cultural competency. However, data showed that they actually had a relatively low level of ICC. MSU may use this information in considering the effectiveness of its cultural diversity goal: experience diversity with supervised reflection and recognize and respond to conditions of marginalized populations.

Politics, Personality, and Poor Decision-Making? Assessing Psychological Variables' Impact on Changing False Knowledge.

Steven Arriaza, Sungjin Kim, and Isabella Cock-Villafane

Karla Lassonde, Faculty Mentor, Psychology (Social and Behavioral Sciences)

With the rising accessibility, and distribution of news through different media sources, the ability to discern factual from fake information becomes crucial. A theory called conceptual change has been widely used to design methods to revise misconceptions. Conceptual change theory asserts that learning depends on abandoning prior knowledge and experiencing dissonance that comes with being incorrect. Thus, a person has to realize their knowledge is incorrect to incorporate new, correct information. A similar approach has been employed for addressing misconceptions on social or political issues with little success. The term “backfire effect” has been used to name the process in which people, in the face of factual evidence, double down on their beliefs. Research indicates that when facts challenge our personal beliefs or moral values then we tend to discredit them as counterfactual, even in the face of overwhelming evidence. In this study we examine how political beliefs, the personality trait open-mindedness, and need for cognition interact with refutation text that are designed to correct false knowledge. The first stage of this study focuses on assessing beliefs. In the second, experimental stage, we present a series of passages about common misconceptions with half of them being shown a refutation and explanation that the misconceptions is untrue and half with no refutation or explanation. We hypothesize that individuals who are found to be more politically extreme in their views, less open-minded, and have little desire to think deeply will be less likely to correct misconceptions when reading refutation texts.

African American History presented in Monuments and Museums from Select Cities in Southern United States

Sara Baranczyk

Angela Cooley, Faculty Mentor, History (Social and Behavioral Sciences)

American history is often taught in an incomplete fashion, focusing mainly on the European perspectives. This research focuses on a specific aspect of American history that is often neglected or distorted in the canon representation of historic events: the African American perspective. This project aimed to identify which African American figures are memorialized in monuments and museums and what artistic choices are made to represent them. 3 scholarship texts on racial relations, reconciliation and memorializing history, and artistic choices in monuments were studied before traveling to select cities throughout the Southern United states to view African American historic sites, monuments, and museums. Archival studies of each site were conducted after visiting each site. Significant findings include the non-human representations (such as animal or godlike comparisons) of African Americans. These representations can lead to inaccurate ideas and perspectives of African American persons, both in history and the modern day.

Investigating Shading as a Viable Control Method for *I. pseudacorus* Seed Establishment.

Brandon Bentley

Matthew Kaproth, Faculty Mentor, Biology (Science, Engineering and Technology)

Iris pseudacorus (yellow iris), a wetland invasive species, is documented in all coastal regions of the U.S. and is prevalent in the Great Lakes states and Midwest. States including Connecticut, Massachusetts, Montana, New Hampshire, Oregon, and Washington have listed *I. pseudacorus* as a noxious weed. *I. pseudacorus* displaces native vegetation and negatively impacts wetland structure, function, habitat and successional trajectories. Recent research has provided evidence that *I. pseudacorus* spreads almost entirely by seed and not rhizome fragmentation as previously believed (Gaskin et al., 2016). *I. pseudacorus* seeds have high viability (Gaskin et al., 2016), can float long distances (Coops and Van Der Velde, 1995 in Tu et al., 2003), and form seed banks with their large, persistent seeds. *I. pseudacorus* seeds have demonstrated a photorequirement for successful germination (Deno, 1993), which may be a limiting factor in their establishment. Research has also found evidence that treatment/removal effectiveness could be genotype specific (Gaskin et al., 2016). Additional research regarding management and treatment/removal techniques is needed as *I. pseudacorus* demonstrates a strong potential for re-growth and re-establishment post treatment/removal. We hypothesized that reducing light availability by $\geq 50\%$ would inhibit establishment of *I. pseudacorus* seeds. We performed a greenhouse experiment with two lighting conditions testing germination and establishment rates to investigate the use of shading as a viable control method for *I. pseudacorus* seed re-establishment post treatment/removal. We performed the experiment using two seed sources (assumed genetic difference) to establish further evidence that treatment and post-treatment control effectiveness could be genotype specific.

Electric Utility Vehicle

Samuel Biljan and Issac Leonard

Bruce Jones, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

Gary Mead, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

Electric vehicles have been becoming more popular with the advancements in battery technology and increased emissions. Electric vehicles have the advantage of being quiet, efficient, powerful and produce no emissions. This has been very beneficial in the automotive industry and is starting to make its way in to off road power sports vehicles. The aim of this research was to determine the requirements and benefits that an electric utility terrain vehicle while keeping performance and usability comparable to the internal combustion engine drive train. The research vehicle was a 2015 Prowler that was donated to the university by Arctic Cat/ Textron Off-Road. This UTV was used for a platform to determine the requirements for the electric drive conversion. With the testing benchmarks such as top speed, range and sound tests were used for the design goals for the electric UTV. Surveys were created to help determine the wants and requirements of a consumer that would be interested in buying an electric drive UTV. One of the largest parts of the research was determining the energy required to reach the target speed of 50 MPH and a 50 mile range while being at 350-volts for the electric motor. An energy requirement calculator was used determine the appropriate battery size for the vehicle. Some of the inputs the calculator included were vehicle weight, tire diameter, rolling resistance, aerodynamic drag, desired speed and gear ratios. This provides the amp-hour requirement that was needed in a system that has an output of 350 volts.

Impact of service learning on inter-cultural competence of pre-service teachers

Yuseina Brito Lino and Andrea Faye Aguila

Elizabeth J. Sandell, Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)

The population of the U.S. is becoming increasingly diverse in language and culture. And, the population of students in elementary and secondary schools is becoming more diverse. Pre-service teachers (PSTs) must experience and understand other cultures in order to become more inter-culturally competent (ICC). According to Hammer & Bennett (2010), ICC is "the capability to accurately understand and adapt behavior to cultural differences and commonality." One way to do this is for PSTs to participate in Service Learning. According to the National Service-Learning Clearinghouse (NSLC), service learning is "a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities (NSLC, 2012). This study responded to the question: Do different types of Service Learning have different impacts on changes in inter-cultural competence of pre-service teachers? The data set included more than 800 students who took the general education course, Human Relations in a Multicultural Society. Students completed the Intercultural Development Inventory (IDI) at the beginning and at the conclusion of the semester (Hammer, Bennett, & Wiseman, 2003). Service Learning opportunities included 18 hours of volunteer work at organizations such as residences for disabled adults, English language tutoring of immigrants, home visits with children of new immigrants, and others. This general education course had a statistically significant impact on participants' ICC. However, data analysis found no statistically significant differences in ICC as a result of various Service Learning opportunities.

A Study of Decomposition Based on Body Wrappings in Cold Climates

Shannon Bruce

Kathleen Blue, Faculty Mentor, Art (Arts and Humanities)

Though a wealth of research exists on decomposition rates in warmer temperatures, much less exists about what happens to a body after death in cold climates. In this study, I tested decomposition rates in cold weather based on the way a body might theoretically be disposed of. Three already deceased feeder pigs were used as subjects. One was wrapped in heavy-duty plastic, one in a blanket, and one was left out in the open. The weather conditions were recorded daily, in addition to weekly visits to observe the state of the subjects. As of now, no differences in decomposition rates have been detected among the three conditions, but the experiment is still ongoing.

Abstract of the student paper "Content Analysis of gender stereotypes in video games" by Sarah Cain

Sarah Cain

Jim Dimock, Faculty Mentor, Communication Studies (Arts and Humanities)

Over the course of the last 30 years video games have not only grown in their usage but their technology has vastly improved. However, because technology has created a media that is completely malleable and open to interpretation, it is important to look at what messages and ideas are transmitted through video games. Having had experienced gender under representation and gender stereotyping in video games that I have played, I decided that I wanted to engage these issues further by doing a content analysis of popular video games. The purpose of this study is to look at the gender stereotypes and representation as it is portrayed in video games. Contemporary video games often have complex narratives and game play can stretch over the course of weeks or months based on the gaming skills the player possesses and the difficulty of the game in question. Due to the immense length of video games, it is important to look at all aspects of the game. While there are many studies revolving around the effects and messages transmitted through video games, this study focuses on the qualitative data rather than quantitative results. I am able to gather more data from my research by looking more closely at fewer games. Through a content analysis that utilizes Mertens pGSM coding method, a method used to generate numerical data based off of "typical" or "atypical" content in games. I was able to quantify the stereotypical behavior that's conveyed through the video game platform.

Formula SAE Electric powertrain

Samuel Forde, Storm Lenz, Mitch Boike, and Wichai Yang

Bruce Jones, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

Electric vehicles have been gaining a lot of attention over the past few years. Due to restrictions on emissions, many vehicle manufacturers are looking to add electric vehicles. The aim of this research was to design an electric powertrain system and then retrofit it to a Formula SAE chassis. The Formula SAE competition is for students to engineer and design a small race car. In order to build an electric powertrain, we looked at the main components. The biggest focus was on the battery management system (BMS). The battery management system that was used is an Elithion Lithiumate Pro. The BMS controls 84 lithium iron phosphate (LiFePo₄) battery cells by a small cell board that is attached to each cell. The cells are wired in series to supply 268 volts to the electric motor. Testing was done to make sure the BMS could balance all the cell voltages while charging and discharging. The biggest challenge was getting all the cells to communicate with the BMS. Every cell board was tested and the communication wires were redone. After the batteries were connected to the BMS, they were put through load testing. The load testing discharged the batteries based a simulated road course and environment. The results showed that the BMS was able to keep the batteries within a specified voltage and temperature range. The benchmarks that were obtained will be used by future Formula SAE electric teams.

Assessing and Improving Learning Strategies in the Typical MSU, Mankato Student to Increase Student Persistence and Retention in the Academy

Jacklyn Gehling and Rebecca Osborn

Karla Lassonde, Faculty Mentor, Psychology (Social and Behavioral Sciences)

According to public data, 70% of students here at MSU, Mankato are retained and enrolled one year after their first semester. However, just over 50% of students graduate in six years. A factor that may influence retention is whether students know how to best learn. MSU, Mankato has a host of helpful student support services, however, there is not a comprehensive course or resource dedicated to learning skill training. In this study, 45 students enrolled in Cognitive Psychology completed cognitive assessment and learning skills training. Their cognition was assessed using the National Institute of Health's Cognitive Toolbox application which targets cognitive skills like attention, memory, and decision-making. Students then took the Learning and Study Strategies Inventory (LASSI) 3rd Edition (Weinstein, Palmer, and Taylor, 2016) online which focused on thoughts and behaviors related to learning. Student scores were compared to national norms to determine skill needs. We then worked with the students across the semester to build learning strategies into the curriculum. Students will be assessed on the NIH toolbox and LASSI again at the end of the semester to determine the influence of curricular change. Formally providing these strategies to students may have a positive effect on ensuring retention and graduation.

The effect of living abroad on the beginning of inter-cultural competency of pre-service teachers

Elizabeth Hall and Mariah Adams

Elizabeth Sandell, Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)

Lori Piowlski, Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)

In 2007, Sandell reviewed data from 31 undergraduate students who had studied abroad. Respondents were in a variety of academic majors and classifications. Subjects reported that their international experiences had an impact on their professional roles, their international perspectives, and their personal development. Oh and Nussli (2014) concluded that US pre-service teachers who study abroad enhanced their empathy for the experiences of English language learners in the US, revised their teaching strategies to foster student success, and became committed to transferring insights to their US classrooms. Colleges of education may try to enhance cultural competency of their pre-service teachers by facilitating study abroad. However, international studies require investments from the individual students and their families, as well as their sponsoring universities. To assess the outcomes of such investments, this project addressed the starting point of intercultural competency of the pre-service teachers and the relationship with their previous experiences of living abroad. After approval by Institutional Review Board, researchers used archived data collected between 2011 and 2017. Subjects were undergraduate students, generally between 18 and 30 years old, with varied academic majors, primarily in elementary education, but also in special education or secondary education, as well as a variety of other academic majors. This study used the Intercultural Development Inventory (IDI) (Hammer, Bennett and Wiseman, 2003), which measures group intercultural sensitivity and is based on Bennett's Developmental Model of Intercultural Sensitivity (Bennett, 1986).

Ackermann testing

Christopher Harteau

Gary Mead, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

Ackermann geometry is designed into the steering system of a vehicle to turn the wheels at slightly different rates. In a typical passenger vehicle the Ackermann is designed to turn the inner wheel on a corner more than the outer wheel so that the difference in turning radiuses are accommodated for and producing a common center of rotation. The idea behind this setup is to reduce the binding and scrubbing of tires that occurs when they do not have a common center of rotation. Reduction of the binding will save the tires from prematurely wearing and reduce rolling resistance.

In race car applications the vehicles Ackermann geometry would need to be set up differently and can be often overlooked for performance benefits. The reasoning behind this difference comes from a tire and rubber polymer characteristic known as slip angle. Slip angle is the angle between the direction the wheel and tire are pointed verses the actual direction of travel. The slip angle is created when lateral force is applied to a tire, a distortion of the tire is caused differing the trajectory of the wheel and effective footprint of the tire on the ground. Slip angle varies with tire type, tire size, rubber compound, inflation pressure, and tire temperature and is actively affected by lateral force and vertical load from the result of turning force and vehicle weight transfer.

When a vehicle experiences a cornering force, there is weight transfer from the inside tire to the outside tire. This will cause two different vertical loads between tires resulting in each tire having different slip angles. For effective cornering the trajectory of the tires effective footprints still need to have a common center of rotation, but with the addition of slip angle, the wheel and tire trajectories will differ even have varying angles throughout load ranges. Those differences have to be accommodated for with a change in Ackermann geometry from that of a typical passenger vehicle. The amount of Ackermann for each race car's application will vary due to multiple variables affecting the slip angles. With the aid of specific tire data, testing of Ackermann variations is required to find the proper geometry for the application that the race car will be subject to. With the proper testing data, changes in geometry can be implemented for different events or tracks to obtain the maximum potential grip in corners. For testing, five different sets of tie rods and toe pick up points were made that set Ackermann geometry in five intervals within range specified range. Each set was tested and timed in a skid pad test along with a slalom section. The results were then compared to each other to see how each Ackerman settings worked in both test setups.

Does chronic dieting lower resting energy expenditure below that estimated by predictive equations, thereby increasing an individual's risk of becoming overweight or obese?

Elizabeth Herrick, Brenna Oberg, and Elizabeth Rummel

Brooke Burk, Faculty Mentor, Recreation, Parks and Liesure Services (Allied Health and Nursing)

David Bissonnette, Faculty Mentor, Family Consumer Science (Allied Health and Nursing)

In the United States, 70.2% of adults are overweight or obese (NIH, 2014). The most prevalent obesity treatment modality is dietary restriction yet roughly 80% of overweight individuals are not successful at long term weight loss (Wing and Phelan, 2005). In fact, 33-83% of dieters regain more weight than lost (Mann et al., 2007; Swanson & Dinello, 1970). The goal of the study was to develop a screening questionnaire that detects chronically persistent and transient obesity. A total of 16 women (ages 19 to 59) completed an obesity-screening questionnaire and were assessed for total body weight (TBwt), percent fat mass (FM), fat free mass (FFM), and basal metabolic rate (BMR). The ratio of BMR/FFM was non-significant between controls (29.39 +- 0.37) chronically obese (27.92 +- 0.86) and transient obese subjects (27.92÷1.56), but that the ratio BMR/TBwt was significantly lower in chronically obese (14.69 +- 1.81) vs transient obese (17.81 +- 3.35) and controls (22.37 +- 1.14). The screening questionnaire did significantly distinguish between controls (22.20 +- 4.60), transient (29.35 +- 3.32), and chronically obese (40.75 +- 2.53) subjects. This research did validate the obesity-screening questionnaire and suggests that chronic dieting may cause a loss of fat free mass (FFM), and a lowering of basal metabolic rate (BMR). On a larger scale, this questionnaire can allow clinicians to efficiently discern whether to implement a treatment plan for chronically obese subjects who struggle with difficult weight loss or implementing one for transiently obese who experience easy weight loss.

Increasing Air Flow Velocity at Low-Mid RPMs in a Restricted Engine

Mitchell Hribar and Khansaa Myran

Gary Mead, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

The purpose of researching the effects of varying air flow velocity on engine behavior is to increase the overall efficiency and performance of the vehicle. A more efficient engine will require less energy to produce the same desired power output. Unfortunately, improving an engine's performance is a carefully balanced game of compromise. In this case, the research weighs the benefits of restricting air flow to increase air velocity for optimal performance at low rpms. The research is verified in four steps. First, by using an engine simulation software, followed by flow comparison of a stock and modified head. Data is then compared between air velocity on a stock and modified head using an air speed measuring instrument called a Pitot tube. The modified set up is finally tested by comparing the power output of the different cylinder heads while on an engine dynamometer. The data collected from this study will provide further insight into the development of more efficient small engines.

Analysis and mitigation of dimensional variations

Jared Huddleson, David Macharia, and Alexander Leba

Jacob Swanson, Faculty Mentor, Integrated Engineering

Robert Sleezer, Faculty Mentor, Integrated Engineering

During the extrusion process of crosslinked Polyethylene (PEX) pipe, waste material that does not conform to the outer diameter (OD) specifications cannot be sold and is not recyclable. Therefore, it is important both from a financial and environmental standpoint to minimize the amount of extrudate that does not meet OD specifications. Within this extrusion process there are a wide range of variables that affect the efficacy of the overall system. The process involves feeding a compound of 4 chemical components through a system under specific temperatures and pressures. Flow meters, pressure transducers, thermocouples, thermal imaging equipment, laser measurement, and photo imaging, were used to gain a complete working knowledge of the internal characteristics of PEX pipe extrusion. The data collected was compared analytically to categorize process parameters, response to changes, and variation between each sensor location. Analyzing the newly acquired data, the ability to provide accurate and verifiable modifications using ANSYS Simulations was obtained. Results from CFD Simulations were used to suggest changes to the current process with an expected cost-benefit ratio. Understanding the intricacies of these process parameters allowed future design changes that improve the overall efficiency and accuracy of PEX pipe production to be predicted.

Sustainability in Art

Sarah Huttner

Joshua Winkler, Faculty Mentor, Art (Arts and Humanities)

I will explore the methods of papermaking with scrap paper made of various material as well as high quality paper fibers sourced from a manufacturer. The images created will draw influence from how the paper industry is depleting natural forests, as well as how the replanting of young trees in well-developed forests impacts that environment. I want to bring attention to the importance

of recycling and how to utilize recycled material in my work. This project will be a comparative study looking at the benefits of making my own paper from otherwise discarded material versus buying brand new material. It is important to be conscious of how the materials I use impact the environment. The world climates are changing and with it forest fires are becoming more prevalent. The recent fires in the eucalyptus forests of Portugal are one example of how the paper industry is not only destroying natural forests but also negatively affecting rural communities in the area. This project will help create visual commentary on the importance of sustainable resources and the paper industry's impact on the environment.

I will be giving an oral presentation on my findings and will also have the prints on display in the CSU gallery for viewing.

Native American Women in Media

Amber Jones

Chelsea Mead, Faculty Mentor, Anthropology (Social and Behavioral Sciences)

Stereotypes about diverse cultures have been around for hundreds possibly even thousands of years and they effect a slew of backgrounds and various ethnicities of people. The indigenous people of America are one example, and they have been affected greatly by the perpetuation of biases placed upon them. Some of the issues with stereotypes include that there over-generalizing of characteristics, romanticizing of Native culture and also the creation of stereotypes by omitting them from modern times and only showing American Indians in a historical context. In the last century the main media used to perpetuate stereotypes and prejudices pertaining to Native Americans has changed. Originally dime novels, paper ads, and paintings were the main means of supporting and maintaining stereotypes. Now it includes everything from movies lasting hours, television series, video games, the internet, to commercials and so much more. With that being established, Native women encounter another dimension of discrimination on top of the cultural and political issues already effecting the community, that being sexism. The task of this project is to analyze scholarly articles and see what stereotypes they say are most prominent. After that, images on the internet will be examined via a digital search, and then compared to see if the trends match the scholarly literature.

Population modeling for the reintroduction of Mexican gray wolves as predators to decrease the feral hog populations in the Southern United States (i.e. Texas).

John Kauphusman

John Krenz, Faculty Mentor, Biology (Science, Engineering and Technology)

Invasive species are a huge problem in the United States. As their populations continue to increase in size they disrupt ecological systems. One of the most notorious invasive species is the feral hog. In Texas, the hog populations cause ecological and agricultural damage that costs the state \$52 million annually. The reason for the large continuously growing population is that the feral hogs, unlike its relatives in Europe, have no natural predators and hunters cannot suppress the population growth. In Europe, the gray wolf is a predator to the European wild boar. Although wolves, like the Mexican gray wolf, are not allowed to be reintroduced in Texas. If Mexican gray wolves had similar predation rates as their cousins in Europe, could they lower or remove the feral hog invasion?

A theoretical population model was designed on excel where it used life-history information for wolves and feral hogs to simulate their population sizes for 50 years. Three different predation rates were simulated on the feral hog population, and population rates were compared to the control that had no wolf predation. The results showed that medium and high predation rates significantly reduce the hog population. This research is intended to show a natural and sustainable approach to dealing with the feral hog problem, while aiding conservation efforts for the gray wolf. To further this research, the next objectives would be to add a habitat model and perform a field experiment.

Academic and Non-Academic Stress of College Students Enrolled in Physical Activity Classes

Lauren Kizlik

Jessica Albers, Faculty Mentor, Human Performance (Allied Health and Nursing)

PURPOSE: To explore demographic differences among students enrolled in physical activity classes and to examine how stress changes in comparison with changes in physical activity over time.

METHODS: Participants (n=46) completed consent forms, a demographics questionnaire, and two surveys which were sent out electronically through Qualtrics during the first, ninth, and fifteenth week of the semester. The surveys assessed academic (Academic Stress Scale) and non-academic (Perceived Stress PSS-10) stress. Between group differences were analyzed using ANOVA's in SPSS.

RESULTS: Females reported higher perceived stress than males at time-point (tp) 1 ($p = .030$). Female students reported higher academic stress levels compared to male students at tp 1 ($p = .034$). Academic stress compared with school year showed sophomores reported more academic stress at tp 2 ($p = .034$) and tp 3 ($p = .047$). Students identifying as age 21- 22 years reported more academic stress than other age groups at tp 3 ($p = .012$). Non-white students reported more academic stress at tp 2 than white students ($p = .002$). Academic stress was higher than perceived stress at tp 1 ($p = .001$) and tp 3 ($p = .000$).

CONCLUSIONS: The results of this study can be used to reach students who's major may not require physical activity classes, as well as indications of how college students may be utilizing exercise as a “de-stressing tool”.

The language of signage

Berry Kone

Chelsea Mead, Faculty Mentor, Anthropology (Social and Behavioral Sciences)

Signs play a central role in our day to day lives and MNSU they play a critical role in providing direction, regulating behavior, and representing the community symbolically. This research examines the use of linguistic signs on campus to better understand the role of linguistic choice being communicated to the community. By examining the linguistic features of signage around campus, I offer important insights into their impact on college student experiences and understandings of communication. Completing an analysis of signage from popular campus locations and historic signage, I suggest that the language of campus is overwhelmingly English dominant. As a university dedicated and proud of its international student populations and relationships, I offer new insights into the ways the university can increase its support of linguistic diversity through signage to support multilingualism amongst all students. The larger implications of my research are ways to increase fluency in public communication by looking at signage around on campus.

Comprehensive Modelling of the Microwave Plasma Biomass Gasification Process Utilizing the COMSOL Multi-Physics Platform

Benjamin Lindquist, Gustavo Lahoud, Tressa Marquardt, Carl Hobus,
Jacob Swanson, Faculty Mentor, Integrated Engineering

This research effort developed a comprehensive multi-physics model to explore the underlying physics associated with the process of microwave plasma biomass gasification (MPBG). The MPBG process uses microwaves transmitted through a waveguide positioned orthogonal to the flow of a plasma carrier gas to generate a plasma field. Biomass in pellet or particle form is fed into the carrier gas stream and travels through the plasma that transforms the particles into a resultant mixture of gases and residual solids. The primary objective of this research addresses the lack of an optimized model of the MPBG process by development of a model based on a peer reviewed experimental methods and results as a source of validation. The validated model served as a baseline for an iterative design approach to MPBG system geometry design. Input parameters of the system were microwave power, plasma properties, flowrate and chemical composition of the plasma carrier gas and biomass feedstock. The outputs of interest were biomass particle dynamics (i.e. size, temperature, position, velocity) and resultant properties (pressure, temperature, flowrate, and composition) of gases and residual solids. Model boundary conditions assume standard temperature and pressure. Modelling was performed using COMSOL Multi-physics to couple plasma, chemical kinetics, heat transfer, and CFD physics into one comprehensive model. The results of the model provide a functional time evolution of the MPBG system. An experimental design using the geometric constraints defined in the model will further validate MPBG system design and provide a foundation for more efficient future commercial designs.

Personal Identity

Omoleso Ogunnowo

Julie Wulfemeyer, Faculty Mentor, Philosophy (Arts and Humanities)

According to the Internet Encyclopedia of Philosophy, John Locke holds that personal identity is a matter of psychological continuity that is, for a person X to survive an adventure, it is necessary and sufficient that there exists, at a time after the adventure, a person Y who psychologically evolved out of X. In his essay concerning human understanding which includes a passage on “Identity and Diversity”, John Locke argued that personal identity is based on the sameness of individual consciousness and that consciousness makes up the term “self”.

According to Locke, “since consciousness always accompanies thinking, and tis that that makes everyone to be what he calls self; and distinguishes himself from all other thinking things; in this alone consists personal identity, i.e. the sameness of a rational being” (302). There have been several debates by philosophers following Locke's essay about what constitutes personal identity focusing on the role of consciousness and memory. Paul Helm, a philosopher who wrote a paper titled, *Locke on Personal Identity* holds that memory is the evidence for personal identity and the role of consciousness in personal identity is logical and metaphysical. In this research project, I will deconstruct the term, “consciousness” by explaining that it does not only mean to be aware of things but also the perception and remembrance of different things at different points in time. I will be arguing that the definition of consciousness should include memory and by only this can it account for what constitutes personal identity.

Racial Microaggression and Discrimination: The experiences of a Muslim African Female Immigrant

Ayan Omar

Wade Davis, Faculty Mentor, Business Law (Business)

This presentation will examine Microaggression, Discrimination and the Law. The purpose of this presentation is to examine Microaggression in the context of: work, college campuses, Islamophobia, police force and Law interpretations. This presentation will also examine discrimination, how it connects to Microaggression and solutions.

Microaggressions and Discrimination are both vital issues that are facing our education systems, work force and communities. In order to solve them we should start by raising awareness to the problem, training workforce on how to compact and eliminate it in the workforce and educate our people in both public and higher education on how to deal with these issues.

Iconographic Influences on Russian Avant-Garde Art

Dasha Person

Curt Germundson, Faculty Mentor, Art (Arts and Humanities)

At the “Zero Ten” gallery of 1915, a Black Square hung in the top corner of two joining walls accompanied by a 39 related abstract images. Traditionally, an icon of Christ or the Virgin Mary would hang in the top corner of the ceiling along accompanied by a small alter was in orthodox Russians homes. Malevich's work shook the art world by stating that abstraction would be the new icon. At the beginning of 20th century, many Russian painters, poets, and philosophers looked back on their Old Russian roots, both traditional and theological. Russian icons offered inspiration for artists to break away from linear perspective and realism offered by the Renaissance. This allowed for color, expansion of understanding of geometric manipulations and form, and perspective to fit the eternal meaning of an image, leading Russian avant-garde artists to develop a unique approach to abstraction.

Brake and Gas Pedal Ergonomics

Patrick Pierret

Gary Mead, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

When operating a vehicle it is crucial that the driver is able to apply physical inputs to receive a predictable outcome. It is also possible to use the feedback from the vehicles environment, with feeling in the hands and feet to make adjustments to better suit the vehicles surroundings when maneuvering. Two of these inputs are the gas pedal and brake pedal. Together these are known as a pedal box. The 2018 FSAE vehicle at MSU will need a pedal box in order to compete in FSAE competition. Formula SAE (FSAE) is a competition for different schools to design and build a small open wheel car to simulate real world engineering as if the teams are a real car company. The goal is to have the drivers comfortable to allow them to concentrate on driving the vehicle rather than fighting discomfort. To start the design of the 2018 pedal box, research on ergonomics of vehicles was completed. Input from past and current drivers was taken into account throughout design of the pedal box. The amount of force the driver needs to apply to the brake pedal is 90 lbs to lock up the tires. A pedal box was designed using Creo, a Computer Aided Design program. A full working design model was created and used to find the pedal movement ratios of both gas and brake pedal. This data was put into a graph to find the desired pedal movements. It was found that the use of double circle movements can be used to create a smooth, fairly linear pull on a cable, where one circle movement does not create a linear pull of a cable. The drivers are happy with the outcome of the geometry and control of the newly designed pedal box. Based on the different sources of information or data, the most crucial source when undertaking an ergonomics project is the drivers themselves. Without drivers to test the pedal box locations and movements, the ultimate goal of having a comfortable racing cockpit is compromised.

A Visual Representation of the Stages of Tooth Development

Alysia Przybilla

David Sharlin, Faculty Mentor, Biology (Science, Engineering and Technology)

Giovanna Walters, Faculty Mentor, Honors

One of the most amazing sensory organs of the human body are teeth. They help assess the best strategy to chew food and are an integral part to cosmetic looks. However, poor oral hygiene and lack of access to healthcare can cause teeth to decay, become infected, and be potentially removed. Understanding how teeth develop in an embryo might give clues on how to regrow teeth from stem cells, potentially solving some of the stated issues. Tooth development is a complicated process with different signaling molecules conducting various stages. The goal of this research was to create a digital media project summarizing tooth development at an undergraduate level understanding. Numerous research articles, dentistry websites, and other student created projects were evaluated, and cross referenced for relevance, accuracy, and quality of the information provided on tooth development. Sources were often confusing and hard to follow without finding more information to grasp concepts. To overcome this, a written journal was created encapsulating important topics and to create a timeline of critical stages in tooth development. The result of the extensive research synthesis was an animated video presenting five different stages of tooth development and some molecular signaling pathways that allow these stages to advance. The video includes histological pictures, flow charts, and diagrams and was meant to be a visual representation of the information rather than regurgitated text. Using digital media not only helped clarify difficult concepts and examples but can also keep scholars engaged on the subject to inspire future research.

Can One Multi-cultural Course Impact Inter-cultural Competency?

Amanda Rousemiller, David Edwards

Elizabeth Sandell, Faculty Mentor, Education (Education)

Inter-cultural competency is “the capability to accurately understand and adapt behavior to cultural differences and commonality” (Hammer & Bennett, 2010). University students can increase their intercultural competence, by understanding behaviors and cultural differences. MSU's academic goals include preparation of “students with course content and the analytical and reflective skills to better understand diversity across the world” (MSU). One way to do this is by participating in a course such as Human Relations in a Multicultural Society. The course's objective was to help students in understand their own cultural roots, as well as global culture groups. This study responded to the question: Can one undergraduate multicultural course impact interculturally competency? The data set included more than 800 students who took the general education course, Human Relations in a Multicultural Society. Students completed the Intercultural Development Inventory (IDI) at the beginning and at the conclusion of the semester (Hammer, Bennett, & Wiseman, 2003). Data analysis showed that the course made a statistically significant difference in student cross-cultural competence. The university may use this information in considering the effectiveness of its cultural diversity goal: experience diversity with supervised reflection and recognize and respond to conditions of marginalized populations. University departments will use the information in planning, evaluating, and promoting opportunities in the community.

A Culture of Memorialization: Examining Public Grief through Funeral Programs

Bethany Rykhus

Chelsea Mead, Faculty Mentor, Anthropology (Social and Behavioral Sciences)

Grief can be expressed in a vast number of ways, each unique to the person experiencing it. But are there wider trends in the manner in which this grief is displayed publicly? In this research, I examine a collection of Christian funeral programs in Blue Earth County spanning from the 1960's to the present day. By examining the linguistic and symbolic features of these programs, I identify commonalities in the imagery, hymns, bible verses, and other tributes to the deceased and analyze them across several factors including specific genders, ages, and time periods. This examination reflects a larger culture of memorialization among local Christian mourners as they participate in the grieving process, ultimately contributing to larger conversations of grief, mourning, memorialization, and religious ideologies in the Southern Minnesota area.

An autoethnographic exploration into the experience of a low-income student in an institute of higher learning

Shelbi Schadendorf

James Dimock, Faculty Mentor, Communication Studies (Arts and Humanities)

Conducted through the qualitative research method of autoethnography, and presented through the lens of critical analysis, this study explores the oppressive experience as a low income student in an institute of higher education. Written as an attempt to make the struggle as a low income students more visible, the focus of this study is both an exploration into the commodification of higher education and the culture surrounding how we treat, or don't acknowledge, low income students.

Through the presentation of the author's experience as an autoethnography, the insight gained from first hand experience can be shared through an accessible, but still academic, medium. By reflecting on this experience using the critical paradigm, the oppressive nature a low income student has with their institute of higher learning is revealed, explored, and critiqued.

The results of this study have shown that while some institutes of higher education may be skillful in attracting low income students, they are not necessarily equipped to serve low income students. Even more troubling, on an interpersonal level its entirely possible that those who serve the institute may not even be aware enough to recognize, considerate enough to care, or empathetic towards understanding low income students.

Mass data routing of discrete inputs and digital processing for replacement of an analog device

Danayit Shewamene, Micheal Zylla, Justin Rudie, and Mikkell Schwartz

Jacob Swanson, Faculty Mentor, Integrated Engineering

This research effort developed a comprehensive data routing solution intended to replace current industrial analog devices. Industries currently employing these analog circuits are running into their impassable physical limitations. Particularly, high current draw of constituent components reduces voltage fanout, the number of logic gates a voltage can drive, which limits scalability. By nature, the developed solution resolves this inherent shortcoming of the currently employed analog technology, by virtue of modern integrated circuit (IC) design. These compact multipurpose ICs are low current drawing and immensely powerful signal processing devices. The increased functionality and efficiencies of integrated circuits demands equally sophisticated manipulation and programming to bring out their maximum potential. The primary challenge and objective of this project addresses the need for application exclusive conditioning of technologies with vast potential uses. The particular method of adapting a versatile technology to a specific application reached through this research effort was validated through a functional proof of concept circuit. The proof of concept is free of limitations found in the predecessor analog circuit and lends itself towards further improvements in scalability and functionality in the intended system.

Warrior or Guardian? - Training in German Law Enforcement

Jonathan Smith

Nadja Kramer, Faculty Mentor, German (Arts and Humanities)

In recent years, police in the United States have gotten under scrutiny for violent conflict resolution that many in the public criticized and deemed as excessive and inappropriate - reflecting a “Warrior” mindset. What is lacking to return to a “Guardian” mindset? In my research, I took part in the Behavioral Training seminars of the Berlin Police Academy in Germany, where the focus is on teaching fundamental skills that decelerate or de-escalate a potential conflict situation. This training relates to core values of communication and conflict management that every law enforcement officer in Germany undergoes. Much of the training is designed to go beyond the apparent conflict and extends to “reading” the situation by emphasizing skills that are typically honed in a liberal arts curriculum: critical thinking and engaging in effective communication that is informed by intercultural competency. This presentation asks: Does a Liberal Arts Education make a better cop? What are core principles of communication and conflict resolution? And are these even viable goals to incorporate into law enforcement training in the United States?

Student Perceptions of an Interprofessional Collaboration in an Experiential Learning Setting

Briana Spicer

Brooke Burk, Faculty Mentor, Recreation, Parks and Liesure Services (Allied Health and Nursing)

BACKGROUND

According to the Interprofessional Health Collaborative, interprofessional collaboration is the process of developing and maintaining effective working relationships with learners, practitioners, clients, and communities to enable optimal outcomes. Interprofessional collaborations within an experiential learning setting are essential for current and future professionals. At MNSU a program known as Rec N' Read provided interprofessional opportunities between two departments, Recreation, Parks, and Leisure Serves and Communication Disorders (RPLS and CDIS). Rec N' Read allowed the two departments to collaborate with one another to develop literacy interventions as well as recreational opportunities for children K-5th grade struggling with reading and writing.

PURPOSE

The objective of this study was to explore student perceptions on the benefits of interprofessional collaboration through the program known as Rec N' Read.

METHODS

Focus groups with the RPLS and CDIS students (20 students in total) were used to collect data after the Rec N' Read program was complete. Each session was recorded and then transcribed. Themes were identified throughout the transcription process, and quotes relating to those themes were organized and reviewed.

RESULTS

Following analysis, the data uncovered two themes: The benefits of interprofessional collaboration and professional development in an experiential setting.

CONCLUSION

All of the CDIS and RPLS students had positive perceptions towards their experience working alongside a contrasting discipline. Overall, the student's perceptions indicate the importance of universities to use interprofessional collaboration experiences as a valuable tool in higher education.

Not Your Everyday Glaze

Elizabeth Stensland

Todd Shanafelt, Faculty Mentor, Art (Arts and Humanities)

The goal for this project will be to achieve colors in handmade glazes that are found on the color wheel as well as the colors that are found between the primary and secondary colors. Ceramic glazes are made by combining three components; a glass (ex: silica flour), a flux (ex: soda ash), and a refractory (ex: kaolin). These elements combine to make a stable composition that coat the ceramic piece and form a glass coating on the pot or sculpture. To add colors to glazes you then add mason stains or specific oxides to get a desired color. Now natural colors such as blues, greens, and browns are much easier to achieve in glazes due to the color that certain materials give off. I would like to bring bright vibrant colors that are not typically found in nature to a medium that comes from the earth. Warm colors that are found on the color wheel are much harder to achieve given that the need for rare materials aren't available or accessible.

What happens when a museum does not have ownership of abandoned collections?

Hallie Uhrich

Ronald Schirmer, Faculty Mentor, Anthropology (Social and Behavioral Sciences)

A Google search will point you towards statutes that assume there is some type of documentation indicating who owned the collection or has ties to the property where the collection was found. However, what happens when the documentation is expired? Or if there is some documentation, what if it is not what the museum needs in order to display or house collections from federal land. This is often the case at many Minnesota museums, but statutes do not specifically say what steps to take in this situation. As a result, museums are left with a collection that they cannot use and often have no time to figure out who the collection belongs to based on what little information they may have. The main problem that will be addressed is the lack of actual documented loan or donation agreements on record between government recognized parcel owners since this is where the problem has shown itself the most. As part of this project, time will be spent to determine all the information possible about abandoned collections from the Museum of Anthropology at Minnesota State University, Mankato in order to contact a potential owner or relative to ask what they want to be done with the collection. Once this process has been completed multiple times, the hope is that a standard set of procedures can be created that will aid museums with any possible issues they may run into in their efforts to get documentation for their abandoned collections.

Designing and Building An Effective Muffler for FSAE

Samuel Warriari

Bruce Jones, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

The explosive combustion process of an internal combustion engine generates acoustic pulses that are pushed out of the engine along with the exhaust gases during the exhaust stroke. These acoustic pulses join to form loud sound waves which are considered one of the major components of sound pollution and more specifically, traffic noise pollution. To curb this problem, a muffler is used in an exhaust system. The aim of this research was to build an effective and efficient muffler for the Formula SAE (FSAE) car that met the FSAE sound rules. FSAE is a challenge whereby students design and build small formula-style racing cars within an 8-12 month period then bring their vehicles for a competition. FSAE cars are judged in a series of static and dynamic events, including technical inspection, cost, presentation, engineering design and endurance. According to part IC3.3 titled "Maximum Sound Level" of the 2018 Formula SAE rules, the maximum sound level that will be acceptable for the 2018 competition will be 103 dBC at idle and 110 dBC at all other speeds. Sound tests were done on a reactive muffler and combination glass pack style muffler whereby each muffler was mounted onto the exhaust pipe of the 2017 Formula Car and sound tested using an audiometer. Both Mufflers passed the sound test. After the sound tests, flow tests were done on the flow bench where the combination glass pack style muffler was determined to be the least restrictive. A total of 6 combination glass pack style mufflers with 2 inch and 2.25 inch perforated core diameters and lengths of 9, 12 and 16 inches respectively were made and sound tested. The sound test results were compared and showed that the length of the mufflers and the core diameter had an impact on sound attenuation. A sound attenuation, weight and size criteria decision matrix was made where a suitable muffler for the FSAE car was chosen.

How do changes in inter-cultural competency (ICC) compare among pre-service teachers at three data collection points?

Tori Smith, Chandler Gooding

Elizabeth Sandell, Faculty Mentor, Educational Studies: Elementary and Early Childhood (Education)

This project investigated the research question: How do changes in inter-cultural competency (ICC) compare among pre-service teachers at three data collection points? Inter-cultural competency is considered to be defined as “the capability to accurately understand and adapt behavior to cultural differences and commonalities (Hammer & Bennett, 2010).” Data was collected from 48 undergraduate students who majored in elementary education. Based on the Developmental Model of Intercultural Sensitivity (Bennett, 1986), the investigators hypothesized that students would have a statistically significant change in their ICC from the beginning of their academic studies until just before student teaching. Subjects completed the Intercultural Developmental Inventory (IDI) (Hammer & Bennett, 2012), which calculates a score that reflects capacity for cross-cultural adaptation. Results showed that (1) students who completed the first course (Human Relations) improved their ICC by an average of 5.874 points and (2) students who completed the professional education program (3 semesters) improved their ICC by an average of 15.805 points. Most importantly, students improved their ICC by an average of 21.679 points from the beginning of their academic studies until the beginning of student teaching. The data analysis showed that students did have a statistically significant change in their ICC, and results suggested that the program's content, pedagogy, and mentorship has a positive impact on pre-service teachers.

Comparison of Media for Intermediate-term Storage of Brewer's Yeast

Naomi Abraham

T.E. Secott, Faculty Mentor, Biology (Science, Engineering and Technology)

The number of microbreweries has been increasing in Minnesota over the past decade. To make these businesses economically viable, many microbrewers have begun to maintain their own stocks of yeasts. How these yeasts are stored can have an effect on the quality and turn-around of the resulting beer. One form of yeast maintenance is through cryopreservation, in which yeasts are frozen in an appropriate storage medium. However, which media are appropriate for yeast storage have not been established, nor is it clear that storage conditions for one yeast strain would be appropriate for all strains. We stored two strains of yeast (ale yeast and lager yeast) in three different freezing media - wort broth (WB), CryoBroth (CB), and OxyStasis (OS) - and assessed the viability of the yeasts in these media at several time points over a four-month period by flow cytometry. Viability was determined using Viacount reagent, which labeled viable cells fluorescent green and nonviable cells fluorescent red. Ale yeast retained 90% viability in CB, 40% viability in OS, and < 10% viability in WB. In contrast, lager yeast retained > 80% viability in all media. We conclude that no one medium is best for intermediate-term storage, and the medium most appropriate for storage should be determined experimentally.

Persons with recently diagnosed Alzheimer's Disease: An exploration comparing quality of life indicators across three time points

Stirling Adrian, Aspen Curtis

Kristen Abbott-Anderson, Faculty Mentor, Nursing (Allied Health and Nursing)

Alzheimer's disease (AD) affects 44 million people worldwide. This progressive, neurodegenerative disorder has a significant negative impact on an individual's quality of life (QoL). QoL is a multidimensional concept that encompasses subjective and objective evaluations of health, functional abilities, participation, and relationships. This negative impact on an individual's QoL often results in a loss of independence and increased social isolation.

Differences are noted between self-reports of QoL for persons with AD in comparison to collection through proxy, with proxy ratings showing decreased perception of QoL. The aim of this study is to explore QoL indicators for persons recently diagnosed with AD, both self-reported and proxy reported, from the year of diagnosis and including the two years prior to diagnosis.

A secondary analysis of the National Institute on Aging's National Health and Aging Trends Study will be conducted on persons with AD to explore the longitudinal report of QoL indicators. Descriptive statistics comparing activity engagement, well-being, and cognitive impairment as proxy variables for QoL indicators will be reported. An N of 147 adults diagnosed with AD within the last year comprise the sample, 85 self-reported and 62 proxy-reported. Results will inform nursing care for persons with a recent diagnosis of memory loss and provide insight into differences in QoL perceptions with implications for nurses in community and clinical settings. Understanding changes in QoL that can coexist with AD will help nurses to develop care strategies that support the affected person and their family as they navigate life with this progressive disease.

Determining Secondary Structure Relation to Singlet Oxygen Reaction Rates with Eye Lens Protective Proteins α -Crystallin, β -Crystallin, and γ -Crystallin.

Cody Allen

John Thoenke, Faculty Mentor, Chemistry (Science, Engineering and Technology)

Ninety percent of the lens proteins of the human eye lens consist of Crystallin proteins, which are important in the prevention of protein aggregation. Fully mature lens fiber cells do not produce or degrade proteins, therefore existing proteins must remain stable in solution for the lifetime of the individual. With any denaturation of Crystallin proteins the protective function fails causing protein aggregation, subsequent blurring of the lens, and the patient develops cataracts. Singlet oxygen is a common denaturation agent of proteins. This highly reactive form of oxygen reacts with protein molecules, causing structural changes. These structural changes can be detected using molecular probes, HPLC, and fluorescence spectroscopy. HPLC measurements coupled with molecular probes have shown that α -Crystallin is more reactive with singlet oxygen than γ -Crystallin. This coincides with our hypothesis that α -Crystallin should react faster than γ -Crystallin due to the presence of more tryptophan amino acids. The faster reaction with singlet oxygen and α -Crystallin should cause more denaturation, as observed using fluorescence spectroscopy. The combined results from probe molecules, HPLC, and Fluorescence spectroscopy, along with the primary amino acid sequences have allowed the identification of specific structures within the Crystallin proteins that increase or decrease the rate of singlet oxygen damage. This information can be used to better understand why certain proteins develop cataracts more readily than others.

Bored Millennials: How Do Young Adults View Leisure Time and Play

Leah Anderson, Tess Leland, Emily Schoeller, Allison Anderson, and Kayla Anderson
Heather Von Bank, Faculty Mentor, Family Consumer Science (Allied Health and Nursing)

Millennials get a bad reputation and are sometimes viewed as being disconnected or even bored. Young adults, born between the years 1980 - 1999 have been known to spend a large amount of time on electronic devices, which portrays them as lazy, unmotivated, and entitled. In this study, we want to delineate the stereotypes of millennials and determine how they spend their leisure time when they feel bored. In the online survey, young adults, mainly college students ages 18-24, were asked about what they do in their free time. Survey questions include how young adults define play, what they do when they are bored, how they play, their feelings and moods associated with boredom, their history of play, and previous involvement in extracurricular activities. Other influences on young adults' views on play will be analyzed.

We will shed light on the myths and facts of bored millennials and their behaviors. We anticipate that participants will indicate a heavy reliance on social media and electronic devices to alleviate boredom. It is our hope that participants will become more aware of their current behaviors and habits.

Wind Turbines

Alexander Anderson

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

Wind turbines are contributing 4.7% to the generation of electricity in the United States. That output comes out to 82,183 megawatts produced. Almost all of these turbines are designed with a horizontal axis. Along with the cost of disrupting the natural scenery is the high cost of maintenance. The torque being generated by the blades is enough to destroy gear boxes which are similar to the ones used in semi-trucks. The cost of replacing one of those gear boxes over 200 feet in the air is over \$200,000. The typical wind turbine requires complex motors and mechanisms to yaw and pitch the blades to optimize wind capturing to spin the generator. They also require 7 rotor widths apart from the next turbine to maximize each turbine's power output. The vertical axis wind turbine eliminates the need for complex motors and decreases the amount of spacing between turbines. Vertical axis turbines also require less maintenance because of their simple design, compared to their horizontal axis cousin. Utilizing this design will lead to better cost effectiveness and increased efficiency, all while using less land.

Solar Windows

Logan Back

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

SolarWindows™, a newly innovative creation being recognized as a new way to capture energy. The use of solar windows and the way that they can impact society is the big idea. For the research of this topic, scholarly sources from the web will be used to obtain the information. The reason for this topic is because there needs to be more alternative ways to conduct solar energy to reduce the amount of energy consumption throughout the world. Every building, whether it is commercial, industrial, or residential, all have windows of some sort and being able to convert those windows into a way to harness energy will reduce the energy cost prices around the world by more than 50%. The electricity-generating coating can be applied to new or existing windows, which is connected to an electrical adapter. They are said to be able to conduct enough energy to support America's 85 million detached homes and commercial buildings, turning entire buildings into 'vertical power generators'. This topic is important because solar energy is the most readily available way to make energy using a sustainable resource. Solar energy is already used in forms that may be too expensive or not as obtainable to people. Solar windows would cut the energy cost of a building by 30-50% and "guarantees a one-year financial payback (SolarWindow™)" for building owners. As a building owner, investing in solar windows would be an efficient way to save money, as well as the environment.

Effect of Estrogen on Brain Development in the Green Anole Lizard (*Anolis carolinensis*)

Erin Baker

Rachel Cohen, Faculty Mentor, Biology (Science, Engineering and Technology)

In rodents, it is known that sexual differentiation and masculinization of the developing brain is determined by the steroid hormone estradiol (E2). In contrast, the developing brain becomes feminized by the absence of E2. It is unclear if the sexual differentiation of the brain is facilitated by E2 in reptilian species. Studies on green anole lizards have shown that treatment of testosterone (T) and E2 can play a role in the differentiation of tissues outside the brain including hemipenes. I hypothesize if E2 treatments are applied to anole lizard eggs, then there will be larger volumes in sex-specific brain regions compared to eggs treated with vehicle because E2 masculinizes the developing brain in mammalian species. Anole lizard eggs were collected from nests daily and topically treated with E2 on days 10 and 13 of development. Control eggs were treated with a vehicle. On postnatal day one, tissue was collected and stored at -80°C. Torsos and brains were sectioned via cryostat. Slides were stained and examined under the microscope to determine the sex of the lizard and the brain region volumes. Findings from this project will allow us to determine if this specific hormone action in the developing mammalian brain is consistent in reptiles. Future studies can be conducted on other taxa to determine if this trait is present amongst them. If E2 does not play a role in masculinizing the reptilian brain, then future research may need to be done on this species to determine how sex-specific behaviors are obtained.

Identification of proteins interacting with the alpha subunits of actin capping protein

Ryan Bennett

Marilyn Hart, Faculty Mentor, Biology (Science, Engineering and Technology)

Actin is one of the three major filaments of the cytoskeleton that is involved in a number of cellular processes including cell motility, organelle movement, and cell division. Actin is regulated by a number of accessory proteins, including actin capping protein (CP). CP is used to regulate the addition of monomers at the barbed end of the actin filament. CP is composed of two subunits, an alpha and a beta. Three isoforms for each subunit have been identified ($\alpha 1$, $\alpha 2$, $\alpha 3$, $\beta 1$, $\beta 2$, and $\beta 3$). Although CP $\alpha 1$ and CP $\alpha 2$ share >90% sequence identity, the subunits contain a region of divergence that is highly conserved among the subunits. This suggests that the alpha isoforms have different functions and associate with different proteins. In a previous study, a yeast two-hybrid screen identified five proteins that interact with CP $\alpha 1$ and seven proteins that interact with CP $\alpha 2$. Utilizing bioinformatics, we confirmed the identity of the proteins; one novel protein was identified. To confirm the interactions of the candidate proteins with CP $\alpha 1$ or CP $\alpha 2$, we used a protein:protein technique, glutathione S-transferase, to "pull down" the putative binding proteins. Interactions were confirmed.

Photosensitizer Induced Oxidation of Protein via Common Sunscreen Ingredients

Zachary Berkebile

John Theomke, Faculty Mentor, Chemistry (Science, Engineering and Technology)

Sunscreen use has become quite ubiquitous across the developed world. It provides protection from harmful Ultraviolet (UV) radiation that causes mutations that lead to specific cancers like melanoma. With this widespread use of sunscreen, cancer rates have not decreased.

Unfortunately, the exact opposite has occurred. Some sunscreen ingredients approved for use in the United States can act as photosensitizers to create reactive oxygen species. Singlet oxygen is a highly reactive molecule that can damage proteins important for life and protection of nucleic acids inside cells. If use of these ingredients creates singlet oxygen, by oxidizing the protein sidechains of amino acids like tryptophan, tyrosine, and histidine, damaging changes to the functional conformations of the protein are a likely unintended consequence. The aim of this research is to elucidate the extent of oxidation from singlet oxygen in mixtures of a potential sunscreen photosensitizer and model protein. This was accomplished by irradiation of samples with UV light and measurement of samples with the aid of furfuryl alcohol, a molecular probe (norharmane) to determine changes to protein conformation, and fluorescence spectroscopy. Reactive oxygen species generated by photoirradiation of several UV blocking ingredients, and damage to collagen protein types I and IV was found to be a time dependent process. Findings from this research indicate that the longer these UV blockers are exposed to UV light while maintaining contact to skin, risks increase for formation of singlet oxygen can in turn cause significant damage to protective proteins.

Virtual Power Plants

Matthew Clark

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

Where and how we get our power is becoming an increasingly important societal topic. Traditional power plants have one or few main power generation locations for a vast area. However, Virtual Power Plants (VPP) are network cloud-based power plants. In a VPP, a vast network of interconnected individual buildings are the energy producers for a larger network of power consumption thus eliminating the need for singular power plants that create emissions.

A VPP would work in a way that as a homeowner you could create green energy from solar, wind or another source and store that power in one or more large household batteries, like that available from Tesla. One thought is that you could sell excess stored power on an open market. VPP's could also be government run and operated in a way that homeowners who opt to have solar panels and batteries installed would be subsidized for the costs involved. In either scenario, producers would be able to take the place of a power plant.

VPP's have only been theoretical until recently and are currently being pursued by Tesla and the state of South Australia. They are teaming up to create a VPP network over the next 5 years which will be comprised of over 50,000 household producers. The initial trial is underway and is comprised of 1,100 households and will be grown to 24,000 households at which point the deal will be opened to more residents in the region.

Linking above and below ground allometric growth patterns in oak species

Grant Conner

Matthew Kaproth, Faculty Mentor, Biology (Science, Engineering and Technology)

Above ground traits have long been used to explain plant species ability to tolerate environmental stresses (Wright et al. 2004); whereas relatively little exploratory work has been done to understand its below ground counterparts. Fine roots play crucial roles in the life of plants in that they are responsible for absorption and transport of nutrients and water to the rest of the plant, although functional differences in fine root order are not always accounted for (McCormack et al. 2015). While they are difficult to measure, below ground traits are responsible for survivability and growth of a plant and should have equal consideration with above ground traits when exploring resource allocation and growth patterns in plants. Complications in measuring below ground traits arise from the lack of non-destructive methods of observation in addition to the high risk of damage to fine roots through the process of harvesting itself. Here we discuss allometric trait relationships that reveal scaling between fine root and above ground traits using parametric methods of analysis. The study used twenty oak species adapted to a wide variety of native environmental conditions, grown in common garden. Given robust previous studies including a high-resolution family tree, we are able to use phylogenetic independent contrasts implemented to account for phylogenetic inertia present in the different observed species of oak. Analyses allow us to uncover if fine root traits vary with native environmental conditions or are conserved across species.

Obesity is the Symptom of a Much Greater Social Malaise

Derrick Connor, Larissa Chapman, Nancy Christianson, and Courtney Fruchey

David Bissonnette, Faculty Mentor, Family Consumer Science (Allied Health and Nursing)

Brooke Burk, Faculty Mentor, Recreation, Parks and Liesure Services (Allied Health and Nursing)

Objective: We hypothesized that obesity is a symptom among other social malaises that is primarily associated with the breakdown of the American family.

Methods: A systematic web-search of scholarly and peer reviewed articles using MEDLINE, PUBMED, ACADEMIC SEARCH PREMIER and GOOGLE was completed on family integrity in relations to obesity, depression, child abuse, substance abuse, divorce, single parent families, screen time sedentarism, family mealtime disruption, and sexually transmitted infections (STIs).

Results: The cause of obesity is not medical in origin, but rather a complex system of societal disorders resulting primarily from the disruption in family integrity. Anxieties, depression, substance and child abuse, obesity and a rising prevalence in STIs has emerged from the deterioration of nuclear family health, ultimately from divorce and increased prevalence of single parent-families. The main vectors driving the obesity epidemic is family deterioration from which emerges growing sedentarism in youth, lack of family mealtimes, poor quality nutrition, dual parent employment, single-parent poverty, and decreased prevalence of breastfeeding.

Conclusion: The current rates of obesity presents more as a symptom of a greater societal malaise that is primarily driven by poor quality family environments. The deterioration of the family environment has led to single parent households, poorer quality nutrition, increased rates of depression, STIs, child abuse, obesity and substance abuse. Moreover, the failure of the medical community to properly address the obesity epidemic as a social crisis rather than a medical one has only further deepened the US healthcare crisis and delayed its recovery.

Are we scaffolding? Using teams for problem-based learning in child development and family studies

Arliah Cox, Tess Leland, Micah Link, Geneva Kachinske, and Timnit Yikealo

Daniel Moen, Faculty Mentor, Family Consumer Science (Allied Health and Nursing)

Problem based learning (PBL), learning through the experience of solving problems, is suggested to be an effective teaching model. It is a student-centered pedagogy in which students learn a material by making some direct connections and applying what they have learned in class to solve a real-life problem. When applied within teams, it enables students to identify what they already know, what they need to know, and what ways they can use to access latest information. The Study is guided by sociohistorical theory of cognitive development (Vygotsky, 1978) and Bloom's taxonomy of learning (1956). The purpose of this study is to evaluate student's perceptions of problem based learning within teams in the area of family studies. This cross-sectional mixed method study uses data collection (Qualtrics survey) to assess and evaluate the perceptions of learning experiences in a survey response (n=104) of undergraduate students in an introduction level family studies course in a mid-western university. Overall, students reported significantly favorable experiences in working with teams on Problem Based Learning in terms of overall experience, comprehension, critical and creative thinking, gained insights, social skills, and conflict management. The study supports the idea that PBL within teams works effectively as it encourages the activation of prior knowledge in group setting and provides opportunities for elaboration on that knowledge.

Semantic Diversity: Differences Between Narrative and Expository Language Sample Tasks

Tiana Dixon and Jessica Boespflug

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We examined the semantic diversity in elementary-age students diagnosed with a language disorder. Semantic diversity quantifies the vocabulary that the subjects use and how they implement the vocabulary depending on the context of (purpose for) communication. Our subjects included 30 elementary school students from rural and urban Midwest school districts who see speech-language pathologists (SLPs) for language services. Four-task language samples were administered, transcribed and analyzed using a qualitative rubric. Additional data sources include standardized language and reading assessments as well as an SLP perception form where SLPs rate the degree of deficits in reading, writing, receptive and expressive language. The transcripts were then examined for the number of words different compared to the total number of words across expository and narrative language sample tasks to determine semantic diversity.

Assessing Current Supports for LGBTQ+ Students in Rural and Semi-Rural Schools in Central and Southern Minnesota

Alexandria Dobson

Jeffrey Brown, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Jannine Ray, Graduate Mentor, Psychology (Social and Behavioral Sciences)

This study, still in progress, will examine current school supports for LGBTQ+ students in grades K-12. To assess the current supports that LGBTQ+ students are receiving, we will send out surveys to school staff (e.g., teachers, school psychologists, counselors, principals) in Mankato, St. Peter, St. Paul, and Minneapolis, Minnesota. Questions in the survey are tailored to determine the value that staff hold for their LGBTQ+ students. To determine whether or not the schools offer an abundance of support for their LGBTQ+ students, we will ask them questions such as: “Does this school have an LGBTQ+ club”, “Does this school discuss LGBTQ+ relations in sexual education?”, “Are the counselors and/or psychologists at this school trained on how to assist LGBTQ+ students?”. Specifically, the poster will detail results of the survey discussing how LGBTQ+ students are treated at the schools by faculty and other students, as well as how the matters are handled (e.g. what happens when a student is bullied for being LGBTQ+?). Furthermore, the poster will discuss potential biases that some faculty might hold against their LGBTQ+ students (e.g. faculty that are against LGBTQ+ people in general, believe that it is a phase, think that the students are mentally ill, etc.). Based off of previous research, we expect school faculty to report having substantial knowledge and support on the topic of LGBTQ+ issues; however, we expect to find that this knowledge is not incorporated into active clubs/organizations, teaching about LGBTQ+ relations in sex education, or providing safe and comfortable access to bathrooms to their transgender students.

Lie Detection in Employment

Jessica Eul and John Walker

Emily Stark, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Companies build their structure with employees that are good at performing their jobs and completing work tasks. Applicant interviews are a crucial factor to hire the right person for the job. However, how do we know whether the applicant is telling the truth or lying in the interview? Research suggests that hiring managers generally trust the information they receive in interviews, and in fact, sometimes become overconfident about the accuracy of their hiring decisions when interviews are incorporated into the selection battery (Furnham, 2008; Kausel, Culbertson & Madrid, 2016). However, Weiss and Feldman (2006) found that 81% of the participants admitted to lying in the written application and/or the interview. The current study assesses whether participants are able to accurately detect lies in a job interview context. Participants were asked to watch a series of simulated job interviews that present true and lie answers and determine whether they believed the individual was lying or telling the truth. The subjects were also asked to rate how much they liked, trusted, and were willing to hire the person on each video clip along with answering a few personality questionnaires at the end of the experiment. Overall, we expect that participants will not be able to accurately detect deception. The findings of this study will be relevant for hiring managers who need to be able to select the right candidate for a job, who need to be aware that applicants may not always be honest and truthful.

Paper Insulation (Cellulose)

Brock Fobbe

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

Made from recycled newspapers and cardboard, paper-based insulation is a great alternative to chemical foams. Both insect resistant and fire-retardant because of the inclusion of borax, boric acid, and calcium carbonate (all completely natural materials that have no associations with health problems), paper insulation can be blown into cavity walls, filling every crack and creating an almost draft-free space. It is also called cellulose insulation. Cellulose insulation is made from recycled paper products, primarily newsprint, and has a very high recycled material content, generally 82% to 85%. The paper is first reduced to small pieces and then fiberized, creating a product that packs tightly into building cavities and inhibits airflow.

In new construction, cellulose can be either damp-sprayed or installed dry behind netting. When damp sprayed, a small amount of moisture is added at the spray nozzle tip, activating natural starches in the product and causing it to adhere inside the cavity. Damp-sprayed cellulose is typically ready for wall covering within 24 hours of installation. Cellulose can also be blown dry into netting stapled over building cavities. Cellulose is compared to spray foam and also fiberglass insulation. Being cheaper and more safe. Cellulose will change insulation by using recycled materials and by being a safer alternative with less chemicals than what most insulations have today.

The effect of exercise on neurogenesis and BDNF levels in the green anole lizard brain

Caitlin Foley

Rachel Cohen, Faculty Mentor, Biology (Science, Engineering and Technology)

Previous studies in mammals have shown that exercise promotes neurogenesis in the hippocampus, but not as much is known about how exercise affects neurogenesis in reptiles. The hippocampus is a major site of neurogenesis in the adult brain. It exhibits high levels of brain-derived neurotrophic factor (BDNF) and exercise has been associated with an upregulation of BDNF. The green anole lizard (*Anolis carolinensis*) is an ideal model organism for studies of neuroplasticity due to dramatic seasonal changes in circulating steroid hormone levels and brain morphology. We examined how exercise impacts neurogenesis and BDNF levels in the dorsal and medial cortex, the reptilian homolog of the hippocampus. To do that, two cohorts of adult breeding male lizards were injected subcutaneously with BrdU (50 mg/kg) five days prior to treatment. The exercise group underwent forced exercise on a treadmill for 30 minutes/day for three weeks. The control group was handled and put back in the cage every day for three weeks. Two hours prior to sacrifice a bolus of BrdU was injected. Tissue was collected, frozen and cryosectioned. An immunohistochemistry was performed to label cells with BrdU/Hu and double-positive cells were quantified. RNA extraction and qPCR were formed to quantify BDNF levels. We want to determine from this study whether exercise impacts neurogenesis and BDNF levels in the hippocampus. Because previous experiments have shown that exercise increases new neuron growth and an upregulation of BDNF levels, we predict that exercise lizards will show increased neurogenesis and increased BDNF compared to non-exercise lizards.

MicroRNA regulation of APOBEC3A and APOBEC3B

Katlyn Gieseke

Allison Land, Faculty Mentor, Biology (Science, Engineering and Technology)

APOBEC3A (A3A) and APOBEC3B (A3B) are part of a family of enzymes that deaminate DNA cytosine to DNA uracil. Some APOBEC3 family members defend the body against viruses such as HIV, while A3B and A3A are upregulated in multiple cancers. One of the changes during oncogenesis is alteration of the expression profile of cellular miRNAs. This study focuses on the putative role of miRNAs in regulating A3A and A3B. I hypothesize that since A3A and A3B likely arose by a gene duplication event, some miRNAs will regulate both A3A and A3B, while other miRNAs will only regulate one. Previous work used prediction software to identify miRNAs that may interact with the 3'UTR of A3A and/or A3B. To confirm this interaction, the 3'UTRs of A3A and A3B were amplified from two cancer cell lines and cloned into the luciferase-containing psiCHECK-2 vector. Currently, we are cloning the predicted miRNAs into an expression plasmid so that we can co-express each miRNA with the 3'UTR of A3A or A3B using a Luciferase assay. Decreased luciferase activity compared to the control would indicate that the associated miRNA interacted with the 3'UTR to decrease protein levels. We expect to see that a subset of the miRNAs that interact with the A3B 3'UTR to decrease luciferase activity will also interact with the A3A 3'UTR to decrease luciferase activity. This study will provide information about the regulation of two proteins involved in cancer progression and may lead to the development of targeted cancer therapies.

MSU-M Social Work Students' Perceptions of Sexual Assault Reporting

Elizabeth Guss

Debra Gohagan, Faculty Mentor, Social Work (Social and Behavioral Sciences)

The purpose of this research project is to learn more about MSU-M Social Work students' perceptions of sexual assault reporting. The hope is that the University and the Department of Social Work will benefit from the gathered information to improve efforts to educate students on sexual assault.

Prior research has identified several barriers to reporting, such as rape myths, negative perceptions about how a report will be handled, and misinformation about reporting rights. Due to these barriers, many cases of sexual assault go unreported. By increasing education about sexual assault policies and access to resources, it is hoped that college campuses can become safer for students.

Data will be gathered for this research project through an online, anonymous survey which contains eleven questions. The survey consists of six questions about sexual assault that focus on participants' acceptance of rape myths, knowledge about reporting rights, and previous sources from which they learned about sexual assault policies and/or resources. There are also five sociodemographic questions. Students will be contacted through email to request their participation in this research project after approval from the IRB has been received.

Converting Dams to Produce Power

Jonathon Harrington

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

Dams are typically constructed for irrigation, flood regulation, and power generation. The United States currently houses over 80,000 dams, only 2,500 of which are used for power. Dams are built across rivers, which create a lake behind the dam. For hydropower dams, power is generated as the water moves through the dam and into the river below. There are currently 54,391 non-powered dams, NPDs, that can be converted into hydropower dams. While building new dams would be beneficial for power and energy production, the construction would be detrimental to the surrounding ecosystem. Converting NPDs to produce power is still harmful, but it is not as harmful as new construction. This research will display effective and efficient ways of converting NPDs into hydropower dams while conserving the surrounding environment.

Biocompatibility of Hydroxyapatite and Cobalt-Chrome Alloys

Mehedi Hasan, Bethany Haus, and Eryn Zuiker

Michael Bentley, Faculty Mentor, Biology (Science, Engineering and Technology)

Kuldeep Agarwal, Faculty Mentor, Automotive Engineering Technology (Science, Engineering and Technology)

The biomaterial used in medical implantable devices must be able to sufficiently integrate within the biological system and remain compatible with surrounding tissue. Previously, Stainless Steel was explored. Cobalt Chrome (CC) will now be utilized due to higher biocompatibility while minimizing immune response and rejection. Hydroxyapatite (HA), a bioactive material that is a major and essential component of normal bone and teeth, is often used for coating metal implants to initiate infiltration. However, its bioactivity leads to high biodegradation when implanted alone, which can result in clinical implant failure. In the present study, our focus is on the biocompatibility of a mixture alloy of stainless steel and hydroxyapatite, fabricated by using a three-dimensional printer. To test the biocompatibility of the fabricated metal implant in vivo, one millimeter-sized metal pieces of high and low HA ratio mixture alloys were inserted on rat skulls through a small incision on the back made using a sterilized implantation surgery. After four months, the metal pieces were removed and observed under scanning electron microscopy to determine the degree of infiltrated bone and connective tissue. The surrounding connective tissues were also examined for inflammation and other tissue damages. The result showed that, the metal alloys that were fixed on the bone were encapsulated by dense connective tissue continuous with the periosteum without having any signs of inflammation or rejection. Furthermore, the connective tissue infiltrated into spaces within alloy, between and around the spheres of cobalt chrome, and formed a dense matrix of cellular and fibrous material throughout the implant. As further study, an implant using CC and HA with various particle bond strength will be implanted for better infiltration of bone growth and formation of vessel. Our findings will help improve medical device alloys for hip, femur and other implants.

Investigation of Maximum Operating Voltage of a Van de Graaff Accelerator

Oishik Hasan and Lukas Halberg

Andrew Roberts, Faculty Mentor, Physics (Science, Engineering and Technology)

Since it was invented in 1931 by Robert J. Van de Graaff, the Van de Graaff particle accelerator has been used in various fields, especially nuclear physics. MSU has an AN-400, 400 kV Van de Graaff accelerator which was bought in the 1970s. Various experiments have been done with this accelerator, including experiments with X-rays during the 1980s and several papers were published. In the late 1980s the accelerator was having operational problems and was put out of commission. But during the last decade the accelerator has been rebuilt and tested. Further testing of the machine is required, especially its maximum operating voltage under different insulating gas mixtures and pressure. The AN-400 operates up to 400kV, some accelerators can go to voltages in the order of a million volts. Such high voltages demand that Van de Graaff generators use dielectric, non-reactive gases as insulators instead of air, as air is 21% oxygen which is a reactive gas. An experiment was done in 1963 to find the ideal insulating gas mixture and pressure which would allow voltage to be maximized. Further experiments were done in 1965 and sulfur hexafluoride (SF₆) came out as the dielectric gas of choice. But SF₆ has become hard to obtain over the years because it is now prohibitively expensive and can be environmentally harmful. So the purpose of this project is to find an equally efficient and more cost effective alternative to SF₆ so experiments at higher energies and pressures could be performed.

The Effects of Mandibular Orthopedic Re-Positioning Appliances on Resistance Training Performance in College-aged Men

Michaela Hauer and Jason Hoerle

Mary Visser, Faculty Mentor, Human Performance (Allied Health and Nursing)

Athletic mouth pieces have been used by athletes for decades to prevent injury, but they may have more uses than just protection. The purpose of this research project is to test whether Mandibular Orthopedic Re-Positioning Appliances (MORAs) have an impact on resistance training performance. Twelve experienced, college-aged men were recruited and randomly placed into one of two groups. These men were asked to perform three sets of bench press and back squat once per week for nine weeks. These nine weeks were divided into three intervals of varying workout volume and intensity. One interval of high volume and low weight, a second interval of moderate weight and moderate volume, and a third interval of low volume and high weight. One group performs their exercises with MORA intervention, and the other without. By analyzing fatigue patterns between the two groups this study will show whether MORAs have a significant impact on weight training performance in any interval. Results pending.

Self-Healing Concrete

Taylor Hedberg

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

The production and installation of concrete accounts for 5% of CO₂ emissions world-wide. Concrete is the second most consumed substance on the planet behind only water, and research shows production is growing at a steady 2.5% per year. Concrete is used in all aspects of construction, from footings and foundations, to bridges, to roads. The problem with concrete is that although it has a high impact strength, it also has low tensile strength, and because of this is susceptible to cracking. The lifespan of concrete can vary depending on the surrounding climate, but can range anywhere from fifty to one hundred years. This creates a need for it to be demoed and replaced, or repaired. Researchers have found a method for manufacturing concrete that can heal itself without significantly changing its genetic make-up. This entails the addition of different bacteria and nutrients to common mixes. Once concrete begins to crack; water, or other liquids and gases can find their way in, causing damage to the concrete, and corroding the reinforcement. When the bacteria and nutrients are added they react with these harmful substances, and harden. This fills the cracks, and greatly extends the life of the concrete. This revolutionary method has the potential to reduce the steadily growing percentage of concrete production and decrease the carbon footprint of the concrete industry.

Cellulose Insulation

Zachery Heyne

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

According to the EPA, paper takes up roughly 27% of our landfills in the United States. Paper products alone are taking up more space than glass, plastic, and metals combined. Cellulose insulation is made up of roughly 85% recycled paper. People across the United States have primarily been using fiberglass insulation because of its price, fire resistance, consistent R values and sound absorption. Surprisingly these two types insulations are very comparable in terms of performance. Cellulose insulation came into general use around the 1970's although most homeowners and contractors use fiberglass insulation today. There are many advantages of using cellulose insulation over other types of insulation along with some disadvantages. Cellulose insulation is non-toxic and safe, while also being completely mold, insect, and rodent resistant. It is more fire resistant and uses only 10 inches of insulation to achieve R-38 rather than using 15 inches of fiberglass insulation. Some of the disadvantages of using this form of insulation that is that it needs a vapor barrier installed, and in some cases, it has been known to sag and absorb moisture when it is used reducing R value over time. Considering these facts and closely looking at the features of the most commonly used insulation across the United States, cellulose insulation could be the better alternative for not only performance but for reducing landfill use and preserving our environment we live in.

Correlation of calmodulin susceptibility and cardiac arrhythmia mutations

Amanda Hinde

Rebecca Moen, Faculty Mentor, Chemistry (Science, Engineering and Technology)

Calmodulin (CaM) is a calcium binding protein found in all muscle types in humans including cardiac muscle. CaM's role is to mediate intracellular calcium levels and modulate cardiac contractility by binding calcium ions as well as to a diverse set of targets including the calcium-release channel called the ryanodine receptor. CaM has been found to be susceptible to both site-specific methionine oxidation and disease-causing point mutations. A series of disease-causing point mutations lead to a congenital arrhythmia disorder catecholaminergic polymorphic ventricular tachycardia (CPVT) including mutants D95V, D129G, and F141L. Both oxidative modifications and CPVT mutations within the primary amino acid sequence of CaM decrease CaM's ability to bind calcium and affect the protein's stability and folding. CaM has a general dumbbell shaped structure with two globular domains, a N-terminal and C-terminal lobe, connected by a flexible alpha-helical linker. Each of these two globular domains bind two calcium ions. CPVT mutations negatively affect the ability of calcium binding to the C-lobe of the CaM which lead to a decrease in thermal stability of the protein (16). The correlation of between the CPVT mutation in CaM and oxidative susceptibility was investigated. Site-directed mutagenesis and recombinant protein overexpression was used to produce CaM which was purified using hydrophobic interaction chromatography. Changes in protein stability was monitored using ThermoFluor assays. Changes in CaM's stability and folding give insight into the affects of single amino acid point mutations on cardiac muscle contractility and how these mutations are linked to calcium in cardiac diseases.

An Educationally Relevant Investigation of Spaced Practice

Brittney Hjelmeland

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In order to ensure students benefit from instruction, it is important to use methods that aid retention of information. Spaced practice, or the distribution of practice over time, is one method shown to aid retention because it serves as a reminder of previously learned information. Spaced practice is often cited as an effective instructional practice. However, most research on the spacing effect is not conducted in an educationally relevant way. For example, most research in this area includes adult participants, is conducted in laboratory settings, and uses very brief retention intervals (typically less than 1 day). The purpose of this research is to contribute to the small body of educationally relevant research on the spacing effect by including school-aged participants, conducting research in a school-based setting, teaching meaningful grade-level content, and using lengthier retention intervals (1 week). Participants will include students in third through fifth grade who will be taught eight grade level math vocabulary words using a flashcard procedure known as incremental rehearsal (IR). Students will participate in a series of three practice sessions corresponding to their randomly assigned condition (spaced, expanded, or massed practice). They will also participate in a retention check 7 days after the final practice session. During these practice sessions, error correction will be provided as needed to help students learn words and word definitions. At each practice session and the final retention check the number of words and definitions retained by each student will be recorded and compared across the three conditions.

Validating the Instructional Hierarchy

Courtney Jensen and Stephanie Winter

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Efficiently and reliably identifying the most effective intervention is critical to timely remediation of reading difficulties. This study will utilize basic reading data and the Instructional Hierarchy (IH) to identify effective reading fluency interventions. This study will focus on the first two stages of the IH: acquisition and fluency. Students were recruited from first, second and third grade classrooms because students at this age are generally learning how to read fluently. Baseline words correct per minute (WCM) were obtained by reading three grade level passages for 1 minute each. Then, students were exposed to two repeated reading interventions targeting the acquisition and fluency phases, respectively. The students received each intervention twice, and their average reading fluency gains within each intervention, from the first read to the final read, were calculated. The intervention which results in the greatest average reading fluency gain was identified for each student. We then investigated whether initial fluency and accuracy according to baseline WCM is a reliable predictor of the most effective intervention. We then discuss the extent to which a brief reading assessment is a good predictor of the type of reading intervention from which students may benefit.

Effects of Fiber Percentage and Orientation on Fixtures Manufactured by Nylon-Carbon Fiber 3D Printing

Jacob Jones and Travis Goss

Kuldeep Agarwal, Faculty Mentor, Manufacturing Engineering Technology (Science, Engineering and Technology)

Currently, machinists and part manufacturers are using metallic and plastic fixtures to secure their parts during machining, assembly and other manufacturing processes. These fixtures are also used on robots and other automated equipment for part gripping and movement. It is estimated that the work holding and fixture industry generates about \$2 billion revenues annually. Most of the fixtures and devices are made either of metals or of plastics. The primary manufacturing process used for these is machining. This process is very time consuming and wastes a lot of material. 3D printing is a new manufacturing process that can reduce the cost and time required for fixtures and work holding devices. The plastic fixtures are easy to replace with 3D printing, but the metal fixtures need high strength characteristics that are not easy to replicate in 3D printing. A new 3D printing process called Composite Freeform Fabrication (CFF) has the potential to create parts with high strength similar to aluminum by using a matrix of Nylon with fibers such as Carbon fiber. The process has been demonstrated for a limited use for the manufacturing of fixtures. However, there needs to be more investigation into the process so that guidelines can be set which would help designers and engineers manufacture fixtures from this technology. This project studies the properties of carbon fiber 3D printed parts and its application to manufacturing fixtures. In this project mechanical test specimen were created using the CFF process by varying volume percent of fiber and their orientation. The properties were then compared based on the processing parameters.

Subcellular Localization of FAM171B in Mouse Neurons

Brooke Jones

Geoffrey Goellner, Faculty Mentor, Biology (Science, Engineering and Technology)

Maddi Bauer, Graduate Mentor, Biology (Science, Engineering and Technology)

Huntington's disease (HD) is a severe neurodegenerative disorder for which there is no known cure. HD is one amongst a group of nine neurodegenerative diseases that all share a similar type of mutation. All of these diseases are defined by repeats of CAG (CAG codes for amino acid glutamine) within their DNA sequences, and in disease affected individuals these glutamine (Q) repeat tracts somehow expand beyond their normal range, resulting in cell death within specific subpopulations of neurons in each respective disease. The absence of expanded polyQ sequences in healthy populations has led to the inference that these mutated polyQ stretches are the primary cause of the pathological effects underlying HD and the other polyQ diseases. Numerous polyQ proteins have been identified, but have yet to be functionally characterized. One such novel polyQ protein that has yet to be extensively studied is FAM171B, and our lab has preliminary data showing its ubiquitous expression throughout mouse brain. In this study, we utilized immunofluorescence (IF) to reveal FAM171B's subcellular localization. IF was performed on neurons isolated from mouse brain tissue (BrainBits). Early microscopy data shows dense perinuclear localization of FAM171B as well as expression extending along neuronal processes. Experiments utilizing NeuN, a neuronal marker that will serve as a double label to ensure we are looking at neurons, are currently underway in our lab.

Antibiotic Resistant Escherichia coli (E. coli) in Minneopa Creek Collected During Two Storm Events in 2017

Melissa Jones and Caitlin Flynn

Beth Proctor, Faculty Mentor, Environmental Sciences (Science, Engineering and Technology)

State wide, the 3rd largest water impairment is E. coli/fecal coliform (approximately 600 listed with 83 added in 2016). E. coli is used to indicate the potential presence of waterborne pathogens that can be harmful to human health. Minnesota's water quality standard for E. coli in streams is 126 organisms per 100 mL (milliliters) of water. Potential sources of E. coli contamination include wildlife, failing septic systems, feedlots, wastewater treatment plant effluents, and agricultural application of manure and treated biosolids to fields. E. coli levels were monitored at several sites along Minneopa Creek during storms on June 28 and August 9, 2017 where rainfall was 0.68 and 1.56 inches, respectively. Nine of the 10 stream/ditch sites exceeded the standard and all but one of the sites were above the designated impaired water segment. E. coli were tested for resistance to 8 antibiotics (Amoxicillin/Clavulanic Acid, Cefotaxime, Ciprofloxacin, Colistin, Erythromycin, Neomycin, Oxytetracycline and Rifampin) using the Kirby-Bauer disk diffusion assay. In June, at Minneopa State Park (Park) 75% percent of the colonies tested were resistant to 4 or more antibiotics and all were developing resistance to 1 or more antibiotics and in August, at the Park 52% were resistant to 4 or more antibiotics and 83% were developing resistance to 1 or more antibiotics. E.coli were most resistant to Amoxicillin/Clavulanic Acid, Erythromycin, Neomycin, Oxytetracycline, Rifampin and Colistin. Resistance to Amoxicillin/Clavulanic Acid, Erythromycin and Colistin is especially concerning as these antibiotics are listed on the World Health Organization's list of essential medicines.

College students' perceptions of sex work and sex trafficking

Gretah Kangas and Sedona Kintz

Eric Sprankle, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Alexander Twohy and Machensey Shalgren, Graduate Mentors, Psychology (Social and Behavioral Sciences)

The media, public policy, law enforcement, and anti-trafficking campaigns often conflate sex work and sex trafficking, which have negative consequences for both sex workers and those trafficked, and may leave the public misinformed. To assess the degree of confusion over this conflation, this study examined students' attitudes and knowledge on various elements of sex work and sex trafficking. Using an online convenience sample of 160 undergraduate students, 75.6% of participants agreed there is a difference between sex work and sex trafficking, yet results showed they were drastically misinformed about the differences. When presented with a series of news articles and vignettes containing sex work scenarios, the majority of participants believed non-trafficking instances to be cases of sex trafficking. Furthermore, 86.9% agreed that sex trafficking is a highly organized crime, and 89.4% agreed that sex trafficking is a threat to the US. In reality, however, there is no evidence that sex trafficking is a highly organized crime, and viewing sex trafficking as a national threat has provided support to the police to conduct broad-sweeping enforcement tactics that do little to curb sex trafficking, but largely negatively impacts marginalized sex workers (e.g., immigrants, women of color) through arrest and deportation (Meshkovska, Siegel, Stutterheim, & Bos, 2015). Overall, it is recommended the legal definitions of sex work and sex trafficking be assessed and revised to reduce conflation, and changes be made in the way sex work and sex trafficking are depicted and described in the media, public policy, law enforcement, and anti-trafficking campaigns.

Mineralogical and Elemental Composition of Carbonaceous Meteorite Allende by micro-Raman Spectroscopy and SEM/EDS

Rohil Kayastha

Analía Dall'Asén, Faculty Mentor, Physics (Science, Engineering and Technology)

Meteorites provide precious clues about the formation of planets in the solar system. In particular, carbonaceous chondritic meteorites, considered the most primitive surviving materials from the early Solar System, can contribute to understand how planets formed from dust by studying their composition. These relics are mainly composed of chondrules (micro/millimeter-sized inclusions) surrounded by a matrix of microparticles. The mineralogical composition of the chondrules and surrounding matrix of this kind of meteorites can be characterized at the microscale using micro-Raman spectroscopy, while the topography and elemental composition of these relics can be studied at the micro/nanoscale using SEM/EDS (Scanning Electron Microscopy/Energy Dispersive X-ray Spectroscopy). Here we present a study of the mineralogical and elemental composition of the chondrules and surrounding matrix of carbonaceous chondritic meteorite Allende (observed falling in 1969 in Pueblito de Allende, Mexico) using the aforementioned techniques. We examine how these properties vary in different regions of the chondrules and matrix. Preliminary Raman spectroscopy results show graphite, pyroxene and olivine, both within and outside the chondrules. Well-defined chondrules, rims and matrix are observed from the SEM images. The results obtained with EDS show that iron is most abundant in the matrix, while the chondrule is enhanced in magnesium. Silicon, aluminum, sodium, calcium, oxygen and carbon are also found in both, chondrule and matrix. Iron and sulfur rims are observed around the chondrules. These findings can provide information about the conditions that those minerals were formed.

Expression of Follistatin-Like 1 (Fstl1) in the Cochlea: A Potential Deafness Gene

Eunwon Kim and Lauren Hesser

David Sharlin, Faculty Mentor, Biology (Science, Engineering and Technology)

More than 360 million cases of auditory deficits world-wide are linked to hereditary genetic deafness. The 115 genes linked to hereditary genetic deafness, does not account for entirety of genetic deafness. Untreated congenital hypothyroidism results in permanent hearing loss. Thyroid hormone works by binding to a nuclear receptor that controls gene expression. It is proposed that deafness associated with lack of thyroid hormone in early development results from the mis-regulation of specific genes that drive development of hearing.

Follistatin-like 1 (Fstl1) - a bone morphogenetic protein (BMP) 4 signaling antagonist important in the development of the brain, lung, and urinary system - is a potential thyroid hormone receptor target gene. However, whether Fstl1 is important in cochlea development is completely unknown. Therefore, this research aims to map the expression of Fstl1 in euthyroid and hypothyroid conditions during development. Using a postnatal day 3 total cochlear cDNA pool, we amplified a candidate Fstl1 cDNA using PCR. It was cloned into the pGEMT-easy vector and transfected into JM109 bacterial cells. Colonies are currently being screened for the proper Fstl1 containing plasmids. The animal experiments are generating euthyroid cochlear and hypothyroid cochlear tissues for in situ hybridization. We predict Fstl1 mRNA will be expressed in a cochlear region known as the greater epithelial region (GER) and be increased in the hypothyroid cochlear tissues compared to euthyroid control tissues. Ultimately, our study has the possibility to identify Fstl1 as a novel cochlear expressed gene and potentially a unique deafness gene.

Effect of non-nutritive sweeteners (artificial sweeteners) and nutritive sweeteners on fat mass (FM) and fat free mass (FFM) in rats

Jill Knepprath

Penny Knoblich, Faculty Mentor, Biology (Science, Engineering and Technology)

Mary Hadley, Faculty Mentor, Chemistry (Science, Engineering and Technology)

Obesity increases the risk for many diseases, including diabetes and heart disease. It has been shown in prior research that there is a link between the consumption of sucrose-flavored beverages and obesity. Non-nutritive sweeteners have been used for years as an alternative to nutritive- (sucrose) sweetened beverages and food in order to avoid the increased consumption of calories, but maintain the sweet taste. A concern is that non-nutritive sweeteners may enhance hunger in the consumer, and promote weight gain. A prior study done in this lab investigated the relationship between non-nutritive sweeteners and weight gain. That study found that rats that ate diets sweetened with the non-nutritive sweetener (Stevia) gained more weight than rats that ate the sucrose-sweetened diet. The current study investigated whether the greater gain in mass in the Stevia group was due to fat or fat-free tissue, by comparing it to the sucrose group. Percent fat was analyzed using a chloroform-methanol procedure adapted from Brooks (1998). The lipid was extracted from the homogenized samples of rat carcasses from both groups from the previous study. The percent body fat for each sample was then calculated. . Results: the Stevia-fed rats had a percent body fat of 17.65 +- 0.85 versus 14.13 +- 1.56 in the sucrose-fed rats, but this difference was not quite significant ($p = 0.58$). Conclusion: Although there was a trend for higher body fat in the Stevia-fed rats, the increase in body mass was likely due to greater overall body growth.

Evaluating Public Speaking Performance: A Quest to Discover an Empirically-Supported Public Speaking Task

Quincey Krein

Jeffrey Buchanan, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Samuel Spencer, Graduate Mentor, Psychology (Social and Behavioral Sciences)

This study investigated various influences on the level of anxiety in public speaking tasks such as the presence of audience members, audience evaluation, and public speaking topics. Based on previous research indicating that audience presence, audience evaluations, and public speaking topics influence public speaking performance, we hypothesized that evaluative audiences would create a higher level of anxiety in participants, as opposed to a non-evaluative audience. Further, it was anticipated that an autobiographical speech topic would induce a moderate amount of anxiety. 204 college students completed an online survey and were asked to evaluate 12 separate hypothetical public speaking task situations. Participants were asked to imagine that they will be giving a speech in front of an audience, with five minutes to prepare the videotaped speech. The structure of each vignette remained the same for all vignettes (e.g., time given to prepare for speech, speech will be videotaped, etc.), except for manipulations of the presence of audience, (i.e., an audience present or not), and public speaking topics. Contrary to our hypothesis, there was no effect of audience present on participant ratings of perceived distress. The polemic and scientific article review public speaking task topics were rated as most distressing, and the autobiographical task rated as the most relatable to real life. Therefore, future experimental research should utilize autobiographical public speaking task topics. This research can lead to development of future interventions to alleviate the stress and anxiety experienced by people faced with an intense fear of engaging in public speaking.

YWCA - Ready To Learn Program Review and Data Analysis Project

Quincey Krein and Linh Hoang

Jeffrey Brown, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Children lacking proper cognitive and social stimulation early on have a disadvantage when they begin school (e.g. Burger, 2010). For children in immigrant families, this is crucial; their additional needs for adaptation to a society and language differ from those of their caregivers. Early pre-academic, social-emotional, and English language preparation will increase their chance for success when they enter American schools. School readiness- defined in terms of social emotional, communication, gross and fine motor, problem solving, personal, and social skills- strongly predicts later school achievement and behavioral difficulties within the school environment. Using the Ages and Stages Questionnaire (ASQ), this project aims to assess outcomes of the YWCA of Mankato, Minnesota's Ready to Learn program for immigrant families in the Mankato area (Bricker et al., 1999). The ASQ scale measures major developmental milestones in young children. The program's scope includes approximately 30 immigrant families; the Ready to Learn program consists of teaching pre-academic skills to children before they reach school age. These essential pre-academic skills foster positive long-term academic and social-emotional outcomes (e.g. Dowsett, Huston, Imes, & Gennetian, 2008; Johnson, Padilla, & Votruba-Drzal, 2017). It was anticipated that children who go through the ready to learn program will finish the program with higher ASQ scores from before they began and therefore have more developed kindergarten skills to be more prepared. This poster will present results from the Ready to Learn program, and associated ASQ assessment data to review how family outcomes have changed over a two month period.

The impacts of UV-B radiation and litter placement on the microbe community structure of *Typha angustifolia* detritus.

Kaitlyn Kuehn

Timothy Secott, Faculty Mentor, Biology (Science, Engineering and Technology)

Christopher Ruhland, Faculty Mentor, Biology (Science, Engineering and Technology)

Erin Moseman, Graduate Mentor, Biology (Science, Engineering and Technology)

Microbial activity plays a vital role in transforming refractory carbon sources into soil humus. During the stages of decomposition, carbon structures change eliciting a reconfiguration of detrital microbe community structure. For example, ultraviolet (UV) radiation photodegrades lignin compounds, a refractory phenol, into more labile carbon sources for further microbial use. However, little is known how photodegradation influences a change in microbial community structure. Therefore, we investigated how varying levels of ultraviolet-B (UV-B) influences the microbial structure of narrow-leaf cattail (*Typha angustifolia*) leaf litter. Plant material was exposed to near-ambient UV-B radiation (Aclar) and reduced UV-B (Mylar) at two different sample placements (standing or fallen) over the course of 180 d. Biologs were used to house plant-microbe samples and microbial colonization was measured through fluorescence. Detrended correspondence analysis (DCA) analyzed the qualitative trends of changes in microbial community along environmental gradients. DCA revealed that UV-B exposure affected microbial community structure in fallen plant material treatments. However, UV-B had little influence on microbial communities associated with standing plant material. No clear patterns were observed within aclar treated groups nor within mylar treated groups.

Sex Trafficking and Misleading Research: A Critical Analysis

Elliott Kunerth and Kelsi Pettit

Eric Sprankle, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Alexander Twohy, Graduate Mentor, Psychology (Social and Behavioral Sciences)

This critique analyzes the findings of a 2016 study published by the University of Texas, Human Trafficking by the Numbers: The Initial Benchmark of Prevalence and Economic Impact for Texas, by Busch-Armendariz. Through examination of the poorly constructed methods used in identifying victims of youth of sex trafficking, this critique challenges the study's misleading findings. The report cited seven studies on at-risk youth (homeless, in foster care, etc.), which found an average of 25% who have sold sexual services. By multiplying the number of at-risk youth in Texas by 25%, 79,000 victims of minor and youth sex trafficking were identified. However, many “youth” in the studies were over the age of 18. This is problematic for several key reasons, as it includes the experiences of many legal adults working in the sex industry through their own free will and portrays all of them as being inherently victimized, coerced, or trafficked into the industry. Furthermore, none of the study's secondary sources specified whether the participants had a pimp or adult trafficker, which makes the assumption all youth in the sex industry are working for adults, whereas many are working independently. This critique suggests using a concrete method for determining victimization, such as strict definitions of youth and trafficking. In the future, better, more exclusive research methods will generate more accurate results, working to eliminate misconceptions and eradicate the social stigma that blurs the boundary between independent, consensual sex work and clearly defined instances of sex trafficking.

Impact of Recreational Activity Before Literacy Intervention with Elementary Students

Emily LaCasse and Meghan Gavin

Megan Mahowald, Faculty Mentor, Communication Disorders (Allied Health and Nursing)

This project aims to compare and contrast the literacy gains made by two third grade students who participated in Rec N' Read Literacy Intervention Sessions. Rec N' Read sessions occur once a week for an hour and a half. These sessions begin with thirty minutes of recreational activity coordinated and supervised by future recreation professionals (specifically recreation therapists). The remaining hour is spent working on literacy techniques through one-on-one and group intervention. During the literacy intervention, participants work on skills such as word work, comprehension strategies, reading and writing skills.

Data for this research was gathered through the administration of pre-assessment evaluations (including informal and formal language, reading and writing assessments), bi-weekly probe data (on reading and writing skills), and post-assessment evaluations. We aim to understand the influence of recreational activity on gains made during literacy intervention.

Applying Tootling to Special Education

Jenna Macziewski

Carlos Panahon, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Alexandra Panahon, Faculty Mentor, Special Education (Education)

Jannine Ray and Kennedy Alstead, Graduate Mentors, Psychology (Social and Behavioral Sciences)

Achieving a positive environment in a special education classroom can be difficult. Students in special education, particularly those with Emotional and Behavioral Disorders (EBD), are likely to exhibit problem behaviors and a lack of strong social skills, which may lead to disruptive behavior in the classroom. Tootling is a class-wide intervention in which students are encouraged to monitor and report prosocial behaviors in the classroom (e.g., sharing with another student). The intervention helps students focus on acceptable behaviors, rather than problem behaviors. The class works together to report prosocial behaviors to earn a reinforcement (e.g., cookie party). Utilizing a tootling intervention may reduce disruptive behaviors and improve the quality of social interactions. One special education classroom consisting of students with EBD will be used. This study will use an ABAB design. In the first phase (A), researchers will observe and record rates of appropriate and inappropriate behaviors using momentary time sampling. During the second phase (B), the tootling intervention will be implemented by the teacher. Researchers will again observe and record rates of appropriate and inappropriate behaviors. The third phase (A) will replicate the first phase, and the fourth phase (B) will replicate the second phase. The students will report their peers' prosocial behavior and place tootles in a box. The special education teacher will read aloud previous day's tootles. Upon reaching their goal, they will receive a reward. It is hypothesized that during the tootling phases, there will be an increase in prosocial behavior and decrease in disruptive behavior.

The Importance of Leader Confidence for Group Member Satisfaction

Natosha McClain

Emily Stark, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Group work is a common method for task completion that is utilized in many settings. According to Jansen (2012), there are many benefits of group work. However, Whitman et al. (2010) found that group members must be satisfied with their work to be productive. For this reason, researchers have examined factors that may lead to greater group satisfaction. Ennen, Stark, and Lassiter (2015) found that higher levels of trust in group members lead to higher levels of group satisfaction, while Lambertz-Berndt and Blight (2015) found that leadership traits such as cooperativeness and assertiveness lead to greater group satisfaction.

In the current study, participants independently completed a questionnaire about past leadership experiences and leadership ability. Then, participants worked in groups to imagine they were the leadership team of Psychology Club and create club goals with events, action steps, resources, and a timeline to achieve those goals. They were only given 15 minutes to brainstorm goals and events. Finally, participants independently filled out a questionnaire about group trust and satisfaction.

We hypothesize that groups with leaders who rate their leadership ability as high will be more satisfied with their results than groups with leaders who rate their leadership ability as low. This information will be beneficial for individuals who want to create productive and satisfied groups. This knowledge will also provide information on how to be an effective leader.

A Comparison of Mindfulness Techniques to Reduce Anxiety in a University Setting

Brennah McCorkell

Shawna Petersen-Brown, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Carlos Panahon, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Megan Johnson, Graduate Mentor, Psychology (Social and Behavioral Sciences)

Undergraduate students are prone to high levels of stress, and stress is likely to result in negative outcomes for these students, including reduced self-esteem and poor health habits (Hudd et al., 2000). With this being said, identifying effective interventions for stressed undergraduate students is critical. Mindfulness-based interventions (MBIs) could have potential benefits for coping with stress. MBIs emphasize the regulation of attention with a focus on being present, open, and accepting, which can help reduce stress (Carsley, Heath, & Fajnerova, 2015). MBIs have been found to be effective in decreasing stress and anxiety levels in college students. There is a lack of research on MBIs within the university setting, suggesting that more research is needed prior to their use. There is not only a need to add to the research investigating MBIs in a university setting, but there is also a need to compare MBIs to other accepted methods of reducing stress and anxiety, including stress reduction seminars which include psychoeducation and relaxation training. Our study will utilize a randomized group design with a pretest and posttest as well as two groups: MBI and a stress reduction seminar. We hypothesize that anxiety levels will be reduced the most in the seminar condition. This is because the participants will be learning actual skills that they can apply to their lives and use to reduce everyday stress rather than simply coloring in a mandala. Preliminary results and implications for the findings will be discussed.

Steroid Hormone Induced Plasticity in the Forebrain Region of Green Anole Lizards

Kyle Mercer and Mohannad Alhuwaish

Rachel Cohen, Faculty Mentor, Biology (Science, Engineering and Technology)

Testosterone has distinct effects on seasonal brain morphology and behavior. Our animal of interest, the green anole lizard, *Anolis carolinensis*, is known for reproductive displays such as extension of the dewlap, a red throat fan, aggressive behavior such as defending territory against other males, and pushups. These behaviors are observed during the breeding season, but not in the non-breeding season. Forebrain areas that are being studied include the preoptic area (POA) which facilitates masculine reproductive behavior under androgen treatment, and the ventromedial hypothalamus (VMH) which facilitates female reproductive behavior. These areas are also known to change volume seasonally, but the specific mechanism is unknown. Our experiment seeks to understand the mechanism by which steroid hormones act on nuclei in the forebrain to induce seasonal differences. Our experiment was conducted on gonadectomized breeding season males. Steroid hormones were then introduced through a long acting implant, supplying testosterone, DHT, estradiol, or vehicle. We expect to see soma size and cell proliferation in steroid hormone treated lizards to be restored to breeding season levels within the POA and the VMH, as has been shown in previous work. Future studies may include measuring the distances between neurons, dendritic branching, or glial cell counts, which may explain changes in brain area volumes. It is likely that steroid hormones are critical for maintenance of breeding season morphology; however, it is also predicted that there may be other factors contributing to soma size and cell proliferation.

Exploring How Recreation Impacts Behavior and Outcomes of Literacy Intervention

Madison Mueller and Mackenzie McCarthy

Megan Mahowald, Faculty Mentor, Communication Disorders (Allied Health and Nursing)

The purpose of this research project is to explore how a recreation activity conducted before a literacy intervention session impacts behavior throughout literacy intervention and literacy outcomes. Two participants were enrolled in Rec N' Read Literacy Sessions which included 30 minutes of small group recreation activities and 60 minutes of individual literacy intervention. One participant received individual literacy intervention in a typical clinical session. Both literacy intervention programs were based around the following key steps: word work, read with, write with, and talk with. The data collected included: behavioral charting, probe data, and comparing pre-intervention and post-intervention literacy assessments.

Vascular Morphology in Normotensive and Hypertensive Rat Eyes

Hannah Murphy and Keshari Sudasinghe

Michael Bentley, Faculty Mentor, Biology (Science, Engineering and Technology)

Vasculature changes induced by hypertension have been previously studied because hypertension is a prominent risk factor for many cardiovascular and renal diseases. The effects of hypertension on the vasculature of the eye, however, has not been extensively studied and could be important for diseases such as glaucoma. In this experiment, hypertensive and normotensive rat vasculature will be examined for differences in structure. If there are to be differences, we hope to find them especially in the aqueous humor drainage pathway, which is where drainage can cause issues and can lead to glaucoma. To study the vasculature of the eye, we will prepare vasculature casts by injecting Mercox plastic resin into the cardiovascular system and then remove the excess tissue with KOH. The casts will then be examined by scanning electron microscopy for differences between the normotensive and hypertensive rat eyes.

Bromoxynil octanoate affect on bacterium *Acidovorax facilis*

Erik Olson

Steven Mercurio, Faculty Mentor, Biology (Science, Engineering and Technology)

Bromoxynil is the second most applied herbicide (mass vs. acreage) will be tested for its effect on the soil nitrogen reducing bacteria, *Acidovorax facilis*. This is a free living aerobic soil bacterium. The study will consist of three test groups including a control receiving distilled water, an acetone and water mixture group and a group of acetone, water and bromoxynil treatment group. The EPA's limit on bromoxynil is 0.5 lbs. per acre which equates to 0.58 mg bromoxynil per 4 in. square glass vase. Each of the 3 experimental groups will have 3 replicates. Due to the low solubility of bromoxynil, it will be dissolved in 30 ul acetone (solubility 1.2 mg/ul) and then added to 100 ml water and added to the soil samples. Bacteria will be cultured in ATCC medium 72 at 30°C for 2 days. Bacteria will be counted after incubation. To analyze change over time, 1g samples from all groups will be taken after bacteria are added to the soil, after liquid treatment has been added, two weeks after treatment and one month after treatment. The expected result is reduced plate count between pretreatment to one month after treatment comparing control and bromoxynil treatment groups. Results of the experiment will show if important nitrogen cycle bacteria are reduced in fitness and thus reduce soil quality in agricultural land. Bromoxynil is present in soil for about 60 days after application which would reduce soil health into the growing season.

Dissecting the Role of serum Growth Hormone in the Regulation of Brain Igf-1

Anjola Onadipe and Madison Burandt

David Sharlin, Faculty Mentor, Biology (Science, Engineering and Technology)

Congenital hypothyroidism, a condition in which there is an insufficient amount of circulating thyroid hormone starting at birth, results in permanent neurological deficits. Interestingly, low Insulin-like growth factor 1 (Igf1) from birth results in similar neuroanatomical and cognitive deficits to that of congenital hypothyroidism. Furthermore, it has been demonstrated that thyroid hormone regulates pituitary growth hormone production and that pituitary-derived growth hormone regulates serum Igf1. However, it is unclear whether pituitary-derived growth hormone (GH) regulates local brain-derived Igf1. If reductions in brain Igf1 are related to deficits associated with low thyroid hormone, then recovering brain Igf1 may potentially help to normalize brain development. To test this idea, four groups of mice were used: euthyroid+saline, euthyroid+GH, hypothyroid+saline and hypothyroid+GH. Methimazole, a thyroid hormone inhibitor was delivered through water to pregnant dams starting on embryonic day14 (E14) to induce developmental hypothyroidism. Euthyroid and hypothyroid pups were injected with saline (vehicle) or GH from postnatal day 1 (P1) to P7. Pups were sacrificed on P7 and the brains and serum were collected. Preliminary results indicated that treatment had no effect on pup body or brain wet weights. The effect of treatment on serum GH concentrations will be measured using the enzyme-linked immunosorbent assay (ELISA). On-going experiments are quantifying brain Igf1 mRNA from total mRNA isolated by micro-dissection using SYBR-Green based quantitative real time-PCR. These findings will determine whether circulating levels of growth hormone regulate brain Igf1 mRNA levels, and whether thyroid hormone is an important factor in the expression of brain-derived Igf1.

Biofilm Activity in Methicillin-Resistant Coagulase Negative Staphylococci

Collin Palmer and Ofelio Zavala

Timothy Secott, Faculty Mentor, Biology (Science, Engineering and Technology)

Methicillin resistance in staphylococcal infections is a significant concern because of the very limited availability of antimicrobials that are available to treat infections caused by these organisms. We have repeatedly detected methicillin resistance in coagulase-negative (non-*S. aureus*) staphylococci (CNS) isolated from students in Medical Microbiology, indicating that these weakly-pathogenic organisms can serve as a reservoir methicillin resistance. We wanted to determine if these organisms could also harbor genes for biofilm formation, enabling these organisms to colonize hosts more efficiently. Methicillin-resistant CNS were assayed for their ability to form biofilms using a static biofilm assay. Of eight CNS isolates tested, four were observed to form biofilms. Polymerase Chain Reaction testing for *ica* genes, those associated with *S. aureus* biofilm formation, revealed that all biofilm-positive isolates also contained *ica* genes. We conclude that not only may CNS act as a reservoir for antimicrobial resistance, but that acquisition of virulence genes such as those associated with biofilm formation may result in the evolution of previously avirulent organisms into those capable of causing significant disease.

Quantifying Cochlear Nerve Myelination in Mice Lacking Thyroid Hormone Transporters

Stephanie Peterson and Marissa Swenson

David Sharlin, Faculty Mentor, Biology (Science, Engineering and Technology)

Thyroid hormone (TH) is essential for development of many organs and tissues, especially nervous tissue. Without access to TH, the architecture of neuronal tissue develops improperly, leading to functional deficits in neurons. One disease where this is the case is Allen-Herndon-Dudley Syndrome (AHDS), which is caused by mutations in the MCT8 gene. MCT8 mutations lead to severe psychomotor retardation, with global developmental delays and severe intellectual disabilities. Mice lacking two TH transporters - Mct8 and Oatp1c1 - that facilitate TH uptake and efflux across the cell membrane, model AHDS. Recently, we found that mice lacking both transporters have normal cochlear development, but display delayed auditory signaling. Thus, our experiments aim to test the hypothesis that auditory deficits observed in mice lacking Mct8 and Oatp1c1 is due, in part, to altered myelination of the auditory pathway. Our previous work using FluoroMyelin staining revealed decreases in myelin throughout the cochlea in double knockout mice. However, to quantitate myelin changes, we are using qRT-PCR to directly measure myelin associated glycoprotein (MAG) mRNA levels in cochlear and peripheral nervous tissues. Based on our Fluoromyelin observation, we expect to observe decreased MAG mRNA within the cochlea, supporting our original hypothesis. Overall, this research will further define the need for TH transporters in development of normal auditory function. Understanding the mechanism involved in this process may help those who suffer from AHDS, leading to a better quality of life for these individuals and many others who also have auditory deficits due to low TH.

Who is a Liar? Using Behavioral Cues to Detect Deception

Melissa Printup

Emily Stark, Faculty Mentor, Psychology (Social and Behavioral Sciences)

Previous research has delved into the concept of lie detection to answer the main question: can humans accurately perceive when someone is lying? Research has found that humans, without proper training, have no better chance at determining a lie than determining whether a coin flip will be heads or tails. On average, humans are able to detect 47% of lies and 61% of truths (Bond & DePaulo, 2006). Ekman and O'Sullivan (1991) found that those who were more accurate at detecting lies focused on behavioral clues more than anything else. The current study asks participants to view videos of people telling true stories and lies to see if they can correctly identify the lies. We expect the participants to not score above chance at lie detection, but we do expect that people who report using behavioral cues to determine deception will score higher than those who do not. This work is useful for a wide range of professions and interpersonal situations where determining accuracy and honesty is important.

Cyberbullying In Adolescents

Carleigh Pula

Brooke Burk, Faculty Mentor, Recreation, Parks and Liesure Services (Allied Health and Nursing)

As a child grows up, they might be subject to being a bully or a victim of bullying. Bullying can come in all forms or be specified into one type of bullying. They could be bullied in school, online or be bullied in both places. Some children can't ever escape their bullies. Many factors may also play a role in who gets bullied or why. Some contributing factors may be race/ethnicity, age, appearance, family influences and technology use. Some of these factors may make your chances of being bullied or being the bully higher, while others may have a lower chance because of where you fall in some of these categories. No one should be a victim of bullying and no one should ever think that putting someone down physically or emotionally is a good outlet to bully and is justified. In this research study we were looking at 16-18 year old males and females who participate in leisure activities. Throughout this research, characteristics of bullies and victims are identified, family influences are looked at to see if it has an impact on making a bully or a victim, and social media interaction is researched on its implications and impacts that it has on bullies and victims. The overall theme from the interview data for adolescent bullying showed that cyberbullying is the most prominent outlet for bullying others.

Genesis of the Magenta Zone, Northmet Copper-Nickel-PGE Deposit, Minnesota

William Qualls

Steven Losh, Faculty Mentor, Geology (Science, Engineering and Technology)

The Magenta Zone is part of a large Cu-Ni-Platinum Group element deposit located in Northern Minnesota. The sulfide mineralization of the Magenta Zone cuts through existing igneous rock layering (e.g., Units 3, 4, 5, and 6). Previous research concluded the Magenta Zone did not form due to hydrothermal fluids reprecipitating sulfides in a discordant zone nor is it related to a dike that cuts across existing layers. We tested the hypothesis that the mineralization was caused by late magma that was injected into a partly-crystallized “mush” of mineral grains. If this magma were compositionally different from that which crystallized the older “mush”, we might expect to find compositional zoning in minerals, such as olivine, crystallized from that magma. Preliminary line-scan SEM data shows that there is little to no zoning of olivine grains, which might mean that the injected magma had the same composition as that associated with the “mush.” Because injection of sulfide-bearing magma might also produce variations in the ratio of Pd to Cu in sulfides that crystallized along its flow path (because Pd and Cu separate differently between magma and crystals), we examined numerous maps and cross sections through a 3D geochemical model of the deposit. These images show varying patterns of Pd/Cu ratios relative to faults that might have acted as conduits for the magma. We are continuing to obtain data that bear on the origin of this intriguing feature known as the Magenta Zone.

Using Co-Immunoprecipitation to Assay Binding Between Vpx and APOBEC3A

Jacob Rachuy

Allison Land, Faculty Mentor, Biology (Science, Engineering and Technology)

APOBEC3A is a catalytically active DNA cytosine deaminase expressed in monocyte immune cells. This function allows APOBEC3A to mutate and restrict viruses, potentially including HIV. HIV-1, the causative agent of the major HIV/AIDS pandemic, is incapable of infecting monocytes. HIV-2, a less common variant, is capable of infecting monocytes. The unique protein Vpx, produced by HIV-2, but not HIV-1, is thought to be responsible for allowing HIV-2 infection in this immune cell. The objective of this study is to determine whether HIV-2 Vpx can counteract APOBEC3A. We hypothesize that HIV-2 Vpx binds directly to APOBEC3A, and then targets APOBEC3A for proteasomal degradation. Co-immunoprecipitation was utilized to test for APOBEC3A-Vif binding. Human 293T cells were transfected with both Vpx and APOBEC3A. After allowing time for protein expression, the cells were lysed and Vpx was immunoprecipitated using antibody bound to magnetic beads. A known Vpx binding protein, DCAF-1, was probed for to ensure that our co-immunoprecipitation protocol was working. Additionally, we probed for APOBEC3A to determine if it was co-immunoprecipitated with Vpx, which would indicate that Vpx binds APOBEC3A in cells. This project will contribute to our understanding of the innate immune response to lentiviral infection.

Spray Polyurethane Foam in Remodeling and New Construction

Brandon Ranum

Brian Wasserman, Faculty Mentor, Construction Management (Science, Engineering and Technology)

Polymers have become increasingly important as engineering materials. Having a wide range of uses in the construction industry, society finds itself heavily influenced by the innovations we make in polymers because of the impact they have in industries such as fibers, plastics, adhesives, sealants, and caulking. Ease of fabrication makes it possible to produce finished items very economically. Some of these cost-effective solutions include resolving common defects in building materials, energy production costs, can make the building structure portable, improves thermal and sound insulation, consists of environmentally friendly building materials, and the help in the reinforcement of historical structures and monuments. Polymeric Foams are usually gas multi-phase material systems that expand into cellular products that have the ability to be used commercially. Well known examples include PVC, phenol-formaldehyde and polyurethane. SPF or Spray polyurethane foam is a relatively recent innovation to the construction industry, which is derived from the use of polymer compositions. It was first introduced to the construction industry in the 1980s as a means for insulation. Having many practical uses to a building SPF provides thermal resistance; blocking conductive, radiant, and convective heat transfer. Looking to the future, SPF is most likely to be one of the leading building materials in the forefront of innovative insulation methods for the built environment.

Women and Goals in 2016 Hollywood Films

Lauren Reiman

Laura Harrison, Faculty Mentor, Gender and Women (Social and Behavioral Sciences)

Gender representation in Hollywood films has been unequal since the inception of filmmaking. When female characters have leading roles, they often have goals that are about pursuing a man or supporting a man. In this project, I examine the goals of characters in the 2016 films *Rogue One*, *Captain America: Civil War*, and *Deadpool*. Specifically, I look at how gender, race, class, sexuality, ability, and age impact what a character's goal may be, and also if the female characters' goals are independent to the goals of the male characters. I completed a feminist media analysis of the films. I hypothesize that female characters will be more likely to have goals related to marriage and family than male characters, and that female characters will be more likely than male characters to have a goal dependent on a male character. In film, it is important to have diverse characters who have goals. It is empowering to see yourself represented, and it sends the message that you are important and you can do what you set your mind to. Additionally, if you are part of the majority and see a marginalized character with goals in a movie, this helps create understanding and empathy towards those diverse characters and shows that these characters are able to accomplish those goals, such as saving the world.

Is Critical Thinking Critical

Joshua Rem

Emily Stark, Faculty Mentor, Psychology (Social and Behavioral Sciences)

In today's world, critical thinking is a priceless tool, according to many employers and teachers, but does it predict performance on a task? A study by Kettler (2013) suggested that students with higher critical thinking scores have a tendency to be more adept at learning. This study was comparing the relationship between cognitive ability, academic achievement and critical thinking. The study found a positive correlation between academic achievement and critical thinking measurements. Students with a higher academic record tended to score higher on the critical thinking tests. The current research examines potential connections between college students' ability to critically reason about flawed research and their overall academic performance and attitudes. We expect that students with high GPAs and those who put more effort into studying will show greater ability to think critically about research. This is important to study because if critical thinking is something that can be taught or learned, it can potentially positively influence a person's academic prowess.

Dynamic vs. Static Stretching on Vertical Jump Performance

Callie Rohlik

Jessica Albers, Faculty Mentor, Human Performance (Allied Health and Nursing)

The purpose of this study was to compare the affects of dynamic stretching and static stretching on one's vertical jump performance, to determine which stretching technique is most beneficial in increasing one's vertical jump height. "Static stretching is performed by placing muscles at their greatest possible length and holding that position for a period of time" (Bandy et al., 1997). Dynamic stretching is performed by actively moving a muscle through its range of motion, instead of holding the muscle in a timed stretch (Behm & Chaouachi, 2011). The study includes twenty male and female student participants that range in age, height, weight, physical activity, and fitness level. Each participant attended two sessions and was randomized regarding which stretching technique they performed in either session one or session two. In each session, the participant was taped at specific anatomical joints, for recording and data collection purposes, and was recorded, at a lateral view, performing a vertical jump prior to stretching. Participant was then instructed to perform either four different dynamic stretches or four different static stretches, depending on their randomized protocol for that session. Following the stretches, the participant was again recorded, at a lateral view, performing a vertical jump. Data was evaluated using Kinovea and Microsoft Paint to determine the vertical displacement of each participant's hip joint during their vertical jump both prior to stretching and following, for both sessions of each participant.

Data is currently still being collected therefore the results and conclusion of this study is undetermined.

Der Alte Fritz: Rendition of a Prussian King in Contemporary German Society

Alyssa Roushar

Nadja Kramer, Faculty Mentor, German (Arts and Humanities)

This presentation looks at the well-known Prussian King Frederick the Great (1712-1786) who ruled his German kingdom from 1740-1786 which is the longest reign of any Hohenzollern king. Frederick is associated with an enhanced militarism, by winning wars and expanding territories, and establishing Prussia as an entity of strong military power. Considering the damaged German past during World War I and II especially by the devastating Nazi force, these are not desirable qualities. Yet still, he is pedestalized in present-day Germany. Why is this? How is he represented in modern, unified Germany- specifically in Berlin, his place of residence? What is his influence in society today? The project provides insight into the representation of Frederick in modern Germany society through monuments and how his memory is kept alive.

Scaffold Manufacturing by 3D Printing: Cobalt Chrome - Hydroxyapatite Biocomposite

John Ruprecht

Kuldeep Agarwal, Faculty Mentor, Manufacturing Engineering Technology (Science, Engineering and Technology)

Scaffolds are 3D biocompatible structures that mimic the extracellular matrix properties (mechanical support, cellular activity and protein production) of bones and provide place for cell attachment and bone tissue formation. Their performance depends on chemistry, pore size, pore volume, and mechanical strength. Recently, additive manufacturing (AM) has been used as a means to produce these scaffolds. This project explores a new biocomposite manufactured using Binder Jet AM process. Cobalt Chrome and hydroxyapatite are combined to form a composite and used in different volume fractions to produce parts with varying densities. Layer thickness, sintering time and sintering temperature are varied to study the effect of process parameters on the microstructure, dimensions and mechanical properties of the resulting structure. It is found that the resulting biocomposite can be tailored by varying the process to change its properties and mimic the properties of scaffolds in bone tissue applications. The Binder jet process involves multiple nozzles depositing very fine droplets of binder which interacts with the powder material. This interaction can affect the geometry and the resulting properties in multiple ways. This project explores this interaction and shows how this process can be used in the future of scaffold manufacturing.

The effects of diet on resource value in invasive *Pholcus manueli*

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Invasive species displace native species through various means including preying upon the native species. In Southwest Ohio, *Pholcus manueli* have begun displacing the native *Pholcus phalangioides*. *P. manueli* were a hereto unknown species in the area. Their native habitat and how they are displacing *P. phalangioides* is unknown. It has already been shown that in normal (lab controlled) circumstances, *P. phalangioides* wins or ties any aggressive interactions with *P. manueli*. We investigated whether diet in *P. manueli* may affect the results of the aggressive encounters. *P. manueli* were given either High or Low food diet. After the diet *P. manueli* were introduced to the containers of the *P. phalangioides* and were observed for aggressive behaviours and placement in the container at the end of the observational period. Size difference between the spiders was the predominant factor in all interactions. When included as a covariate, the diet provided to *P. manueli* was important; specifically, when *P. manueli* were well fed the *P. phalangioides* was more likely to initiate contests earlier and more often. Despite this apparent aggressiveness, the contesting spiders ended up sharing the web more often under these circumstances. This suggests the success of *P. manueli* may have to do with their interactions with juvenile *P. phalangioides*.

Using Site Directed Mutagenesis to Describe the SIV Vif Interaction with APOBEC3B

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APOBEC3B (A3B) is part of a family of cytosine deaminases found in most mammals that can fight viral infections, like HIV lentivirus, by creating mutations in the viral genome to restrict the virus. Many lentiviruses encode the protein Viral infectivity factor (Vif), which targets the A3 proteins for proteasomal degradation. A3B is upregulated in certain cancers, such as bladder, breast, and throat cancer, and causes mutations in the human genome leading to increased tumor progression and recurrence of cancer after treatment. Previous research indicates that Vif from SIVmac239, an immunodeficiency lentivirus related to HIV that infects rhesus macaques, targets human A3B for degradation. The goal of my project is to determine where Vif protein binds A3B. APOBEC3F (A3F) in rhesus macaques, closely related to human A3B, is resistant to SIVmac239 Vif. I used site-directed mutagenesis to swap coding sections of A3B DNA with coding sections of A3F DNA based on amino acid alignment. The mutagenesis was accomplished using back-to-back (non-overlapping) PCR primer pairs. One primer of each pair contained the desired substitution and 10 complementary nucleotides. The other primer was completely complementary. After PCR amplification, the plasmids were cloned into *E. coli* and confirmed by sequencing. These A3B and A3F chimeric constructs will be cotransfected with Vif into mammalian cells, and degradation by Vif will be assessed by immunoblot. By finding A3B constructs that become resistant to Vif degradation when the homologous region of A3F is swapped in, we will identify the region(s) on A3B that are bound by Vif.

Assessing the role of UV-B radiation and litter position on UV-absorbing, bulk-soluble phenylpropanoid concentrations in *Typha angustifolia*

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Plant phenylpropanoids are secondary metabolites produced via the Shikimate Pathway and act as a protective sunscreen for terrestrial and aquatic plants. These phenolics are essential in deterring herbivory, pathogen-attacks and inhibiting decomposition. Narrow-leaf cattail (*Typha angustifolia*) is an emergent, invasive hydrophyte prominent in Minnesota's wetlands. Decomposition of cattail is a major contributor to biogeochemical cycling in these systems. Therefore, understanding how this material breaks down is important for quantifying carbon fluxes in wetlands. Senescent litter persists throughout the winter months when microbial decomposition is presumably low and limited by temperature. Litter is exposed to sunlight throughout the season and how visible and ultraviolet (UV) radiation influences the breakdown of this material is unknown. We examined how concentrations of bulk-soluble UV-absorbing phenylpropanoids in cattails changed over time when exposed to near-ambient and reduced UV irradiance. We compared litter placement (standing vs. fallen), as much of this material is lodged during winter months. Litter was placed in bags that either transmitted 85 ("Aclar") or 2.8% ("Mylar") of ambient ultraviolet-B radiation (UV-B) for 225 d. Concentrations of phenylpropanoids were measured spectrophotometrically at 300 and 375 nm. Over the course of the experiment, litter lost significant amounts of soluble phenolics and on average, standing litter lost 19% more of these compounds than fallen litter. Standing litter placed in Aclar bags lost 53% of their initial phenolics, which was higher than all other treatments. Exposure to UV-B, especially during the winter months, may prime litter for leaching of bulk-soluble compounds.

Assessment of Clearing Methods for Confocal Microscopy of Eye Tissue

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Clearing methods facilitate viewing of tissue samples with confocal microscopy. Clearing methods are based on refractive indices of tissues. The eye's sclera is a difficult tissue to clear because it is rich in collagen. Our goal was to clear samples of the sclera from pig eyes; we compared the refractive index (RI) of collagen to the RI of popular clearing methods in order to decide which to use. The six methods we tested were xylene, methyl salicylate, two formulations of fructose, and two formulations of benzyl alcohol and benzyl benzoate. The conclusion of our work is that a mixture of benzyl alcohol and benzyl benzoate was most effective at clearing collagen-dense tissue. Moving forward, we will need to engineer a special chamber in order to view these samples under confocal microscopy because there is a possibility of damage to the confocal optics.

Nuclear Power: The Solution to The Energy Crisis

Kafile Kaab Shamoon

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As concern for the environment gets greater, particularly in terms of fossil-fuel consumption and carbon emissions, nearly all developed countries and their institutions are scrambling to come up with a viable source of energy for the planet. Currently only 19.7% of the total energy output in the US comes from nuclear power compared to other developed countries such as France (72.3%), Belgium (51.7%), Sweden (40%), and Switzerland (34.4%). In contrast about 30% of the US energy output comes from coal which creates the most pollution compared to other fossil fuels. The only country that uses more coal than the US is China where it accounts for 64.9% of total energy produced. Although, it does have 32 nuclear reactors under construction, the highest in the world.

My research aims to look into the practicality of building new power plants so that a larger percentage of the total energy output can come from nuclear power as well as discuss some of the common safety concerns. My findings are based on pre-existing statistics published by the New Scientist, International Energy Agency, World Nuclear Association, and the UN.

In conclusion, nuclear energy is cleaner and safer than current conventional energy sources; unlike other green sources of energy like solar and wind, it produces a constant, reliable, and plentiful supply. Most importantly, the technology and infrastructure needed to produce and provide nuclear energy already exist making it the most practical choice for a sustainable future.

Sustainable Cement

Joshua Sheahan

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Over two billion tons of concrete is used worldwide annually. The large amounts of uses, benefits, advantages, and long life span of concrete is why it is so important that it becomes as sustainable as possible. In a survey of Portland Cement Association, an average of 2044 pounds of CO₂ is emitted for every 2205 pounds of Portland cement produced in the United States. Reducing CO₂ emissions is the main concern now that research shows there are multiple ways to improve the environmental efficiency of concrete. Reducing the cement used in the mixture, using plastic reinforcement instead of steel, and using other recycled or alternative admixtures are options that can reduce the CO₂ emission by up to fifty percent. Even though there are more pollution heavy and resource consuming materials out there, due to how much concrete is used it needs to be something that is highly sustainable.

Improving Idea Selection in Brainstorming using GLOMO

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A significant amount of research has been concentrated on identifying factors that would increase the variety and creativity of a brainstormed list. Although there is importance in the amount of average creativity within a brainstormed list, the brainstorming process does not conclude at that point, and further expands to the motion of selecting an idea(s). Selection of an idea from a brainstorming list is the second stage that some current research has placed focus on (Faure, 2004). This research has suggested that people tend to not select their most creative and effective ideas. Furthermore, as of this idea, no interpositions have been proposed to enhance the selection process (Rietzschel, Nijstad & Stroebe, 2006; 2010). It is the goal of this current research to expand from this idea, and utilize the Global vs. Local Processing Model to indicate that local cognitive (detail focused) processing leads to more effective idea selection after the initial idea generation stage of brainstorming. This is opposed to the idea of global processing, otherwise identified as abstract and/or holistic focused processing, which will lead to less effective idea selection. Through an online survey, participants were exposed to imagery that would prime them locally or globally before selecting ideas from a pre-brainstormed list. When engaging in global processing, it is predicted that ideas generated by individuals seem to engage more broad categories, which lacks the detailed focus needed for successful idea selection. This topic has the ability to further research within effective idea selection, which affects many domains.

Flexible Concreate

James Shursen

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Concrete is the lifeline of construction and is the most used material in the industry. It is used for all types of construction because of its high strength. Its weakness is its ability to crack easily when it expands and contracts. Flexible concrete is a new technology that takes out the coarse aggregates that are in normal concrete. Flexible concrete is infused with polyvinyl alcohol fibers that allow it to bend under heavy stress. This makes the concrete less likely to crack and expands the life tremendously. Concrete is something that always has to be redone over time due to it breaking down. With a longer life cycle this cuts down on maintenance costs and creates a more sustainable future. Flexible concrete can also be mixed and placed by the same equipment as normal concrete. They are also working out logistics for allowing regular ready mix trucks to transport this as well. Concrete is so widely used and this is a huge step in improving our buildings and roads for the long haul.

Knowledge & Perceptions of ASD

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Autism Spectrum Disorder (ASD), a condition affecting millions of children and adults, manifests itself in the form of language impairments, social skill deficits, and repetitive behaviors which can all vary widely in their severity. Having a basic understanding of ASD and maintaining an open and welcoming attitude to interacting with individuals affected by ASD is essential for healthy and positive interactions. While ASD is common, it is widely misunderstood among the general population. Therefore, the purpose of this study was to explore levels of knowledge and perceptions of people with ASD among the collegiate population. Data was collected using validated a self-report instrument. A total of 200 students from a single, Midwestern university were selected for the study, using convenience sampling. Descriptive statistics were used to assess overall mean and standard deviation for the knowledge and attitude perceptions. The results showed a mean of 26.2 out of 35 for the total attitude portion, indicating that participants had a positive perception towards interacting with those on the ASD spectrum. The results of the knowledge portion showed a mean of 11.1 out of a total score of 14, indicating there may be areas for improvement. The results of this study show a need for health and education professionals to provide basic information on ASD conditions as well as create training on how to have positive interactions with those who have the condition.

Qualitative analysis of the volatile organic components in beer by gas chromatography mass spectroscopy and solid phase micro extraction

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Dry hopping is responsible for giving beer many of its aromatic characteristics, it is described as the addition of hops near the end of the brewing process prior to bottling. Though trial and error brewers have found the dry hopping period yielding the best results to be around 48-72 hours. Traditional dry hopping period calibration is time consuming and depends on multiple variables such as hops type and human taste sensitivity. Qualitative analysis of the volatile organic components in beer by GCMS (gas chromatography mass spectroscopy) and SPME (solid phase micro extraction) conducted on incipient beer produced identifiable flavor profiles as a function of time, without the need for multiple batches of beer.

Knowledge on Sexually Transmitted Infections (STI)

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Sexually Transmitted diseases (STIs) are on the rise among college going students. This is due to lack of knowledge pertaining to STIs and engaging in risky behaviors. College is a time where many young people are experimenting and taking part in many risky behaviors. The purpose of this study was to assess STI-related knowledge levels among university students. A total of thirty university students completed a previously established 27-question survey, designed to assess various aspects of STI-related knowledge. Subjects were selected via convenience sampling. Descriptive statistics were used to examine knowledge levels and were analyzed using SPSS. The results of the survey showed a mean of 11.70 (SD=4.78) indicating that most of the students do not have sufficient knowledge related to STIs. As knowledge related to STIs is essential for personal health decision making, students would benefit from additional, improved health education programs.

Computational Analysis of Adduct Formation between Benzaldehyde Derivatives and DNA

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Aldehydes have been previously found to be involved in the process of chromosomal aberrations and have the potential to form adducts as a result of DNA interactions. Structural examination of the formed adducts can contribute to the assessment of the level of genotoxicity of the reactive aldehydes as well as allow for the proposal of the reaction mechanism responsible for the formation of adducts. In this study, utilizing computational modeling and density-functional theory calculations aided the structure-property analysis of the adducts in order to yield information necessary to improve our understanding of the biological activity of the investigated benzaldehyde derivatives (cuminaldehyde, p-anisaldehyde, 3,4-dimethoxybenzaldehyde, and vanillin) commonly found in food. The aim of this research was to integrate computational techniques into an experimental study in order to explore the reactivity profiles of the aldehydes as well as determine the structural characteristics responsible for their reactivity toward DNA. Each aldehyde was allowed to independently react with DNA in the presence of L-arginine. The reaction mixtures and adducts were analyzed using HPLC and ¹H NMR so that an extrapolative range of experimental data could be collected and used for further computational studying.

Improving Students' Writing Skills By Providing Choice and Performance Feedback

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Writing is a valuable skill one uses throughout his or her life. Writing lays the foundation at a young age to assist learning in other areas of academics and contributes to success.

Unfortunately, writing has become a neglected skill in schools with 72% of fourth grade students not reaching proficient levels of writing (Hier & Eckert, 2014). This low level of performance highlights the need for improvements in writing instruction. Therefore, it is important for researchers to identify effective interventions that will improve the writing performance of elementary school students. Two interventions, performance feedback and choice, have been shown to improve students' writing skills. The proposed study will contribute to the research on interventions for students struggling in writing by combining these two interventions and evaluating the impact of students' academic productivity. Participants will be third grade elementary school students nominated by the teacher as struggling writers. All participants will be exposed to a control condition and a combined interventions condition. It is hypothesized that students will increase their academic productivity in the combined condition when compared to the control condition. Results of the study and their implications will be discussed.

Qualitative Rubric Scores and Grammatical Complexity in Language Samples

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Megan Mahowald, Faculty Mentor, Communication Disorders (Allied Health and Nursing)

The purpose of this project is to obtain a measure of grammatical complexity language samples that were collected from a school SLP and asked participants to complete five narrative and expository tasks to obtain the language sample. Additionally, we used a qualitative rubric that is used to assess a child's oral narrative skills in terms of language. We explored traditional language sample analysis of grammatical complexity versus a qualitative rubric in order to determine more efficient progress monitoring tools.

Rearrangement of cell-cell junctions in metastatic cells.

Mahala Wolff and Lauryn Hardt

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Actin is a component of the cytoskeleton found in all eukaryotic cells. Actin plays a role in cell mobility, cell shape, division of daughter cells during mitosis, and the stabilization of structures such as striated muscle. Actin is a filament composed of monomers whose assembly and disassembly are mediated by a variety of accessory proteins, such as actin capping protein (CP). CP binds the fast-growing barbed end of the actin filament, preventing subsequent monomer loss and addition. Cancer cells are characterized by uncontrolled growth and the ability to metastasize. In other words, the cancerous cells disengage from neighboring cells, change cell shape, and acquire the ability to invade other tissues. In our current study, we are studying the role of CP in the reorganization of cell-cell junctions in cancer cells (HeLa). We examined the disengagement of cancerous cells, comparing cell-cell junctions of both normal and cancerous cells. Contact structure and actin reorganization was evaluated using fluorescent and scanning electron microscopy. We initially examined a fast, easy growing glial cell line to optimize the experimental conditions including fixative and phalloidin concentration. Western blot analysis confirmed the specificity of CP antibodies, which were subsequently used in immunofluorescent studies. Conjugated fluorescent phalloidin was used to stain actin filaments, and CP specific antibodies were used to visualize the regions of cell contact in both HeLa cells and wild type cells. Results suggest that CP plays a role in the reorganization of cell-cell junctions in metastatic cells.

Arachidonic Acid and Oxidation in the Myosin II Motor Domain

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Myosin is the motor protein responsible for movement and muscle contraction in all eukaryotic cells. The catalytic motor domain of myosin II contains three functionally important subdomains: the actin-binding cleft, the force-generating domain, and the nucleotide binding pocket. The chemomechanical coupling in the myosin catalytic domain allows for hydrolysis of adenosine triphosphate (ATP) into adenosine diphosphate (ADP) and inorganic phosphate (Pi), producing the energy needed for the contraction of muscle. This chemical reaction of ATP hydrolysis in the nucleotide binding cleft must be accompanied by a crucial interaction with actin to allow for the proper production of mechanical force. Various physiological and pharmacological effector molecules interact with myosin specifically in its actin-binding cleft and affect the actomyosin functional interaction. For example, oxidation of a methionine amino acid residue in the actin-binding cleft, M394, decreases myosin's actin-activated ATPase activity and changes the structural dynamics of the actin-binding cleft of myosin (1). Conversely, arachidonic acid, a bioactive lipid produced naturally in eukaryotic cells, acts as a positive allosteric effector of myosin and is postulated to bind near the actin-binding cleft of myosin, increasing the rate at which myosin hydrolyzes ATP (2). We have investigated the combined functional and structural effects of oxidation and arachidonic acid on the myosin motor domain in a *Dictyostelium* myosin II model system. Changes in actomyosin functional interaction in the presence of arachidonic acid after in vitro oxidation was assessed using a myosin ATPase activity assay and an actomyosin cosedimentation assay while changes in structural dynamics of the actin-binding cleft was investigated using electron paramagnetic resonance (EPR). The results illustrate the importance of myosin's actin-binding cleft structural dynamics and how allosteric effectors effect actomyosin functional interaction.

The Relationship between Quality of Life and Physical Activity

Liya Yemiru

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The concept of Quality of Life consists of emotional and social aspects of general well-being. These constructs encompass how one thinks, acts, and views the world. Existing literature suggests that exercise/physical activity has a beneficial outcome on quality of life. The study was done in order to assess whether physical activity also plays a significant role in enhancing the quality of life of undergrad college students. A total of 71 university students participated in this study by completing a pair of previously established self-report questionnaires, designed to quantify physical activity levels and quality of life. The data was gathered and analyzed using SPSS. Results of an Analysis of Variance (ANOVA) failed to reveal a statistically significant difference in the quality of life scores between the various levels of physical activity. The results of a correlation, assessing the relationship between the quality of life scores and the summated physical activity levels failed to reveal a statistically significant relationship. Although the results of this study failed to show a relationship between quality of life and physical activity, further research and study is needed in order to understand the underlying mechanisms between these two factors.

Beginning Readers and the Impact of Recreation on Literacy Growth

Kylie Zellmann and Angela Tell

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Recreational activities benefit on early readers to stay engaged and motivated throughout literacy intervention sessions. The purpose of our research is to provide pre/post assessment and recreational data that analyzes the outcome recreation has on therapy. Participants involved both display weakness in literacy and exhibit high energy and distractibility during sessions. Pre/post assessments were completed for both participants performed across the areas of reading, writing, and spelling. Intervention techniques focused on areas of literacy that the participants showed significant weakness (such as letter recognition, recognition of patterned words, and spelling).

The Effects of Foreign Trade on Real Wages: The Case of the United States and Canada

Matthew Nemitz

Kwang Woo (Ken Park), Faculty Mentor, Economics (Social and Behavioral Sciences)

According to the United States Trade Representative, Canada is the United States' largest export market with machinery (HS 2-digit code 84) being the United States largest export in 2015. The main purpose of this paper is to find a relationship between trade of the United States and Canada and real wages in the United States in the period of 2010.1 to 2016.12. According to the results, the method Karaalp et al (2016) uses is insignificant in the case of machinery exports to Canada and the United States real wages in manufacturing. The new model we develop shows that there is an insignificant relationship between machinery exports and real wages but shows strong long run relationship with industrial production index: Durable goods: Machinery and the Canadian and the United States exchange rate. We then discuss further research methods.