

# UNDERGRADUATE RESEARCH SYMPOSIUM

april 21, 2014

inspiring students    creating scholars



## Greetings from the President

It is my distinct honor to welcome you to the 16<sup>th</sup> 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 26th five of our students presented at the first annual Posters at St. Paul held in the rotunda of the Minnesota State Capitol. Earlier this month, 41 students traveled to the University of Kentucky to make 31 presentations at the National Conference of Undergraduate Research. In addition, 50 students traveled to make 35 presentations at Minnesota State University, Moorhead for the third annual Undergraduate Scholars Conference of the Minnesota State Colleges and University system.

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.

I want to express my appreciation for the efforts of the Undergraduate Research Center Council under the leadership of Drs. Marilyn Hart and Elizabeth Sandell. 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.

A handwritten signature in black ink, appearing to read "Richard Davenport". The signature is fluid and cursive, with the first name "Richard" clearly legible and the last name "Davenport" written in a more stylized, connected script.

Richard Davenport  
President  
Minnesota State University, Mankato



## A Message from the Undergraduate Research Center

Welcome to the 16th Annual MSU, Mankato Undergraduate Research Symposium, featuring scholarship and creative activities. This year, we are proud to showcase the research endeavors of undergraduate students from all six colleges. The conference is designed to acquaint undergraduates with the process and rigors of presenting research in a scholarly manner in an academic setting. This opportunity allows for stimulating interaction between students and an audience of faculty, administrators, peers, and family. An added goal is to encourage undergraduates to pursue advanced degrees that will lead to opportunities in research and teaching.

At MSU, Mankato, many students have been participating in research that is part of a larger grant where faculty sponsors have given them substantial levels of responsibility to carry out specific components, either individually or collaboratively. Some students have received grants from the MSU Foundation, the North Star STEM Alliance, the MSU Undergraduate Research Center, the Honors Program, various MSU academic departments, and other supporters. Other students have initiated their own projects and have been conducting their research independently under faculty guidance. While many students are reporting on completed projects, some are presenting the latest data on research still in progress.

Students present their work at the conference orally, in poster format, or, as part of a creativity exhibit. In the oral sessions, students are divided into groups; each student gives a 15-minute presentation that includes a question-and-answer period. A faculty member, who may also serve as a faculty sponsor for one or more of the student-presenters, moderates the session. In the poster sessions, students present a visual representation of their research and discuss the content with circulating conference attendees. The art exhibit highlights creative activity and affords an opportunity to interact with the student scholars who will discuss their creative work with those attending this session. Each student presenter is recognized for his/her contribution to University research with a medallion that identifies him/her as an Undergraduate Research Scholar and that may be worn at graduation ceremonies upon completion of the degree.

We congratulate these students for their accomplishments and hope that this experience helps to launch productive and satisfying academic and professional careers.



Elizabeth J. Sandell, Ph. D.  
Элизабет Дж. Санделл  
Interim Director, Undergraduate Research Center  
Associate Professor, Early Childhood Education



Marilyn Hart, Ph. D.  
Interim Associate Dean, College of Science,  
Engineering and Technology  
Former Director, Undergraduate Research Center  
Professor, Biological Sciences

## 2013-2014 Undergraduate Research Council Members

Dawn Albertson  
Barbara Bergman  
Queen Booker  
Christopher Corley  
Marilyn Hart  
Joseph Holtermann  
Mary Susan Johnston  
Cindra Kamphoff

Karla Lassonde  
Steven Losh  
Mark McCullough  
Lori Piowski  
Alexandra Hilt-Panahon  
Carlos Panahon  
Barry Ries  
Elizabeth Sandell

Kristin Scott  
Kristel Seth  
Marilyn Swan  
Heather Von Bank  
Trent Vorlicek  
Gina Wenger  
Fei Yuan

# FUNDING SOURCES FOR RESEARCH AND CREATIVE PROJECTS

Several of the research and creative projects presented at this year's Minnesota State University, Mankato Undergraduate Research Symposium were awarded funding through a competitive grant review process. Funding sources included generous contributions from two outside sources as well as the University. Awardees of these grants are noted within their abstract. Specific types of funding awards are outlined below.

## **Minnesota State University, Mankato Foundation Awards: up to \$2,000**

These awards are from the Minnesota State University Foundation Board to support high quality student scholarship at the University. Each student recipient is given \$1,000 as a stipend and up to \$1,000 for supplies necessary for the completion of their project.

## **NorthStar STEM Alliance Awards: up to \$1,300**

These awards are available to students from underrepresented ethnicities enrolled in specific science, technology, engineering, and mathematics discipline majors. Each recipient was granted \$1,000 as a stipend and up to \$300 in supplies. This funding was allocated as part of a larger, multi-campus National Science Foundation grant to encourage student research.

## **Undergraduate Research Center Stipend/Supply Grant: up to \$1,000**

An Undergraduate Research Center stipend/supply grant includes funding for both a student stipend of \$500 and up to \$500 in supplies to aid in the successful completion of their project. These grants are funded by the University.

## **Undergraduate Research Center Supply Grant: up to \$500**

An Undergraduate Research Center supply grant includes funding for supplies to help aid in the completion of the proposed projects. These grants, like the stipend/supply grants, are funded by the University.

## **URC MEDALS AND PRESENTATION AWARDS**

**Medallions** - Each student who participated at the Undergraduate Research Symposium is awarded a medallion in recognition of their scholarly achievement to be worn at the student's graduate ceremony. A solid gold ribbon is in recognition of participation at the Symposium.

**Presentation Awards** - Each poster and oral presentation session is judged by two judges who are graduate students, faculty, or other qualified individuals involved on campus. Outstanding presentations in each session will be recognized with an "Outstanding Presentation" certificate announced at the Celebration Dinner. Winners are also noted on the URC website.

## **UNDERGRADUATE SCHOLAR RESOURCE FAIR**

Explore some resources and activities to enhance your undergraduate research experience. There will be representatives on hand to talk with students about several opportunities. The Resource Fair will be in the CSU Ballroom along with the poster sessions.

1. Publishing: MSU's Journal of Undergraduate Research
2. MSU's Honors Program
3. MSU's Fellowship Office
4. MSU's College of Graduate Studies
5. URC's Graduate Research Consultant
6. And more!

*\*Abstracts were written by the student author(s) and reviewed by faculty mentors. Any opinions expressed do not represent those of the URC or Minnesota State University, Mankato.*



# *Congratulations to the 2013-2014*

## **Minnesota State Foundation Grant Recipients**

Lauren Bach	Samantha List
Jeremy Balster	Thomas Lutz
Mitchell Beckman	Marc Monson
Randall Burns	Philip Munkvold
Laura Chopp	Emma Phelps
Chelsea Conrad	Neil Ranals
Christopher Collins	Dulanjani Rajaguru
Katie Dose	Christine Scheper
Raechel Erdman	Tyler Schrandt
Paula Fischbach	Jaekook Sim
Shelby Flegel	Nicole Snyder
Jessa Gute	Sara Sobota
Areej Hassan	Tatiana Soboleva
Travis Hensersky	Katie Sonnabend
Danielle Hron	Emma Stong
Nicholas Jobeun	Shayna Tietje
Elliott Jorgensen	Ramesh Timilsina
Kira Kirchberg	Daniel Tollefson
Tyler Koonst	Katie Westermayer
Adam Kronebusch	Blake Whittemore
Garrett Luce	Sean Willaert
Sarah Lieske	Natalie Young
Sadie Leidall	

## **The North Star Stem Alliance Grant Recipients**

Henruka Abugre	Ethan Nichols
Samuel Jordan	Natacha Tasha
Stella Menuba	Robera Yahya
Abdikadir Mohamed	

*Thank you to the*



for providing student research awards for  
45 students  
totaling \$52,000.00.



for providing student research awards for  
7 students  
totaling \$6,500.00.

---

**and the Minnesota State University, Mankato Administrators,  
Moderators, and Judges.**

---

*A Special Thank You to*

President Dr. Richard Davenport

Provost and Senior Vice President for Academic Affairs Dr. Marilyn Wells

Associate Vice President and Dean of Graduate Studies and Research Dr. Barry Ries

Dean of Library Services Dr. Joan Roca

Musicians Bennet Coughlan, Timothy Kelly, Adam Maurer, and Alec Panchyshyn

Photographer Bobby McFall



9:00 a.m. – 4:00 p.m.	Student Presenter, Moderator, & Judge Check-in Coffee and Snacks Available	CSU Ballroom Lobby CSU Ballroom
10:00 – 11:30 a.m.	<b>Poster Session A</b> Biology, Chemistry and Geology, Civil Engineering, Electrical Engineering, Integrated Engineering, Manufacturing Engineering Technology, Mathematics and Statistics, & Nursing	CSU Ballroom
10:00 – 11:00 a.m.	<b>Oral Session 1</b> Art & Dance	CSU 201
10:00 – 11:00 a.m.	<b>Oral Session 2</b> English & Scandinavian Studies	CSU 202
10:00 – 11:00 a.m.	<b>Oral Session 3</b> Psychology	CSU 253
11:05 – 12:05 p.m.	<b>Oral Session 4</b> Biology	CSU 201
11:05 – 12:05 p.m.	<b>Oral Session 5</b> Integrated Engineering & Electrical and Computer Engineering and Technology	CSU 203
11:05 – 12:05 p.m.	<b>Oral Session 6</b> Psychology	CSU 253
12:05 – 1:05 p.m.	BREAK	
1:05 – 2:05 p.m.	<b>Oral Session 7</b> Automotive Engineering Technology	CSU 204
1:05 – 2:05 p.m.	<b>Oral Session 8</b> Anthropology, Family Consumer Science, & Health Science	CSU 254
1:05 – 2:05 p.m.	<b>Oral Session 9</b> Gender and Women's Studies	CSU 255
2:00 – 3:30 p.m.	<b>Poster Session B</b> Anthropology, Art, Communication Disorders, Construction Management, Elementary and Early Childhood Education, Ethnic Studies, Family Consumer Science, Government, Human Performance, Management, Nursing, Psychology, & World Languages and Cultures	CSU Ballroom
2:10 – 3:10 p.m.	<b>Oral Session 10</b> History & Political Science	CSU 202

2:10 – 3:10 p.m.	<b>Oral Session 11</b> Integrated Engineering & Mechanical Engineering	CSU 203
2:10 – 3:10 p.m.	<b>Oral Session 12</b> Mathematics and Statistics & Automotive Engineering Technology	CSU 204
3:15 – 4:15 p.m.	<b>Oral Session 13</b> Automotive Engineering Technology	CSU 204
3:15 – 4:15 p.m.	<b>Oral Session 14</b> Elementary and Early Childhood Education & Special Education	CSU 254
3:15 – 4:15 p.m.	<b>Oral Session 15</b> Gender and Women’s Studies	CSU 255
5:00 p.m.	<b>Undergraduate Research Symposium Celebration Dinner</b>	CSU Ballroom
7:00 – 9:00 p.m.	<b>Creative Works Exhibit</b>	CSU Gallery



**Biology, Chemistry and Geology, Civil Engineering, Electrical Engineering, Integrated Engineering, Manufacturing Engineering Technology, Mathematics and Statistics, & Nursing**

---

- 1. Rubidium as Substitute for Potassium in Rat Cardiac Tissue**  
Bisola Asaolu & Mai Vue  
*Victor Esenabhalu, Faculty Mentor (Department of Biology)*
- 2. Regulation of an Earthworm Eisenia fetida and the Regulation of its Nephridal Bacteria**  
Jeremy Balster  
*Dorothy Wrigley, Faculty Mentor (Department of Biology)*
- 3. Influence of Ultraviolet Radiation on Cell Wall Constituents in Reduced-Lignin Mutants of Corn and Sorghum**  
Brock Bermel  
*Christopher Ruhland, Faculty Mentor (Department of Biology)*
- 4. Methods to Reduce Bacteria on Lettuce**  
Pradeep Bhandari & Eric Hermansen  
*Dorothy Wrigley, Faculty Mentor (Department of Biology)*
- 5. Genetic Role in Geotactic Behavior via Pigment Dispersion Factor (pdf) Pathway in Fruit Flies (Drosophila melanogaster)**  
Laura Boon & Tatiana Soboleva  
*Daniel Toma, Faculty Mentor (Department of Biology)*  
*Adam Voss, Graduate Student Mentor, (Department of Biology)*
- 6. Oxidative Effects on Muscle Protein Function**  
Tatiana Soboleva  
*Rebecca Moen, Faculty Mentor (Department of Chemistry)*
- 7. Optimizing Purification and Quantitative Detection of Avidin and Lysozyme**  
Tatiana Soboleva & Ryan Colakovic  
*Theresa Salerno, Faculty Mentor (Department of Chemistry)*
- 8. Estrogenic effects on a protandrous hermaphroditic species: Amphiprion percula**  
Randall Burns & Katie Dose  
*Shannon Fisher, Faculty Mentor (Department of Biology)*
- 9. Optimization of Nucleic Acid Staining For Accurate Determination of Mycobacterium Avium Paratuberculosis Viability by Flow Cytometry**  
Dylan Eaton  
*Timothy Secott, Faculty Mentor (Department of Biology)*
- 10. Effects of Ultraviolet Radiation on the Brown Midrib Mutation in Sorghum Bicolor and Zea**  
Maegan Eatwell  
*Christopher Ruhland, Faculty Mentor (Department of Biology)*

- 11. The Effect of Steroid Hormones on Brain Regions in the Green Anole Lizard**  
Brian Gilbert, Patrick Connolly, & Steven Gilbert  
*Rachel Cohen, Faculty Mentor (Department of Biology)*
- 12. Environmental Effects of Garbage Island**  
Katy Gronewold  
*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*
- 13. Establishment of Primary Neuronal Cultures for the Investigation of Neuronal Survival In Vitro**  
Taylour Hanson & Paul Creger  
*Rachel Bergstrom, Faculty Mentor (Department of Biology)*
- 14. The Effect of Bisphenol A (BPA) on the Expression of Aromatase B**  
Sara Sobota  
*Theresa Salerno, Faculty Mentor (Department of Chemistry)*
- 15. The Toxic Effects on the Liver and Kidney of Administering an Analgesic (Acetaminophen) and a Drug to Treat Obesity-Related Diabetes (Metformin) to Dietary-Induced Obese Male Mice (C57BL/6J)**  
Quinn Hofmann, Yuko Nakamura, & Sara Sobota  
*Steven Mercurio, Faculty Mentor (Department of Biology)*
- 16. Morphological and Molecular Barcode Characteristics of Parasites from Family Strigeidae Collected from Lake Winnibigoshish**  
Rachael Yates Swedberg & Yuko Nakamura  
*Robert Sorensen, Faculty Mentor (Department of Biology)*
- 17. The Adherence of Escherichia coli 0157:H7 on Lettuce Leaves over Time and Removal Technique using Chlorinated Water**  
Karenzha Huwae  
*Dorothy Wrigley, Faculty Mentor (Department of Biology)*
- 18. Taking a Deeper Look at Biological Tubes & Structural Proteins in C.elegans**  
Drew Kampmeyer  
*Kelly Grussendorf, Faculty Mentor (Department of Biology)*
- 19. Optimization of the Presence of an Actin Capping Protein Transgene in Genetically Modified Mice**  
Tyler Koonst  
*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*
- 20. Localization and Expression Level of Vascular Endothelial Growth Factor after Partial Hepatectomy of WKY Rats**  
Adam Kronebusch & Tyler Koonst  
*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*
- 21. Rubidium Uptake in Isolated Rat Cardiomyocytes**  
Jooyoung Lee, Jaekook Sim, & Karleen Doering  
*Michael Bentley, Faculty Mentor (Department of Biology)*

- 22. Examination of Human Embryonic Kidney cells and Cardiomyocytes using Glass Microcarrier Beads and Scanning Electron Microscopy**  
Jaekook Sim  
*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*  
*Geoffrey Goellner, Faculty Mentor (Department of Biology)*  
*Michael Bentley, Faculty Mentor (Department of Biology)*
- 23. Photodegradation of Roundup Ready and Reduced-Lignin Corn Stover During Spring Thaw**  
Erika Magnusson  
*Christopher Ruhland, Faculty Mentor (Department Biology)*  
*Alan Mickelson, Graduate Student Mentor (Department of Biology)*
- 24. Role of the ApeE Esterase in the Growth of Salmonella on Phospholipids as Phosphate Sources**  
Stella Menuba  
*Christopher Conlin, Faculty Mentor (Department of Biology)*
- 25. Carriage of Methicillin Resistance in Coagulase-Negative Staphylococci**  
Christa Moller  
*Timothy Secott, Faculty Mentor (Department of Biology)*
- 26. Morphological Analysis of Chemical Elements in Fish Scales**  
Ethan Nichols, Natacha Tasha, & Henruka Abugre  
*Michael Bentley, Faculty Mentor (Department of Biology)*
- 27. Mapping the Spatial and Temporal Expression Pattern of Chst15 mRNA in the Cochlea of Euthyroid Mice Throughout Development**  
Andrew Nicholson & Cari Graber  
*David Sharlin, Faculty Mentor (Department of Biology)*
- 28. Biofilm Formation by Escherichia coli csgA and fimA mutants**  
Nicole Snyder & Sean Willaert  
*Timothy Secott, Faculty Mentor (Department of Biology)*
- 29. Bone Microvasculature of Male Mice with Reduced Testosterone Levels**  
Katie Sonnabend & Nicholas Jobeun  
*Michael Bentley, Faculty Mentor (Department of Biology)*
- 30. Effects of Strontium in the Bone Density of Mice**  
Kali Trukki, Ashley Ledding, & Rachel Ledding  
*Michael Bentley, Faculty Mentor (Department of Biology)*
- 31. Mechanical Removal of Juniper and its Effects on Plant Diversity**  
Kyle Van Vleet  
*John Krenz, Faculty Mentor (Department of Biology)*  
*Christopher Ruhland, Faculty Mentor (Department of Biology)*
- 32. Development of a Cochlear Specific Cre Recombinase Expression Vector For Targeted Gene Inactivation**  
Abrar Zawed  
*David Sharlin, Faculty Mentor (Department of Biology)*



- 33. Effect of Artificial Sweeteners on the Renin-Angiotensin System in Rats**  
Jacob Ball  
*Theresa Salerno, Faculty Mentor (Department of Chemistry)*
- 34. Analyzing the Effects of Isovaleraldehyde and Cuminaldehyde on DNA**  
Jenna Bowman  
*Danae Quirk Dorr, Faculty Mentor (Department of Chemistry)*  
*Mary Hadley, Faculty Mentor (Department of Chemistry)*
- 35. Structural Factors Affecting the Rate of the Reaction Between Singlet Oxygen and Proteins**  
Danielle Hron  
*John Thoemke, Faculty Mentor (Department of Chemistry)*
- 36. Calcium Hydroxovanadate Synthesis**  
Tigist Hunde  
*Ljudmyla Stackpool, Faculty Mentor (Department of Chemistry)*
- 37. Further Investigating the Reactivity of Citral and Octanal toward DNA**  
Brittany Leeder  
*Mary Hadley, Faculty Mentor (Department of Chemistry)*
- 38. Degradation of Aquatic Pollutants via Photoproducted Reactive Intermediates: Investigation of Factors that Determine which Reactive Intermediates are Produced**  
Abdikadir Mohamed  
*John Thoemke, Faculty Mentor (Department of Chemistry)*
- 39. Binding to Bovine Serum Albumin: Effects of Molecular Structure**  
Michael Ntoka  
*John Thoemke, Faculty Mentor (Department of Chemistry)*
- 40. Comparison of Protein Expression in Soy Bean by Two-Dimensional Electrophoresis**  
Emma Phelps  
*James Rife, Faculty Mentor (Department of Chemistry)*
- 41. Exploring the Role of miRNA 393 in Soybean Stress Response**  
Dulanjani Rajaguru  
*Jame Rife, Faculty Mentor (Department of Chemistry)*
- 42. Further Examination of Formed Adducts from the Reactions of Decanal and Trans-2-Decenal with Each Nucleoside of DNA**  
Neil Ranals  
*Danae Quirk-Dorr, Faculty Mentor (Department of Chemistry)*  
*Mary Hadley, Faculty Mentor (Department of Chemistry)*
- 43. Quantifying Hydroxyl Radical in Natural Waters: Role of Dissolved Organic Matter in Determining Production Rates**  
Andria Sellner  
*John Thoemke, Faculty Mentor (Department of Chemistry)*

- 44. Formation of Iron-Molybdenum-Sulfide Phase(s) in Anoxic Natural Waters**  
Emma Stong  
*Trent Vorlicek, Faculty Mentor (Department of Chemistry)*
- 45. Quorum sensing molecules for unicellular organisms: Spectroscopic and computational study of conformational behavior**  
Daniel Tollefson  
*John Thoemke, Faculty Mentor (Department of Chemistry)*
- 46. Analysis of Lipoxygenase 9 and 10 in Soybean Root by Q-PCR**  
Robera Yahya  
*James Rife, Faculty Mentor (Department of Chemistry)*
- 47. The Effect of Artificial Sweeteners on the Expression of microRNAs in Rat Kidneys**  
Natalie Young  
*Theresa Salerno, Faculty Mentor (Department of Chemistry)*
- 48. The Heart Mountain Detachment, Wyoming: Processes Involved in a Mega-Block Slide**  
Matthew Jaros  
*Steven Losh, Faculty Mentor (Department of Geology)*
- 49. Anti-icing Effectiveness on Pavements Research**  
Thu Nguyen & Andrew Pfeffer  
*Stephen Druschel, Faculty Mentor (Department of Civil Engineering)*
- 50. Model Based Testing using Real-Time Embedded Software**  
Sarzana Shabab & Faimi Ahmad  
*Nannan He, Faculty Mentor (Department of Electrical Engineering)*
- 51. First Step Mental Health App**  
Joshua Martin, James Faraday, & Mackenzie Lopez  
*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*
- 52. Paint Book System Development**  
Dale Boynton  
*Winston Sealy, Faculty Mentor (Department of Manufacturing Engineering Technology)*
- 53. Buying a Car in Today's Society**  
Amber Cederholm & Hannah Englin  
*Winston Sealy, Faculty Mentor (Department of Manufacturing Engineering Technology)*
- 54. 3D Printing of Stainless Steel for Engineering Applications**  
Michael Doyle  
*Kuldeep Agarwal, Faculty Mentor (Department of Manufacturing Engineering Technology)*
- 55. Concurrent Engineering**  
Peter Howley, Ridge Raddatz, & Rebecca Pasquale  
*Winston Sealy, Faculty Mentor (Department of Manufacturing Engineering Technology)*

**56. How to Succeed at an Internship**

Samuel Putrah

*Winston Sealy, Faculty Mentor (Manufacturing Engineering Technology)*

**57. Statistical Modeling on Effects of Lead Exposure on Children**

Auriol Moteng

*Deepak Sanjel, Faculty Mentor (Department of Mathematics)*

*Namyong Lee, Faculty Mentor (Department of Mathematics)*

**58. Documentation of Peripheral Intravenous Insertion Sites in the Hospital Medical Record**

Allison Mumbleau

*Marilyn Swan, Faculty Mentor (School of Nursing)*

## **1. Rubidium as Substitute for Potassium in Rat Cardiac Tissue**

Bisola Asaolu & Mai Vue

*Victor Esenabhalu, Faculty Mentor (Department of Biology)*

A normal cell contains a sodium/potassium ATPase pump that functions to maintain a high intracellular level of potassium ( $K^+$ ) inside the cell and high levels of sodium ( $Na^+$ ) outside the cell. Since rubidium ( $Rb^+$ ) shares similar chemical properties with potassium and has a similar atomic radius it can replace potassium in all known processes (Olga Jilkina et al). We used rat hearts as a model to determine and quantify how rubidium will take over as potassium in the sodium/potassium pump. First we used the Langendorff system to infuse the aorta of the rat heart with a buffer solution containing Rubidium Chloride ( $RbCl$ ) so that it circulates through the coronary arteries. The Langendorff apparatus provides a means to control pH, temperature and pressure of the solutions perfusing the heart. A sequel to this procedure is the addition of ouabain to the buffer solution, which will inhibit the sodium/potassium pump. Following each procedure, the heart was freeze dried so that diffusion did not occur, thereby causing a change in the experiment. Using the Scanning Electron Microscopy (SEM), Rubidium will be measured in the cardiac tissue to determine the amount of Rubidium absorbed into the cells. Rubidium will be measured using the Energy-Dispersive X-Ray Spectroscopy system (EDS) associated with the SEM (JEOL JSM-6510LV). The heart is expected to beat for about one hour during which all necessary procedures regarding the use of the heart will take place. Rubidium is also expected to be taken up by the cells of the heart in positive slope with respect to time while the hearts continues to beat. When ouabain is introduced, the sodium/potassium pump activity will slow down. With ouabain, the level of rubidium uptake is expected to decrease while sodium is expected to accumulate inside the cell, causing the heart to stop beating.

## **2. Regulation of an Earthworm Eisenia fetida and the Regulation of its Nephridal Bacteria**

Jeremy Balster

*Dorothy Wrigley, Faculty Mentor (Department of Biology)*

Regulation of an Earthworm Eisenia fetida and the Regulation of its' Nephridal Bacteria Jeremy Balster Abstract The purpose of this study was to examine two mechanisms the earthworm Eisenia fetida might use to regulate its' symbiotic bacterium Verminephrobacter. Verminephrobacter resides in the nephridium of the earthworm which is an osmoregulatory organ. The first possible way of regulation is through the extrusion. Fluorescent in situ hybridization (FISH) was the main assay used to mark the bacteria and a fluorescent microscope was used to detect the bacteria. When earthworms are shocked coelomic fluid is extruded through pores. The fluid and bacterial cells were collected and stained with a specific DNA probe for the symbiont and examined with a fluorescent microscope. The other possible way is through the earthworms' phagocytic cells. Some of the phagocytic cells are also extruded after shock. To test whether the bacteria were phagocytized, the symbionts are mixed with coelomic cells. Then interactions with the coelomic cells were examined using both gram staining and the FISH technique. Finally, for viability, the bacteria mixed with coelomic cells were plated and compared to bacteria numbers without coelomic cells. Results are still underway and will be presented.

### **3. Influence of Ultraviolet Radiation on Cell Wall Constituents in Reduced-Lignin Mutants of Corn and Sorghum**

Brock Bermel

*Christopher Ruhland, Faculty Mentor (Department of Biology)*

Brown midrib mutants (BMR) of corn (*Zea mays*) and sorghum (*Sorghum bicolor*) have reduced lignin content and have recently gained popularity in Southern Minnesota as forage material for grazing animals. These mutants have lowered expression of cinnamyl alcohol dehydrogenase and caffeic O-methyltransferase enzymes in the phenylpropanoid pathway responsible for the construction of the cinnamyl alcohol subunits of lignin. Lignin is found in the secondary cell wall of higher plants, along with substantial amounts of cellulose and hemicellulose polysaccharides. Reduced lignin increases livestock digestibility of these plants, but may also increase susceptibility to environmental stress and lodging. Lignin is comprised of polymerized hydroxycinnamic acids which are also important in absorbing potentially damaging ultraviolet radiation (UV). We examined how sub-ambient levels of UV alter cell wall constituent concentrations over a 50-day experiment. Plants were grown in a UV-transparent greenhouse under filters that either reduce ("mylar") or transmit ("acliar") ambient UV. We harvested plants three times (days 20, 35 and 50) and examined concentrations of cellulose, hemicellulose and lignin using the filter-bag detergent technique in combination with a fiber analyzer (ANKOM Technology). In BMR corn, cellulose concentrations were consistently higher in plants growing under mylar than under acliar on all sampling dates ( $P < 0.05$ ). In BMR sorghum, lignin concentrations tended to be higher under acliar than mylar ( $P < 0.10$ ). There were no UV effects on hemicellulose concentrations in either species. Our results indicate that UV radiation may have a subtle influence on cell wall constituent concentrations under sub-ambient levels.

### **4. Methods to Reduce Bacteria on Lettuce**

Pradeep Bhandari & Eric Hermansen

*Dorothy Wrigley, Faculty Mentor (Department of Biology)*

Lettuce is a minimally processed food with a short shelf life for both grocers and consumers. Three treatments were tested for their ability to decrease spoilage bacteria populations on the lettuce. The effectiveness of the electrolyzed water, U.V light treatment and traditional bleach water wash were compared to regular tap water wash. The spread plating technique was used to determine the concentration (CFU/g) of bacteria. Each treatment was done for 0, 10 and 20 seconds. The bleach and U.V treatments were 40 and 3 times more effective than the tap water wash respectively. The bleach treatment is very effective but also may affect consumer health. To determine effectiveness of electrolyzed water, the lettuce leaf is washed in the generated electrolyzed water and CFU/g is determined. The process is still ongoing, in search of the correct time increments and solution concentration needed for maximum effectiveness. However, initial trials show that 20 seconds was not effective. If this method can be modified to be successful, this could introduce a safer produce wash alternative to bleach.



## **5. Genetic Role in Geotactic Behavior via Pigment Dispersion Factor (pdf) Pathway in Fruit Flies (*Drosophila melanogaster*)**

Laura Boon & Tatiana Soboleva

*Daniel Toma, Faculty Mentor (Department of Biology)*

*Adam Voss, Graduate Student Mentor, (Department of Biology)*

In the early 1960's, Dr. Jerry Hirsch demonstrated a genetic basis for behavior using fruit fly lines he selected for an extreme response to gravity (geotaxis). Geotactically positive fruit flies tend to travel in the direction of gravity (Lo), and geotactically negative individuals will travel against gravity (Hi) through a vertical (T-choice) maze. These established Hi and Lo flies have since been used as models for the genetic basis of complex behavior. Toma et al., 2002 found a significant effect of the Pdf protein in the geotaxis behavioral response. Flies unable to make Pdf protein are geotactically high and tend to travel against gravity. We have identified several proteins within the literature that interact with Pdf and have obtained mutant fly lines that are either unable to make or make for than normal amounts of these proteins. These are each being bred into a geotactically neutral laboratory line (Canton-S, CS) to test the effect of these individual proteins on complex behavior. We have successfully bred and run a control group (CS) and 10 different mutant fly lines with only five mutations left to finish breeding and collect maze run data on. Any deviation from CS scores in the maze by these mutant flies indicates a possible relationship between the particular proteins affecting geotaxis behavior. We noticed significant patterns in five fly lines. However, final statistical analysis has not been complete for all mutant runners.

## **6. Oxidative Effects on Muscle Protein Function**

Tatiana Soboleva

*Rebecca Moen, Faculty Mentor (Department of Chemistry)*

Oxidative stress decreases muscle's ability to produce force by specifically altering myosin, the main contractile protein in muscle, and is associated with muscle aging as well as various muscle diseases. The molecular mechanism responsible for myosin's functional perturbations due to oxidation remains unclear. Purified myosin samples were treated with hydrogen peroxide to induce oxidative modifications at specific amino acid residues within the myosin catalytic domain. Myosin's ability to hydrolyze ATP and bind actin was measured. Changes in myosin structural dynamics were monitored using electron paramagnetic resonance spectroscopy (EPR). Oxidation perturbs actomyosin functional interaction and produces a change in myosin's structure, specifically impairing the weak-to-strong transition of myosin necessary for force production. As myosin is the molecular motor that drives muscle contraction, myosin is likely one of the main targets of site-specific amino acid oxidative modification induced by oxidative stress. These modifications of myosin cause contractile dysfunction leading to a decreased ability of muscle to produce force.

## **7. Optimizing Purification and Quantitative Detection of Avidin and Lysozyme**

Tatiana Soboleva & Ryan Colakovic

*Theresa Salerno, Faculty Mentor (Department of Chemistry)*

Hen egg white is one of the major raw materials used in food industry especially in foaming and gelling. Egg white consists of many different proteins that vary greatly in molecular weights and pI (isoelectric point) values. Two of its minor proteins, avidin and lysozyme have important commercial applications. In this research project, we tested the effect of pH and heat denaturation at 65°C on the purification and recovery of avidin and lysozyme proteins from egg white. Four different pH conditions were chosen; these included ascorbate buffers at pH values of 4 and 5 and phosphate buffers at pH values of 6 and 7. Following heat denaturation and dialysis, the minor proteins were purified by cation exchange chromatography. We also optimized a Western Blot method to quantitate differences in the recovery of the egg white proteins. In this method we were successfully detected small amounts of both proteins using IR detection. It was found that an ascorbate buffer with an initial pH of 5.0 gave the best recovery of both avidin and lysozyme proteins in the eluate 1 fraction. The pH values of 5 and 6 were the best for the removal of a major contaminant, ovotransferrin. These findings allow new insights into the future improvements in the purification of lysozyme and avidin, and have also provided methods that can be used in the laboratory project for Biochemistry 360 students.

## **8. Estrogenic effects on a protandrous hermaphroditic species: *Amphiprion percula***

Randall Burns & Katie Dose

*Shannon Fisher, Faculty Mentor (Department of Biology)*

Estrogen concentrations are increased in aquatic environments due to the addition of pharmaceutical drugs (i.e. birth control) through runoff water. This manipulates maturation of sexes within many species that inhabit aquatic environments, including fresh and marine habitats. *Amphiprion percula* exhibit a hierarchical system behavioral pattern, which determines the social status of individuals within a group. Multiple clown anemonefish, *A. percula* were studied via a controlled environment and hierarchical succession was observed under estrogenic additions. From this study, data on sex change of a hermaphroditic protandrous species was observed under the influence of three concentrations of natural estrogen. Based on sex changes and aggression observed by *A. percula*, it is suggested that estrogen introduced to an aquatic system through external means, influences female-like characteristic within the species. Implications of estrogen entering marine environments through run-off water, may induce the same qualities and allow for a decrease of *Amphiprion* spp. overall because of the protandrouisity of wild populations.

## **9. Optimization of Nucleic Acid Staining For Accurate Determination of Mycobacterium Avium Paratuberculosis Viability by Flow Cytometry**

Dylan Eaton

*Timothy Secott, Faculty Mentor (Department of Biology)*

Johne's disease is a chronic infection of the small intestine of ruminants caused by *Mycobacterium avium* subspecies paratuberculosis (Mpt). This disease greatly affects the profitability of dairy farming in the US, and Mpt has been linked by some to Crohn's disease in humans. Currently, there are many problems with detecting and diagnosing Johne's disease. We have been working to improve culture sensitivity by attempting to quantitate the number of viable organisms present in a sample via flow cytometry. LIVE/DEAD Bacterial Viability Kits provide a fluorescence assay of bacterial viability. While the suggested dye ratios in the LIVE/DEAD kits work for many different species of bacteria, previous work in this laboratory using the suggested dye ratios with Mpt greatly underestimated the number of viable cells in cultures with high viability and overestimated that number in low viability cultures. We will present data demonstrating the effect of altering the dye ratios on the accuracy of estimates of Mpt viability, as measured by flow cytometry. Improving the accuracy of real-time enumeration of this organism will ultimately lead to improved diagnostic testing protocols for Johne's disease.

## **10. Effects of Ultraviolet Radiation on the Brown Midrib Mutation in Sorghum Bicolor and Zea**

Maegan Eatwell

*Christopher Ruhland, Faculty Mentor (Department of Biology)*

Examining plant responses to ultraviolet radiation (UV) under realistic spectral regimes has relied upon supplementing ambient UV using lamps or reducing UV using filters. Responses to sub-ambient UV tend to be more pronounced than those under elevated UV. However, few studies have examined these responses in greenhouses because most cladding absorbs UV. A new greenhouse polycarbonate material has been introduced that transmits >77% of ambient UV. We examined how UV influenced production of UV-screening compounds, chlorophyll fluorescence, growth, and cell wall constituents in the Brown Midrib (BMR) mutation in *Sorghum bicolor* (sorghum) and *Zea mays* (corn). These BMR varieties are an ideal forage feedstock due to lowered expression of cinnamyl alcohol dehydrogenase and caffeic O-methyltransferase enzymes in lignin synthesis. Plants were grown in a UV-transparent greenhouse under filters that either attenuate (mylar) or transmit (acllar) UV. We measured epidermal screening of UV with a modulated fluorometer and the quantum yield of photosystem II ( $\Phi$ PSII) and the variable to maximal fluorescence ratio (Fv/Fm) with a chlorophyll fluorometer. Plants under acllar had 22-23% greater epidermal shielding and 35-54% more UV-absorbing compounds than those under mylar. There were few UV effects on  $\Phi$ PSII, Fv/Fm and growth of either species with the exception of plant height in sorghum. Effects on cell wall constituents were subtle, with cellulose concentrations being 2.5% greater in corn under mylar and lignin concentrations being 1% greater in sorghum under acllar. It appears that BMR sorghum and corn are responsive to UV which could influence their performance in agricultural settings.

## **11. The Effect of Steroid Hormones on Brain Regions in the Green Anole Lizard**

Brian Gilbert, Patrick Connolly, & Steven Gilbert

*Rachel Cohen, Faculty Mentor (Department of Biology)*

Seasonally breeding animals offer a distinct advantage in the study of changes to the brain, because these animals experience dramatic seasonal changes in both the brain and the behaviors associated with these seasonal changes. In order to examine the link between hormone levels and changes in the brain, we examined the seasonally breeding green anole lizard, *Anolis carolinensis*. In the experiment, we used tissue from animals that were used in a previous experiment. Male anole lizards were caught during their breeding season in April. These lizards were anesthetized a week after arrival and all testicular tissue was removed. While under surgery, a hormone-filled capsule was inserted under the skin of each animal. Animals were given one of the following capsules: testosterone, estradiol, dihydrotestosterone (DHT), or an empty capsule as a control. One month after the surgery the brains were collected, sectioned on a cryostat and mounted onto slides. We will stain the brain tissue using thionin. Under a microscope, we will determine the volume of three brain regions that are involved in reproductive behavior. We will also count the neurons in these regions and determine their size. We expect to see an increase in the volume and number of the cells of the brain regions in animals given hormone-filled capsules when compared to animals given an empty capsule. We also expect that testosterone will most likely have the biggest effect on growth of the brain regions because it can be converted into both estrogen and DHT.

## **12. Environmental Effects of Garbage Island**

Katy Gronewold

*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*

Vast amounts of garbage accumulate in the gyres of the Pacific Ocean and impact the environment, marine life and wildlife located on nearby islands. First discovered in 1972, the island patch is made up of microscopic particles of plastic, mostly polypropylene. Entanglement of fishing lines and ingestion of these particles cause injury or death of approximately 267 species worldwide that includes 86% of all sea turtles, 44% of all seabird species, 43% of all marine mammal species and numerous fish and crustacean species. Project Kaisei has conducted clean up attempts and surveys of the Pacific gyre. The clean up efforts have had little effect on large-scale garbage patches. Other solutions would be to stop using plastics or devise a new version of plastic that is less harmful to the environment. However, plastic has become a vital part of society, which consumers and manufacturers rely on. Of ethical concern is that despite worldwide use of plastic, no one claims ownership of the oceans and therefore responsibility. Who should clean up the mess and how? Who will take ownership and take steps to improving an ecosystem we rely upon for food and consumer goods? In this study, current strategies to clean up our oceans will be addressed.

### **13. Establishment of Primary Neuronal Cultures for the Investigation of Neuronal Survival In Vitro**

Taylor Hanson & Paul Creger

*Rachel Bergstrom, Faculty Mentor (Department of Biology)*

Neurons are cells of the brain that pose a challenge to study in vitro as they are one of the few cell types that are post-mitotic and cannot be maintained for a tissue culture as a cell line. Therefore, they must be taken from live organisms and grown in a culture. This study used mouse pups at embryonic day fifteen. A standard procedure for setting up neuron cultures for testing was developed and used for future experiments. Extreme care was taken to prevent cultured neurons from coming in contact with contaminating substances, such as bacteria, by handling neurons in a sterile tissue culture hood. In vitro, neurons require a growth media with all nutrients required for growth and survival. One specific nutrient mixture is B27, which is a standard nutrient mixture of 27 components for neuronal growth in vitro. To study pro-survival protein signaling events within the neurons, serum starve time courses were completed, depriving the neurons from B27 for different lengths of time, including a control group which was not deprived of B27. Proteins were then extracted through cell lysis and analyzed against the control with SDS gel electrophoresis. The comparison of protein expression between serum starved and not starved neurons will allow us to begin to understand what is involved in the pro-survival signaling pathways of neurons. Culturing neurons in vitro is vital to understanding the cellular and molecular components of neuron function.

### **14. The Effect of Bisphenol A (BPA) on the Expression of Aromatase B**

Sara Sobota

*Theresa Salerno, Faculty Mentor (Department of Chemistry)*

Bisphenol A (BPA) is a common plastic additive that has been shown to have physiological effects that mimic estrogen. Unfortunately, the exact mechanism behind this estrogenic effect is still unclear. The general purpose of this research project was to explore the possibility of post-transcriptional regulation by microRNAs as a possible reason for the estrogenic effect of BPA. The specific objective was to quantify a microRNA that could target and subsequently block expression of the mRNA coding for aromatase, a key enzyme in estrogen synthesis, and to correlate levels of this microRNA with protein expression of aromatase B in a zebra fish system. Computer-based algorithms (BLAST) were used to confirm a very probable match between miR-21 and the 3'-UTR of the aromatase B mRNA. Whole body zebrafish tissues with varying exposure to BPA (0, 0.2, and 20 ppb) were used for the three separate quantification procedures: microRNA, mRNA and protein. Frozen samples were ground and homogenized and microRNAs and mRNAs were isolated simultaneously with the mirVana™ miRNA Isolation Kit (Life Technologies). The short RNAs were converted to cDNA with sequence-specific stem-loop primers from the TaqMan microRNA RT Kit (Life Technologies). The TaqMan microRNA Assay for miR-21 and the endogenous control (U6 snRNA) were used to complete the qPCR quantification. Preliminary research confirmed efficiency of the microRNA qPCR method and showed decreased miR-21 expression with a corresponding increase of BPA exposure. Additional samples will be evaluated with qPCR and Western blotting for levels of miR-21, aromatase B mRNA and protein.



**15. The Toxic Effects on the Liver and Kidney of Administering an Analgesic (Acetaminophen) and a Drug to Treat Obesity-Related Diabetes (Metformin) to Dietary-Induced Obese Male Mice (C57BL/6J)**

Quinn Hofmann, Yuko Nakamura, & Sara Sobota

*Steven Mercurio, Faculty Mentor (Department of Biology)*

Acetaminophen is an OTC pain reliever that causes liver damage on overdose. Lower doses affect the kidneys, especially in male mice where the liver metabolite is toxic. Metformin is a medication that is used for dietary-induced diabetes and is similarly toxic to the liver and kidney, especially if compromised by other damage already. Lactic acidosis can further damage organs. The effects of childhood obesity on this medication have not been fully evaluated. The model of dietary-induced obese male mouse is comparable. The expected outcome of a high dose of acetaminophen with metformin will be liver and kidney damage as seen in the organ and the blood chemistry changes. The null hypothesis is that these changes are not observed. The mice will have free access to 11% fat diet to further fatten them over a four week period, then will be put into four groups of four and begin their experimental treatments for four weeks. The four trials will be no medication, acetaminophen, metformin, and a mixture of acetaminophen and metformin. Elevated levels of bilirubin or creatinine may indicate liver or kidney problems and can monitor changes in organ function. Mice will be euthanized using CO<sub>2</sub>. Serum samples will be taken for a HPLC assay, as well as blood and tissue samples. Blood bilirubin levels will be measured using direct spectrophotometry and a tnf-alpha assay will be done using lysed cells. Kidneys and liver will be examined for physical damage, and tissue pH will be tested. Bodies disposed of by EHS.

**16. Morphological and Molecular Barcode Characteristics of Parasites from Family Strigeidae Collected from Lake Winnibigoshish**

Rachael Yates Swedberg & Yuko Nakamura

*Robert Sorensen, Faculty Mentor (Department of Biology)*

Identification of parasites can be problematic as many species go through complex life cycles. To make matters for identification worse, plasticity of an organism can allow adaptations to a different species of host, which may incorrectly suggest a different or subspecies of a parasite. In 2012, ducks and waterfowl were recovered from hunters by Holly Bloom, a graduate student of MSU, from the northern Minnesota lake, Lake Winnibigoshish. Inside the intestines of these waterfowl, which included mallard, ring neck, blue wing teal, and scaup, a number of similar parasites were found. The parasites initially were suspected to be of Family Strigeidae, a family of trematodes. The identity of the suspected individuals has been confirmed to be the species *Cotylurus brevis* and *Cotylurus flabelliformis*. Confirmation of the identity was made from characteristics made visible by microscopy, both stained and SEM. Such characteristics included testis orientation and size, ovary ratio, body ratio, and sizes of ventral and oral suckers. Ranges obtained and observations of sizes and morphology of the worms' organs were comparable to past studies by Nasir (1962) and Dubois (1950). We sequenced a portion of the cytochrome oxidase gene to aid in the identification of these worms. This will be helpful in future studies, because although morphology may change through the parasites life cycle or in relation to the host, its genetic markers should reveal an accurate identification.

## **17. The Adherence of Escherichia coli 0157:H7 on Lettuce Leaves over Time and Removal Technique using Chlorinated Water**

Karenzha Huwae

*Dorothy Wrigley, Faculty Mentor (Department of Biology)*

EHEC 0157:H7 causes hemorrhagic colitis (HUS) characterized by renal injury that leads to permanent kidney failure, impairment of the central nervous system, and ultimately death. Fresh leafy produce has carried the 10 organisms needed for illness. Thus understanding the behavior of EHEC on produce is essential. Previous research conducted in Spring 2013 showed that EHEC did not grow as well as E. coli lab strain on lettuce leaves. Both strains grew better at room temperature rather than at 4C temperature. This project examines the adherence of EHEC on the lettuce surface as a factor of time and the effectiveness of different wash solutions for EHEC removal. For survival and adherence 10 million EHEC were placed onto pieces of lettuce, washed with different wash solutions (chlorinated water, alcohol solutions, and distilled water), stored at room temperature for 0, 1, 2, 4, 6 hours and refrigerator for 0, 6, 24, 48 hours. For survival, a plate count will determine the number of bacteria. I expect the longer exposure time resulted in higher number of EHEC and lettuce washed with chlorinated water gives better removal compared to lettuce washed with other wash solutions.

## **18. Taking a Deeper Look at Biological Tubes & Structural Proteins in C.elegans**

Drew Kampmeyer

*Kelly Grussendorf, Faculty Mentor (Department of Biology)*

The interactions that occur within epithelial tube structures, which are found in the many organs in the human body, are very complex. We are looking at a family of proteins known as ezrin-radixin-moesin (ERM), which plays a role in the morphogenesis and maintaining the shape of these tubule structures. These proteins serve as an important point of interest as they uphold and maintain the architectural stability of these tubes as well as the fundamental structure of many cells. One of the proteins in this family has been shown to act as a linker between the membrane proteins and the cytoskeleton, erm-1, which helps provide structure in cells. To gain a better understanding of these proteins, we have been carrying out a variety of genetic tests of erm-1 in the model organism Caenorhabditis elegans. C.elegans have a large single-celled excretory canal providing a simple model to study. These tests consist of setting up selective matings to introduce a marker protein into the canal of a worm that contains a mutation that stops production of the ERM-1 protein. These offspring are being analyzed under fluorescence for any canal abnormalities, and are being evaluated for severity. If the tubes of these worms appear to be structurally altered compared to normal worms; a second mating will be set up that will illuminate the subcellular components to study irregularities within the canal. This data will be further analyzed to determine the role that erm-1 plays in methodological repair and maintenance of these tubule structures.

## **19. Optimization of the Presence of an Actin Capping Protein Transgene in Genetically Modified Mice**

Tyler Koonst

*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*

Actin Capping Protein (CP) is a heterodimer composed of an alpha and beta subunit, which binds to the barbed ends of actin filaments. Three isoforms of alpha ( $\alpha 1$ ,  $\alpha 2$ ,  $\alpha 3$ ) and beta ( $\beta 1$ ,  $\beta 2$ ,  $\beta 3$ ) subunits have been identified. To evaluate the functions of the beta isoforms, a transgenic line of mice was produced that added additional copies of the  $\beta 2$  isoform of actin capping protein under the control of the myosin heavy chain promoter. The transgene is expressed in the cardiac muscle post gestationally. As such, the integrity of the strain is subject to anyone involved with the colony, including caretaking and husbandry. The colony is now 14 years old and to continue research with constancy, the transgenic mice must be genotyped. Genomic DNA was isolated from wild type and transgenic by digestion of tail clippings. The DNA was purified by phenol/chloroform extraction and precipitated by the addition of ethanol. We are using Polymerase Chain Reaction (PCR) to amplify the transgene using myosin heavy chain and beta two specific primers. We have optimized the buffer, annealing temperature and other PCR variables. The transgene is approximately 1647 base pairs. An internal fatty acid binding protein (FABPI) generated a product of 466 base pairs. The results of this project will be utilized in all subsequent research of the colony as evidence of quality control in specimens.

## **20. Localization and Expression Level of Vascular Endothelial Growth Factor after Partial Hepatectomy of WKY Rats**

Adam Kronebusch & Tyler Koonst

*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*

Inflammation and fibrosis are indicative of liver regeneration following injury and chronic liver diseases, such as cirrhosis and hepatocellular carcinoma. The formation of new vasculature via the process of angiogenesis is vital to the pathological progression of liver regeneration and these diseases. Thus, inhibiting the process of angiogenesis could have the potential to stop or slow the progression of chronic liver diseases. Vascular endothelial growth factor (VEGF) is the most potent and specific growth factor for initiating the process of angiogenesis, making it a prime target to inhibit angiogenesis. Bevacizumab is an antibody that binds to VEGF, inhibiting it from initiating angiogenesis. To investigate the effect that bevacizumab had on VEGF, we determined the localization and expression levels of VEGF after partial hepatectomy in Wistar-Kyoto rats using quantitative immunofluorescence. The tissue samples (n=5) consisted of four groups. Group 1 received no treatment and served as the negative control. Group 2 received bevacizumab treatment without hepatectomy and group 3 had a hepatectomy without bevacizumab treatment. Groups 2 and 3 served as controls to bevacizumab treatment and hepatectomy, respectfully. Group 4, the experimental group, had both hepatectomy and bevacizumab treatment. Western Blot analysis confirmed a significant increase in the level of VEGF in rats receiving partial hepatectomy treatment only. To determine the expression level of VEGF in cells/tissues, we prepared cryosections and probed with a fluorescently labelled anti-VEGF. Digitized images were captured using Simple PCI and localization pattern and expression level determined. Our results have broadened our understanding of chronic liver diseases.

## **21. Rubidium Uptake in Isolated Rat Cardiomyocytes**

Jooung Lee, Jaekook Sim, & Karleen Doering

*Michael Bentley, Faculty Mentor (Department of Biology)*

The element rubidium is known to have similar biological impact as  $K^+$  ions and some studies have shown that heart tissue takes up rubidium through  $K^+$  channels and  $Na^+/K^+$  ATPase pumps. The purpose of the research was to confirm whether or not rubidium was transported into individual cardiomyocytes. Rubidium may be used as a marker to study different physiological functions of  $K^+$  and its channels and pumps. The methods used are mainly two parts: isolation of single heart cells and treatment with rubidium. Isolated heart cells were obtained by anesthetizing a rat, extracting the heart, and infusing its aorta with cell isolation buffer (CIB) solution, and then a digestive enzyme solution containing collagenase, trypsin, and protease. The heart was cut into small pieces to further separate individual cells at  $37^\circ C$ . Once the cardiomyocytes were isolated, they were treated with Tyrode solution containing a physiological concentration of rubidium chloride. Cells were freeze dried and examined using a scanning electron microscope (SEM) equipped with an Energy Dispersive X-Ray Spectroscopy System (EDS) to determine the amount of rubidium that was taken up by the cells. It is expected that there will be an uptake of rubidium cardiomyocytes by means of  $Na^+/K^+$  ATPase pumps and  $K^+$  channels like  $K^+$ . These ATPase pumps are essential in creation of concentration gradient and membrane potentials in most cells and  $K^+$  has many critical roles from muscle contraction to regulation of nerve conduction and propagation in heart cells.

## **22. Examination of Human Embryonic Kidney cells and Cardiomyocytes using Glass Microcarrier Beads and Scanning Electron Microscopy**

Jaekook Sim

*Marilyn Hart, Mentor (Interim Associate Dean of Science, Engineering & Technology)*

*Geoffrey Goellner, Faculty Mentor (Department of Biology)*

*Michael Bentley, Faculty Mentor (Department of Biology)*

Alterations of sarcomeric proteins lead to disruption of myofilaments and are associated with hypertrophic cardiomyopathy. We have identified a genetically altered mouse strain with an elevated level of actin associated protein and are characterizing the nature of the hypertrophy by examining the cultured cells on glass microcarrier beads using Scanning Electron Microscopy (SEM). Beads provide a surface for cell growth and division and subsequent analysis of myocyte morphology. This study requires the establishment of primary embryonic cardiomyocyte culture which is difficult to establish. Therefore in initial studies to acquire the necessary tissue culture skill, we cultured Human Embryonic Kidney (HEK) cells. Confluent HEK cell cultures were established and the cells used to plate collagen coated dextran microcarrier beads ( $60-87\mu m$ ) using varying bead concentrations. The cells were plated at low density, incubated at  $37^\circ C$  for four days in the presence of 5%  $CO_2$ . The cells, attached to the microcarrier beads, were preserved by fixation in 2.5% glutaraldehyde and visualized using SEM. The shape, size, and filopodia of the HEK cells were characterized, demonstrating the feasibility of this technique. We are currently establishing primary cell cultures of mouse embryonic cardiomyocytes, from both wild type and genetically altered mice with known sarcomeric disarray. The individual myocytes will be analyzed for alterations at the cellular level.

### **23. Photodegradation of Roundup Ready and Reduced-Lignin Corn Stover During Spring Thaw**

Erika Magnusson

*Christopher Ruhland, Faculty Mentor (Department Biology)*

*Alan Mickelson, Graduate Student Mentor (Department of Biology)*

Litter decomposition is one of the largest contributors to terrestrial biosphere carbon fluxes and nutrient cycling. Photodegradation is the breakdown of plant litter via solar radiation that may increase decomposition rates and lead to changes in carbon and nutrient cycling between plants, soil and the atmosphere. Decomposition of plant litter in the winter is mainly driven by microbial factors, which could prime photodegradation during spring thaw events. Litter degradation could be accelerated by ultraviolet (UV) and visible wavelengths. Lignin strongly absorbs UV radiation, and litter that contains high concentrations of this polymer may be more susceptible to photodegradation. In addition, litter with high lignin content has been shown to be recalcitrant against microbial decomposition and may be slow to break down. The Brown Midrib (BMR) mutation in *Zea mays* (corn) with reduced lignin content is commonly grown in Minnesota for an ideal forage feedstock. After harvest, corn remnants are often left on the field to decompose over winter and the following spring. We examined the role of UV in photodecomposition of BMR and Roundup Ready corn stover. Litter was placed in UV-transparent and UV-attenuating litter bags in a Southern Minnesota agricultural field. We examined mass loss of litter over a 12-week period and measured concentrations of cellulose, hemicellulose and lignin with a fiber analyzer. Our results should help elucidate the role of photodecomposition of corn stover in agricultural settings.

### **24. Role of the ApeE Esterase in the Growth of Salmonella on Phospholipids as Phosphate Sources**

Stella Menuba

*Christopher Conlin, Faculty Mentor (Department of Biology)*

*Salmonella enterica* serovar Typhimurium, a bacterium frequently implicated in outbreaks of food poisoning, is able to survive in limiting phosphate environments by inducing a number of proteins that allow it to use a variety of compounds as phosphate sources. The gene *apeE* is induced when the cells are starved for phosphate. This gene encodes an outer membrane esterase that is not found in *E. coli*, and has been shown to be necessary for the growth of *Salmonella* Typhimurium in phosphate-limiting environments, such as those that may be encountered in an egg. To demonstrate the role of *apeE* in these environments, wild type and *apeE* mutant strains of *Salmonella* Typhimurium were separately tested for growth on minimal medium containing either phosphatidylcholine or lisophosphatidylcholine as phosphate sources. Growth was observed for the wild type strain in the presence of both phosphate donors, but no growth was observed for the *apeE* mutant. To further support the role of *apeE* in the growth of *Salmonella* Typhimurium under phosphate-limiting conditions, other purified phospholipids as well as egg yolks will be tested for their ability to support the growth of both strains.



## **25. Carriage of Methicillin Resistance in Coagulase-Negative Staphylococci**

Christa Moller

*Timothy Secott, Faculty Mentor (Department of Biology)*

Methicillin-resistant *Staphylococcus aureus* (MRSA) is becoming more commonly encountered in clinical settings. The prevalence of methicillin resistance in *Staphylococcus* species other than *Staphylococcus aureus*, and therefore the potential for the former to serve as a reservoir for methicillin resistance has not been studied in great detail. *Staphylococcus* species isolated from students as part of a class exercise in Medical Microbiology in 2012 were screened for resistance to oxacillin, which is similar to methicillin and is prescribed much more frequently. The identification of isolates was verified, and isolates were screened on oxacillin screening agar plates. Isolates that screened positive for oxacillin resistance were tested further to determine the minimum concentrations of oxacillin necessary for growth inhibition (MIC testing). Putative oxacillin-resistant isolates were also tested for the presence of *mecA* using the Polymerase Chain Reaction (PCR). Five of 46 *Staphylococcus* isolates (10.6%) were oxacillin resistant when tested on oxacillin screening agar. None of the resistant isolates was identified as *S. aureus*. MIC testing revealed that 4 of 5 isolates were resistant to oxacillin, and 3 of 5 isolates contained the *mecA* gene, supporting the characterization of these isolates as oxacillin resistant. These data demonstrate the potential for coagulase negative staphylococci to serve as a reservoir for oxacillin resistance.

## **26. Morphological Analysis of Chemical Elements in Fish Scales**

Ethan Nichols, Natacha Tasha, & Henruka Abugre

*Michael Bentley, Faculty Mentor (Department of Biology)*

Fish scales are thin plates of bone that grow in concentric rings according to seasonal cycles. During this growth there is mineralization of hydroxyapatite ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ) and incorporation of other chemical elements. The incorporation of these elements may occur according to the seasonal growth of the scales. In this study, we used a scanning electron microscope (SEM) equipped with an x-ray energy dispersive spectroscopy system (EDS) to examine fish scales from various Minnesota species. This system provides a means to identify the chemical elements and map their location in relation to the growth rings. Our results indicate that the scale's chemical composition is very similar to that of bone. In addition to calcium, phosphate, oxygen, carbon, and nitrogen that are normal components of bone tissue, other elements such as aluminum and magnesium were found in growth rings of the scales. This study suggests a potential means to detect and localize pollutants (e.g. lead, mercury, and arsenic) that have been incorporated into the bone tissue in relation to the seasonal growth of the fish.

## **27. Mapping the Spatial and Temporal Expression Pattern of Chst15 mRNA in the Cochlea of Euthyroid Mice Throughout Development**

Andrew Nicholson & Cari Graber

*David Sharlin, Faculty Mentor (Department of Biology)*

Hypothyroidism is a state or condition in which there is an insufficient amount of thyroid hormone production. Pregnant women with hypothyroidism, or children born with congenital thyroid disorders, are known to suffer from developmental and neurological dysfunctions such as deafness or mental retardation. Research has pinpointed a cell-dense area in the cochlea known as the greater epithelial ridge (GER) as a major site of thyroid hormone action. This region has the highest concentration of thyroid hormone receptors in the developing cochlea, indicating it is a target of thyroid hormone signaling. Screening for genes that are responsive to thyroid hormone in the GER identified carbohydrate (N-acetylgalactosamine 4-sulfate 6-O) sulfotransferase 15 (Chst15) as a candidate for thyroid hormone receptor target gene. Interestingly, Chst15 was recently identified as one of several genes missing in a large chromosomal deletion of a spontaneous deaf mouse line. Our research is aimed at mapping the spatial and temporal expression pattern of Chst15 mRNA in the cochlea of euthyroid mice throughout development and to determine whether the normal expression of Chst15 mRNA is disrupted following developmental hypothyroidism. To test this, we harvested cochlea from hypothyroid and euthyroid controls at postnatal days 1, 5, and 7. After cryosectioning, in situ hybridization, which detects the localization of mRNA in tissues, was completed. Preliminary results indicate that Chst15 expression decreases as development proceeds and that hypothyroidism delays this decrease. These results support Chst15's involvement in proper cochlear development and implicates Chst15 as a potential deafness gene misregulated in hypothyroidism.

## **28. Biofilm Formation by Escherichia coli csgA and fimA mutants**

Nicole Snyder & Sean Willaert

*Timothy Secott, Faculty Mentor (Department of Biology)*

Biofilms are a structured community of bacterial cells enclosed in a self-produced polymeric matrix and adherent to an inert or living surface. These structures and the organisms that cause them can pose a very serious problem if they colonize on medical devices. This is because biofilms have the ability to communicate within the colony and with other organisms that might attach to the surface, acting like a community working together. Biofilms allow the organism to be resistant to harsh and unfavorable conditions allowing them to survive longer and spread. Several genes in Escherichia coli have been associated with biofilm formation by that organism. Many of those genes encode surface appendages such as flagella, fimbriae, and pili. We created mutations in genes encoding curli (csgA) and fimbriae (fimA) with the aim of comparing their ability to form biofilms. The respective genes were disrupted with a kanamycin resistance gene and selected on kanamycin-containing agar. Biofilm formation in nutrient-rich medium and minimal medium is currently in progress, and the ability of the mutant E. coli strains to form biofilms will be compared with that of the parent wild type strain using a crystal violet microplate assay.

## **29. Bone Microvasculature of Male Mice with Reduced Testosterone Levels**

Katie Sonnabend & Nicholas Jobeun

*Michael Bentley, Faculty Mentor (Department of Biology)*

Bone is a highly vascular structure that is dependent on local blood supply for its proliferation, tissue remodeling capability and hence its sustainability. Bone growth was reduced in research involving ovariectomized mice with deficient estrogen levels. This reduction is correlated with a loss of vital blood supply and further supports previously established physiological relationships between estrogen deficiency and the onset of osteoporosis. While the link between osteoporosis and estrogen has been extensively studied, less research has been conducted on the correlation between osteoporosis and testosterone suppression. Since the structure of testosterone is very similar to that of estrogen, it is also believed to play a role in maintaining vasculature tissues. As a result, it is probable that testosterone suppression influences osteoporosis. Dissolving skeletal fragments in KOH and isolating the subsequent casts of plastic (Mercox resin) infused bone microvasculature from normal type mice has allowed us to establish a standard density and configuration of these tissues. Microscopy reveals notable vascular density and branching as well as maintenance of compact bone. The structure and integrity of these tissues suggest their ability to thrive under normal conditions. By obtaining and isolating bone microvasculature in castrated male mice with testosterone deficiencies we will be able to make comparisons to normal tissue and explore the possibility of a link between testosterone and vascular maintenance. Ultimately, we hope to provide further evidence for or against the link between testosterone suppression and osteoporosis.

## **30. Effects of Strontium in the Bone Density of Mice**

Kali Trukki, Ashley Ledding, & Rachel Ledding

*Michael Bentley, Faculty Mentor (Department of Biology)*

Dietary strontium is readily incorporated into bone tissue of rodents. In prior studies dietary strontium has been shown to inhibit calcium metabolism and has further been shown to prevent osteopenia in ovariectomized rats. In the present study, we evaluate changes in bone density of mice receiving low calcium diet and strontium chloride in the drinking water. The study includes 14 of male mice. A surgical procedure was performed to remove the testes from all of the mice through two small incisions in the scrotal area. The mice were put under anesthesia using isoflurane gas and received 0.02 ml dosage of Rimadyl post-surgery to help with pain. The surgery followed our Institutional Animal Care and Use Committee approval guidelines. All of the mice are weighed by group on a weekly basis to document weight gain and consumption of water and chow. After two months of the water and diet regimen the mice will be euthanized by carbon dioxide inhalation and the long bones will be dissected for analysis with a JEOL 6510 scanning electron microscope (SEM) equipped with a Thermo Noran silicon-drift energy dispersive spectroscopy (EDS) system. This system provides a means to measure strontium, calcium, phosphorous, and other mineral elements in bone tissue. We anticipate finding strontium incorporation and increased bone density in the mice using the Strontium Chloride and low calcium water and food regiment.

### **31. Mechanical Removal of Juniper and its Effects on Plant Diversity**

Kyle Van Vleet

*John Krenz, Faculty Mentor (Department of Biology)*

*Christopher Ruhland, Faculty Mentor (Department of Biology)*

The increase in density and distribution of juniper (*Juniperus* spp.) in sagebrush communities throughout the Western United States, primarily as a result of fire suppression and historic overgrazing, has raised concerns among land managers and ranchers due to the detrimental effects of juniper on livestock forage species, and wildlife habitat. Juniper may dominate sagebrush communities because it may decrease understory plant cover and is more proficient in accessing deep soil waters than common competitors in the area. The main objective of this study was to examine how removal of juniper by mechanical means may affect species richness and abundance of forbs in the immediate surrounding area. We estimated species richness and abundance of forbs in three treatments: live juniper, removed juniper (stump present with masticated juniper materials), and non-juniper (no live juniper tree or stump present). Removed juniper sites had 62% more species than live sites ( $p < 0.001$ ), and 21% more species than non-juniper sites ( $p = 0.001$ ). Abundance of forbs in live juniper sites was 54% lower than removed juniper sites ( $p < 0.001$ ), and 63% lower than non-juniper sites ( $p < 0.001$ ). Some related research supports our findings, however previous work also shows that understory responses and successional patterns following mastication of juniper may be highly site specific and governed by a number of factors, such as soil characteristics, seedbed composition, pretreatment site diversity of forbs, means of removal, and more. Understanding of successional patterns, plant community dynamics and long-term trajectories in regards to removal of juniper by mastication is crucial for long-term management planning.

### **32. Development of a Cochlear Specific Cre Recombinase Expression Vector For Targeted Gene Inactivation**

Abrar Zawed

*David Sharlin, Faculty Mentor (Department of Biology)*

Low thyroid hormone production during a critical period of development delays remodeling process within cochlea which results in permanent auditory deficits. Unfortunately, there is large gap in understanding the molecular mechanisms that thyroid hormone regulates to control cochlear development. This project is developing an in vivo molecular tool that allows targeted gene inactivation in the greater epithelial ridge; a transient cochlear structure that is remodeled under the influence of thyroid hormone. The tectorin-alpha (TectA) gene is produced almost exclusively by cells of the GER. Considering this restricted expression pattern of TectA and our desire to generate a molecular tool for gene inactivation, we are developing a DNA construct that expresses Cre recombinase under the control of the TectA gene promoter. A 6kb TectA promoter fragment that flanks 6kb upstream of the TectA translational start codon is identified and being amplified using the PCR with appropriate primers, C57B1/6J genomic mouse DNA as a template, and a high fidelity PCR enzyme to reduce the introduction of unwanted mutations. After successfully amplification and cloning of the promoter fragment, restriction enzyme digests will be used to release the promoter region that will be subcloned, in frame, to a cre recombinase cDNA cassette. Commercial DNA sequencing will verify the final TectA promoter-Cre recombinase plasmid. We anticipate that in vitro testing will demonstrate Cre expression localized to GER cells and a future transgenic mouse line generated from the vector will be a useful molecular tool for investigating the role of candidate thyroid hormone receptor targets genes.

### **33. Effect of Artificial Sweeteners on the Renin-Angiotensin System in Rats**

Jacob Ball

*Theresa Salerno, Faculty Mentor (Department of Chemistry)*

Normal abundant dietary sugars such as fructose and glucose can contribute to hypertension and other health issues. To avoid these health complications, many individuals use artificial sweeteners. An equivalent intake of some artificial sweeteners also can lead to hypertension. However, Stevia, a sweetener that is isolated from a Paraguayan plant, was shown in relevant literature to decrease blood pressure in both rat specimens and humans. The general purpose of this research project was to study the effect of Stevia and glucose on the expression of two key components of the renin-angiotensin-aldosterone system (RAAS): prorenin receptor (PRR) and angiotensin receptor type 1 (AT1). Increased expression of renin and angiotensin can lead to vasoconstriction and systemic hypertension. Their effects are mediated by their binding to PRR and AT1. Therefore, decreases in the expression of these receptor proteins can result in lowered blood pressure. Rats were fed diets supplemented with glucose, saccharin, or Stevia over a six-week period and the kidneys were obtained. qPCR designs were developed to measure the relative amounts of PRR receptor and AT1 receptor. The methods had efficiencies greater than 97% and gave reproducible results. Then the developed methods were used to measure the expression of AT1 and PRR in the different rat kidney samples. Preliminary results with a small sample group suggest that glucose might cause an increase in the expression of both AT1 and PRR compared to the standard diet. Further experimentation will also document the effects of short-term exposure to Stevia in the diet.

### **34. Analyzing the Effects of Isovaleraldehyde and Cuminaldehyde on DNA**

Jenna Bowman

*Danae Quirk Dorr, Faculty Mentor (Department of Chemistry)*

*Mary Hadley, Faculty Mentor (Department of Chemistry)*

Normal cells in the human body grow, divide, and die uniformly. If the normal cell's DNA gets damaged, the cell will either repair it or die. Cancerous cells are cells that continue to grow instead of dying, so when a cancerous cell's DNA is damaged the DNA will not be repaired, nor will it die off. The cancerous cell will continue to replicate the damaged DNA. This research involves the possible reaction of isovaleraldehyde and cuminaldehyde with DNA. This could cause damage to the cell's DNA, and possibly lead to cancer. Isovaleraldehyde is found in various types of flavors, fragrances, and pharmaceuticals. Cuminaldehyde is used in perfumes and cosmetics. Since we are exposed to these aldehydes, I wish to determine if they will react in vitro with nucleosides found in DNA. Isovaleraldehyde and Cuminaldehyde were allowed to react individually with 2'-deoxyguanosine, 2'-deoxycytosine, thymidine, and 2'-deoxyadenosine with dimethyl sulfoxide at 70°C for 48 hours. These reactions were conducted with and without the presence of arginine. <sup>1</sup>H NMR spectra was obtained for each reaction mixture, and analyzed in order to determine if a product had formed.

### 35. Structural Factors Affecting the Rate of the Reaction Between Singlet Oxygen and Proteins

Danielle Hron

*John Thoemke, Faculty Mentor (Department of Chemistry)*

Reactions between singlet oxygen and proteins are important to many biological processes including cell death. To study aspects of this process, reactions between singlet oxygen and free amino acids are examined. Under visible light irradiation, Rose Bengal (RB) photosensitizes singlet oxygen production and furfuryl alcohol (FFA) is used as a molecular probe to measure singlet oxygen concentration. As irradiation proceeds, the concentration of FFA diminishes due to the reaction with singlet oxygen. When added to the irradiated solution, an amino acid that reacts with singlet oxygen will compete with FFA, and the rate of FFA consumption will decrease. Using a kinetic model, rate constants for the reactions between amino acids and singlet oxygen are determined. A similar approach is used to study the reaction between singlet oxygen and intact proteins including lysozyme, bovine serum albumin, and glyceraldehyde 3-phosphate dehydrogenase. These proteins were selected based on the location of amino acid residues that potentially react with singlet oxygen, allowing a test of the hypothesis that “accessible” residues located on the exterior surface of the protein are more reactive than residues that are “buried” in the interior of the protein structure. The measurement results are compared to predictions based upon a computational model of the relative accessibility of each residue within the protein structure.

### 36. Calcium Hydroxovanadate Synthesis

Tigist Hunde

*Lyudmyla Stackpool, Faculty Mentor (Department of Chemistry)*

Compounds with the apatite-type structure,  $M_5(ZO_4)_3X$  (where  $M = Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}$  etc.;  $Z = Si^{4+}, Ge^{4+}, P^{5+}, V^{5+}, As^{5+}$  etc.;  $X = OH^-, F^-, O^{2-}$ , etc.) are characterized by different properties and may be used as bioactive, laser and luminescent materials, sensors, solid electrolytes and adsorbents. Hydroxovanadates ( $Ca_5(VO_4)_3OH$ ) with apatite structure have enhanced catalytic properties [1] and have been used as carriers for palladium, ruthenium complexes, zinc, nickel, and copper compounds [2, 3] in heterogeneous hybrid catalysis. The purpose of this work was to study for more efficient method of  $Ca_5(VO_4)_3OH$  synthesis. Solid-phase synthesis and solid-phase synthesis from solutions using  $CaCO_3$  and  $NH_4VO_3$  as initial reagents were considered and studied by X-ray powder diffraction. Ceramic synthesis of calcium hydroxovanadates ( $Ca_5(VO_4)_3OH$ ) can be performed at temperature of at least  $900^\circ C$  after annealing for 24 hours. Due to the better homogenization of the constituents of the resulting compound through solubilization, solid-phase synthesis of single-phase product from nitric-tartaric solution can be carried out at much lower temperature of  $650^\circ C$ , after annealing for only 7 hours and this method appears to be more advantageous. 1. T. Hara, S. Kanai, K. Mori, T. Mizugaki, K. Ebitani, K. Jitsukawa and K. Kaneda, *J. Org. Chem.*, 2006, 71, 7455-7462. 2. K. Yamaguchi, K. Mori, T. Mizugaki, K. Ebitani and K. Kaneda, *J. Am. Chem. Soc.*, 2000, 122, 7144-7145. 3. K. Mori, K. Yamaguchi, T. Hara, T. Mizugaki, K. Ebitani and K. Kaneda, *J. Am. Chem. Soc.* 2002, 124, 11572-11573.



### **37. Further Investigating the Reactivity of Citral and Octanal toward DNA**

Brittany Leeder

*Mary Hadley, Faculty Mentor (Department of Chemistry)*

This year's research is looking farther into interaction of the natural occurring aldehydes citral and octanal. These compounds are found naturally in fruits, grasses and are in perfumes and essential oils. Some of these foods are oranges and lemons, but citral is found in a high percentage in lemongrass oil. The research conducted last year found that citral and octanal were able to interact with 2'deoxyguanosine. Further research will be conducted to see if an adduct can be purified and characterized to understand the interaction of DNA and the two aldehydes. In the past, a number of aldehydes have been found to covalently bind to DNA for example acrolein and malondialdehyde. If citral and octanal are able to bond to the DNA, it could potentially be used for preventative measures in diseases because it could lead to repair of the strand of DNA that could have been damaged. By using this repair when aldehydes bond to the DNA it could be used to prevent many diseases that occur from the mutation of DNA such as cancer. Cancer is a growing issue across the globe and looking to discover different options for the preventative treatment versus the current treatment would be very beneficial for society because of the close to 7.6 million people who die of cancer annually.

### **38. Degradation of Aquatic Pollutants via Photoproduced Reactive Intermediates: Investigation of Factors that Determine which Reactive Intermediates are Produced**

Abdikadir Mohamed

*John Thoemke, Faculty Mentor (Department of Chemistry)*

Dissolved organic matter (DOM) results from the accumulation of biomolecular fragments in natural surface waters, and plays a role in numerous environmental processes. There are two broad classification of DOM, with microbial DOM originating from biological activity in the water column, and terrestrial DOM originating from decayed plant material that enters a water body. In sunlit surface waters, a significant portion of the light is absorbed by DOM, leading to energetically excited states of DOM. These excited states then form highly reactive species, known as photoproduced reactive intermediates (PPRIs). These may include 3DOM\*(excited triple state DOM) and  $^1O_2$  (singlet oxygen). The PPRIs interact with a wide range of pollutants and play a key role in determining the ultimate environmental fate of many. In this research project, water samples from a variety of Minnesota lakes and rivers were classified and their relative yields of 3DOM\* and  $^1O_2$  determined. Probe molecules 2,4,6-trimethyl phenol (TMP) and furfuryl alcohol (FFA) were used to measure the reactivity of 3DOM\* and  $^1O_2$  respectively. We compared the rate of TPM depletion by 3DOM\* to the rate of FFA depletion by  $^1O_2$  to determine the relative amounts of the two PPRIs produced in each of the water samples. We have learned that the yields of both 3DOM\* and  $^1O_2$  are higher for DOM that is predominantly microbial in origin, compared to that of terrestrial origin.

### **39. Binding to Bovine Serum Albumin: Effects of Molecular Structure**

Michael Ntoka

*John Thoemke, Faculty Mentor (Department of Chemistry)*

Bovine Serum Albumin (BSA) is a model protein which has been used to investigate interactions between proteins and other substances. Prior work has shown that serum albumin plays a significant role in the body as a transport protein moving a broad range of substances through the bloodstream. The binding of different compounds such as rose Bengal (RB), methylene blue (MB) and avobenzene to BSA was studied using fluorescence spectroscopy. The fluorescence of BSA is primarily dependent upon tryptophan; therefore, if the binding to the protein is localized near a tryptophan residue, the fluorescence signal will be diminished (known as quenching). BSA is known to have two binding sites, site I and site II. A tryptophan residue is present in site I so the degree of quenching for compounds bound to site I should be greater than that of compounds bound to site II. The shape, size, and polarity of sites I and II are unique accounting for the different binding specificities, and allows for testing the hypothesis relating the molecular structure of the bound molecule to its preferred binding site. Our data indicate that RB binds strongly to BSA site I and MB binds to BSA site II. The data for avobenzene suggests a similarity with that of MB; we therefore assume that it also resides in site II. For further studies, we will use the structural properties of various compounds to predict the site on BSA they will be bound to and verify our hypothesis.

### **40. Comparison of Protein Expression in Soy Bean by Two-Dimensional Electrophoresis**

Emma Phelps

*James Rife, Faculty Mentor (Department of Chemistry)*

Soybeans are an important crop that not only provide nutrition for humans and livestock, but are also a potential source of biofuels. However, it is estimated that 70% of yields are lost due to unfavorable environments. Studying the defensive mechanisms of soybeans may help increase yields. Soybeans produce enzymes called lipoxygenases, which are involved in the synthesis of molecules, such as methyl jasmonate that respond to stress. These proteins were the focus of our study. In this project, a two-dimensional gel electrophoresis method was developed to monitor changes in the expression of soybean leaf proteins in response to stress factors. This method allowed proteins to be separated based on their isoelectric point, or the pH at which they have no net charge, and their molecular weight. Edamame “Be Sweet 292” beans were grown to the trifoliolate stage and treated at about three weeks post-emergence. The plants were treated either by wounding with forceps, exposure to methyl jasmonate, or both. Control plants received no treatment. The leaf tissue was harvested 24 hours after the initiation of treatment and frozen with liquid nitrogen. The protein extraction procedure was modified from Sarma et al. (2008 Analytical Biochemistry, 379, 192-195). Proteins were separated by isoelectric focusing on BioRad IPG strips with a pH range of 3-10. They were then separated by SDS electrophoresis using Criterion XT 12% Bis-Tris gels and stained with gel code blue. This project will focus on the visualization of high molecular weight proteins such as lipoxygenase.

#### **41. Exploring the Role of miRNA 393 in Soybean Stress Response**

Dulanjani Rajaguru

*Jame Rife, Faculty Mentor (Department of Chemistry)*

MicroRNAs (miRNA) are small non-coding RNAs about 22 nucleotides in length which function in regulating gene expression. miRNAs regulate protein synthesis by degrading mRNA, blocking initiation of protein synthesis and causing translocation of mRNA to processing bodies. Growing evidence indicates that miRNAs regulate a variety of biological processes. In plants, they regulate leaf, flower, root and vascular development as well as stress and defense responses. It has been predicted through sequence comparison studies that soybean miRNAs are associated with biological and environmental stress. In this project the role of miR393 in soybean stress responses was explored. Soybean (Edamame, “BeSweet 292”) were grown in a growth chamber. Plants (18 days post emergence) were treated to drought conditions, treated with abscisic acid (a hormone associated with root stress) or auxin (a hormone stimulating root growth) and control treatment. Root tissue was harvested, frozen in liquid nitrogen. Small RNAs were isolated using a mirVana microRNA isolation kit. cDNA copies of the purified miRNA were prepared by reverse transcription using a microRNA Reverse Transcription kit. Quantitative Polymerase Chain Reaction (Q-PCR) was used to measure levels of mir393.

#### **42. Further Examination of Formed Adducts from the Reactions of Decanal and Trans-2-Decenal with Each Nucleoside of DNA**

Neil Ranals

*Danae Quirk-Dorr, Faculty Mentor (Department of Chemistry)*

*Mary Hadley, Faculty Mentor (Department of Chemistry)*

Organic substances containing decanal and trans-2-decenal have been touted to potentially possess anti-cancer properties. Since it has also been reported that chemical reactions involving biological and synthetic factors often form adducts with DNA, the anti-cancer properties of decanal and trans-2-decenal may be due to formed adducts with DNA. These formed adducts could terminate cancer-causing replication in cells. The purpose of this research was to further examine the adducts that formed from the interactions of two aldehydes, decanal and trans-2-decenal, with guanosine and explore potential reactions between these aldehydes and the nucleosides 2'-deoxyadenosine, 2'-deoxycytidine, and thymidine. Past research showed that L-arginine promotes the reactivity of aldehydes toward DNA, so it was utilized in these reactions. These reactions of the aldehydes with the each nucleoside, at 70°C for 48 hours, were analyzed via <sup>1</sup>H NMR and HPLC. In addition to the reactions described above, Macro-scale reactions of each aldehyde with guanosine were conducted to obtain a greater quantity of adduct for purification and structural determination. The reactions were monitored by TLC and silica gel column chromatography was used in the purification of the formed adducts. <sup>1</sup>H NMR, HPLC, and UV spectroscopy were utilized in the partial characterization of the formed adducts. Determining the structure of the adducts formed in these reactions may give insight into the reported anti-cancer properties of these compounds.

#### **43. Quantifying Hydroxyl Radical in Natural Waters: Role of Dissolved Organic Matter in Determining Production Rates**

Andria Sellner

*John Thoemke, Faculty Mentor (Department of Chemistry)*

Reactive oxygen species, such as the hydroxyl radical, have gained more attention over the last several years due to their presence in natural water sources. These oxygen species are highly reactive and generated from the photochemical reaction between sunlight and dissolved organic matter. The concern for these species is their potential role in transforming other chemical pollutants. The presence of hydroxyl radical in natural waters has been determined but its high reactivity makes it difficult to quantify. We used a molecular probe, terephthalic acid, to quantify hydroxyl radical. Terephthalic acid binds selectively to hydroxyl radical forming 2-hydroxyterephthalic acid, which is measurable using high performance liquid chromatography with fluorescence detection. In this study, the hydroxyl radical was created by exposing nitrate solutions to ultraviolet light (UVB 320-290nm). Although nitrate has been found to contribute to the production of hydroxyl radical, we determined that under the conditions prevailing in surface waters, it plays a minimal role compared to the amount produced by dissolved organic matter. We also discovered that nitrate exposed to natural light (UVA 400-320nm) produces significantly less hydroxyl radical than nitrate exposed to UVB. This detection method has also been used to determine how the origin of dissolved organic matter (terrestrial vs. microbial) affects the concentration of hydroxyl radical produced.

#### **44. Formation of Iron-Molybdenum-Sulfide Phase(s) in Anoxic Natural Waters**

Emma Stong

*Trent Vorlicek, Faculty Mentor (Department of Chemistry)*

Coastal anoxia is a proliferating environmental problem. Knowledge of the controls on anoxic incidents may assist in creating strategies for mitigating dead zone development. While the unique geochemistry of Mo may provide the means to acquiring this knowledge, interpreting Mo records is hampered by an incomplete understanding of Mo deposition chemistry. While thiomolybdates ( $\text{MoO}_4\text{-nSn}^{2-}$ ;  $n = 0\text{-}4$ ) are believed to play a role in Mo removal, the final sedimentary product remains unknown. Some suggest Mo deposition ultimately involves uptake of  $\text{MoO}_4\text{-nSn}^{2-}$  by pyrite surfaces. Others claim sequestration involves precipitation of an iron-molybdenum-sulfide (Fe-Mo-S) mineral. This research aims to begin resolving such disputes. Buffered solutions initially containing 70 mM  $\text{Fe}^{2+}$ , 70 mM  $\text{MoS}_4^{2-}$ , and  $\Sigma\text{S}^{2-} = 20$  mM at pH = 8.5 experience quantitative loss of  $\Sigma\text{Fe}$  and  $\Sigma\text{Mo}$ , indicating precipitation of an Fe-Mo-S phase(s). Ongoing experiments are designed to characterize the Fe-Mo-S solid(s) and quantify stability constant(s).

#### **45. Quorum sensing molecules for unicellular organisms: Spectroscopic and computational study of conformational behavior**

Daniel Tollefson

*John Thoemke, Faculty Mentor (Department of Chemistry)*

Quorum sensing plays a vital role in unicellular communications. Until recently, it was thought that unicellular bacteria were non-cooperative; that they did not communicate among each other as a larger community. They do, in fact, communicate via small molecules that are created and released into the extracellular environment. Detailed knowledge regarding the interactions of these quorum sensing molecules (QSM) with the molecular and cellular-scale environments can lead to the manipulation of quorum sensing within a population. The function of these molecules requires that they can readily diffuse through the polar environment of aqueous solution and the nonpolar environment of cell membranes. The goal of this research is to see if there are any structural trends between a number of QSMs as these molecules enter an intracellular environment from an extracellular environment. We used infrared spectroscopy in conjunction with computational chemistry to study a class of QSMs named N-acylhomoserine lactones (AHLs), which, when found in nature, have varying acyl chain lengths, saturation levels, and oxidation states. Solutions of QSMs were prepared in water and octanol to replicate, respectively, the extracellular and cell membrane environments. Examination of the spectral data reveals the conformational differences of the QSMs in the different solvents, while, computational modeling of the structures and the conformational changes helps to validate the spectral interpretation and to visualize the role played by the QSM structures in performing their biological functions.

#### **46. Analysis of Lipoxygenase 9 and 10 in Soybean Root by Q-PCR**

Robera Yahya

*James Rife, Faculty Mentor (Department of Chemistry)*

Lipoxygenases are nonheme iron-containing enzymes which catalyze the addition of molecular oxygen to polyunsaturated fatty acids to form fatty acid hydroperoxides. Lipoxygenases are known to be involved in plant growth and development, lipid metabolism and nitrogen storage. Plants such as soybeans have many different lipoxygenase forms. LOX9 and LOX10 are two lipoxygenase forms that are less studied than others. It has been reported that the gene for LOX9 was highly induced in soybean roots infected with soybean cyst nematode, and LOX9 and LOX10 are involved in the development of nodules in soybean roots. Soybean plants (Edamame “BeSweet 292”) were grown for 6 weeks. The plants were separated into four groups. One group was untreated to be used as control; another group was not watered to see the effect of drought while the last two groups were treated with growth regulation hormones Abscisic Acid and Auxin. After the plants were separated and treated, the roots were harvested. RNA was isolated using a MicroRNA isolation kit from Applied Biosystems. The large mRNA fraction was used for this project. Once RNA was isolated, cDNA copies of the mRNAs were prepared using Reverse Transcription. Quantitative Polymerase Chain Reaction (Q-PCR) was used to measure changes in the levels of the cDNAs for LOX9 and LOX10. SYBR Green was used to monitor the Q-PCR reaction.

#### **47. The Effect of Artificial Sweeteners on the Expression of microRNAs in Rat Kidneys**

Natalie Young

*Theresa Salerno, Faculty Mentor (Department of Chemistry)*

Stevia is an artificial sweetener designed to lower calorie use and reduce blood sugar. It is a modified oligosaccharide made up of three glucose molecules and a cyclic alcohol called steviol. Limited research studies have suggested that it might reduce blood pressure, but no evidence has been provided for the mechanism. There are many molecular players that control blood pressure and hypertension. Some of these proteins are part of the renin angiotensin system (RAS). Activation of both the angiotensin receptor 1 (AT1) and the prorenin receptor (PRR) result in the production of other proteins that increase blood pressure. MicroRNAs are short non-coding RNAs that bind to the 3' un-translated region of targeted mRNAs and prevent them from making their proteins. MicroRNAs have been shown to decrease the expression of PRR and AT1 so they have potential to regulate blood pressure and hypertension. MiR-152 has been shown to repress the expression of PRR in retinal cells. High levels of MiR-132 have been associated with lowered AT1 expression. Therefore, MiR-152 and MiR-132 may affect hypertension and blood pressure. In this study male Wistar-Kyoto (normo-tensive) rats were given a diet of unsweetened osmolite, or osmolite sweetened with glucose, or saccharin, or stevia over a 6-week period. Kidneys were removed and frozen in liquid nitrogen. After microRNA isolation using the MirVANA kit (Ambion), qPCR methods were developed and validated for the quantitation of miR-132 and MiR-152 using U6 small nuclear RNA as the endogenous control. Preliminary results are inconclusive until more samples can be tested.

#### **48. The Heart Mountain Detachment, Wyoming: Processes Involved in a Mega-Block Slide**

Matthew Jaros

*Steven Losh, Faculty Mentor (Department of Geology)*

The Heart Mountain detachment is an enigmatic geological feature in northwestern Wyoming which exhibits unique faulting. These faults underlie a slide block, which was over a kilometer thick, has a 3000 km<sup>2</sup> area, and which moved tens of kilometers on a nearly level plane approximately 50 million years ago. Although the processes of this displacement have been debated for decades, this once wanderlust allochthon gives no transparent solution. The greatest mystery of Heart Mountain is the mechanics of faulting. Typically, the more movement there is on a fault, the thicker the zone of broken rock inside that fault. However, the Heart Mountain detachment faulting is commonly very narrow. It is evident that the slide block essentially glided on a very thin, frictionless surface, perhaps lubricated by a process called calcining, which releases carbon dioxide (CO<sub>2</sub>) from carbonate rocks in the fault at high temperatures (800°C - 1000°C). This process can cause fluidization of the carbonates, which produced clastic dikes located above the fault zones. If calcining was involved in the movement of Heart Mountain, where did all of the CO<sub>2</sub> go? To solve this mystery, we have conducted field work and sample collection and examined thin sections of faulted rocks by use of petrographic microscopy, cathodoluminescence (CL), and scanning electron microscopy (SEM). SEM, CL and other petrographic data will be presented to evaluate the processes that occurred during the faulting event.

#### **49. Anti-icing Effectiveness on Pavements Research**

Thu Nguyen & Andrew Pfeffer

*Stephen Druschel, Faculty Mentor (Department of Civil Engineering)*

Unpredictable weather can cause dangerous road conditions resulting in multiple car accidents and even deaths. Sodium chloride, better known as salt, has been the choice for ice control for many years. Another option to prevent dangerous roads before a storm can be the application of anti-icing chemical. Anti-icing is the timely applications of a chemical freezing-point depressants in advance of a winter precipitation event. In-depth research on characteristics of anti-icers can help transportation agencies know how long anti-icing chemicals are affective during different weather conditions. The purpose of this experiment is to test anti-icing chemicals on different types of pavements with various amounts of precipitation. Samples of asphalt, concrete and open graded pavements of varying ages will be obtained from MnDOT. Twenty anti-icing chemicals will be used for testing. Multiple rainfall scenarios will be tested by collecting runoff from each pavement type. Pavement types will be placed in constant temperature chambers at four selected temperatures (28, 20, 12 and 0 degrees Fahrenheit) to see the amount of ice that accumulates. The time the anti-icers are applied to the pavements will be recorded and compared to the amount of ice that forms from different time applications. The results of this experiment should help MnDOT assess what anti-icing chemicals are cost effective for certain pavement types. Results will also help to find the time lapse available to MnDOT of the anti-icing application before a storm leading to accurate preparation in storm management.

#### **50. Model Based Testing using Real-Time Embedded Software**

Sarzana Shabab & Faimi Ahmad

*Nannan He, Faculty Mentor (Department of Electrical Engineering)*

As a result of technological demands and advances, model based testing (MBT) using real-time embedded software (RTES) is slowly replacing the traditional methods of real time embedded systems testing and development. Although MBT is being used to accelerate the manufacturing process, much research is still needed since MBT is still a newer concept to most electrical engineers. The purpose of this research is to find a new type of testing method that is more accurate and takes shorter time to complete. The economical aspect of MBT with RTES shows the fact that it comes equipped with the commonly used products or parts and this eliminates the need for separately purchasing and mounting various parts into the system. Probability of accidents occurring during a MBT testing is zero since it uses computer interface. The procedure is brilliantly simple. The first step is to determine all the physical specifications of the product. In this case, the product used to verify the stated method will be a robotic arm. Step two is creating a virtual model or geometry of the product. Now, real-time simulations of the product can be executed. After the simulations are successfully executed, a hardware robotic arm will be purchased. The part will then be modified to meet the virtual specifications and it is run using Labview software. Results from both the virtual and hardware based testing are finally compared in the last step to determine the accuracy and efficiency of the whole procedure.

## **51. First Step Mental Health App**

Joshua Martin, James Faraday, & Mackenzie Lopez

*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*

The goal of this project is to create a tool that provides students at Minnesota State University, Mankato with mental health information through a freely available smartphone application (App). Our approach uses a software engineering design process that focuses on who our customers are, what resources are available, and how we can best connect the two to improve student lives. We identified the stakeholders involved and worked with campus mental health professionals to help shape our App. While there is a broad range of mental health topics, we have focused on materials related to depression. The first process gives the student a picture of their standing through a frequently used and freely available evaluation questionnaire. Depending on the results, the App provides supportive feedback in the form of materials that describe coping skills, ways to contact campus counselors, and other local community resources. We have incorporated artificial intelligence approaches to provide the most appropriate materials given the student evaluation. In addition, we have incorporated formal graphic design to make the App easy to use. The outcome is an App that is free for campus students, connects them to resources and can be improved upon by future developers.

## **52. Paint Book System Development**

Dale Boynton

*Winston Sealy, Faculty Mentor (Department of Manufacturing Engineering Technology)*

Jarraff Industries has a current Paint Book System which is out of date. The current system is simply pictures of the parts and part numbers for them. It has old versions of parts in it. This creates confusion when the current parts show up and look different. Also, new pictures have to be taken every time a new part is made, which creates a delay in the process to update the books. For a solution three different samples for new Paint Books were made to distribute to users and get feedback on what they liked and did not like about them. The sample that was most liked was picked. The first goal was to determine the formatting for the new Paint Books. Secondly, was to go through and make the complete list of parts which are painted and what areas of each part needs paint. The last goal was to design a system in which the books get updated without being forgotten. The findings showed the best format for the books was found. In this format, the books will be updated as soon as new parts are designed. The goals were to determine a better Paint Book System for Jarraff. This project concluded with a more efficient method for Jarraff's Paint Book System. This will create a more lean type of manufacturing without wasting time because of out of date books.



### **53. Buying a Car in Today's Society**

Amber Cederholm & Hannah Englin

*Winston Sealy, Faculty Mentor (Department of Manufacturing Engineering Technology)*

Buying new cars can be costly and used cars have a negative impact on the environment. Therefore, we need a way of addressing the two problems with a common solution. As college students, we pay more attention to our financial standings, especially as we are getting ready to enter the work force. Vehicles have become more of a necessity in our society and the depreciation in the value of new cars seems impractical. To overcome this, we can recycle older cars and use them to make new cars that are more efficient and last longer on the road. This would also lessen the extreme depreciation in the value of new cars when driven off the lot. Although new cars are becoming more environmentally friendly, they are decreasing in value. In addition, used cars are being discarded when the bulk of the vehicle can be reused. Recycling used cars to make new cars will keep the waste out of landfills and also lessen the overall manufacturing costs of raw materials. This in turn, will benefit not only consumers, but the environment.

### **54. 3D Printing of Stainless Steel for Engineering Applications**

Michael Doyle

*Kuldeep Agarwal, Faculty Mentor (Department of Manufacturing Engineering Technology)*

3-D metal printing has the potential to solve problems in the medical, prototyping, automotive, aerospace, defense, and other engineering industries. To reach the potential of any manufacturing process, the final product's material characteristics and how the process affects those characteristics must be understood to meet the demands of industrial applications. There is a gap in standard testing information regarding metal based 3-D metal printing processes. The purpose of this research is to fill that gap of valuable information for this manufacturing process, so that its principles can be used to design better products. Fundamental tensile and compression tests were executed using American Society for Testing and Materials standard methods on printed parts whose process variables were adjusted independently. Heater power temperature per metal powder layer, layer thickness, and printing orientation of the part were changed to understand how varying the process affects the strength when elongated or compressed. These tests and factors were setup using a design of experiments method to reduce the fundamental research's complexity and waste while retaining quality statistical results. Our research shows a strong interaction between the process variables and the resulting mechanical properties. This data can be utilized to design better quality parts.

## **55. Concurrent Engineering**

Peter Howley, Ridge Raddatz, & Rebecca Pasquale

*Winston Sealy, Faculty Mentor (Department of Manufacturing Engineering Technology)*

A key aspect of a company's survival in the current competitive market is being able to translate concepts from ideation to production as efficiently as possible. Many factors such as time to market, costs, and quality affects a company's competitive edge. Therefore, the focus of the research was to identify the apparent gap between the designing and manufacturing phases of a product's life cycle due to the inefficient use of time. The proposed solution to this problem is the implementation of concurrent engineering. The information used was obtained by reading scholarly journals and articles. Concurrent engineering is the collaboration of the necessary stakeholders from multiple disciplines for product development. This effort could be conducted as either a simultaneous or an additive approach. Simultaneous collaboration involves all relevant parties working on the project and remaining invested throughout the process. The additive approach requires stakeholders to join the team for each iterative succession of the process. This solution is beneficial because it eliminates communication gaps, and allows for early detection of potential problems in various areas. In order to maximize the practice of concurrent engineering in the field, it should be engrained into the educational curriculum of upcoming engineers and all other relevant professions.

## **56. How to Succeed at an Internship**

Samuel Putrah

*Winston Sealy, Faculty Mentor (Manufacturing Engineering Technology)*

The purpose of this presentation is to examine the multiple ways to be successful while working at an internship. It will look beyond the obvious such as doing what is expected of you and dive more in depth into items such as how to properly apply for an internship. Also it will cover what to do in the interview process and also how to get the most out of your experience once you have your internship while standing out among the rest of your colleagues. Many college students start searching for an internship without being prepared or knowing what to expect. For every little thing that is not done to get what you want, the odds of getting what you want diminish. This presentation will help clarify the important actions to take while obtaining an internship. It will also cover the more subtle ideas that will help students make the internship the most successful opportunity possible. The presentation will be supported by related literature and research, previous experience, manager interviews as well as interviews from interns past and present. It will cover topics such as change management, proper communication, networking, and career building.

## **57. Statistical Modeling on Effects of Lead Exposure on Children**

Auriol Moteng

*Deepak Sanjel, Faculty Mentor (Department of Mathematics)*

*Namyong Lee, Faculty Mentor (Department of Mathematics)*

Exposure to lead is a significant public health hazard, particularly to children since they are at an early stage of their brain development. Blood-lead levels were measured in a group of children who lived near lead smelters in some parts of US. Back in 1972, 62 children in El Paso, Texas were tested and found to have at least 40 micrograms of lead per milliliter of blood. A control group of 62 children was also identified the same year and had blood-lead levels of less than 40 micrograms per milliliter. The affected group was put into three groups according to how far away from the smelters they were living, in order to measure the significance of the effects. It was observed that there was a varied amount of blood lead levels within the groups. Also, the scores of the finger-wrist tapping tests and full-scale IQ tests seemed slightly lower in the exposed group than in the control group. Different statistical methods were used to compare groups in different situations, such as the t-test when data followed an approximately normal distribution. Otherwise, a nonparametric test was used. The aim of this research is to analyze and measure the significance of each relevant factor.

## **58. Documentation of Peripheral Intravenous Insertion Sites in the Hospital Medical Record**

Allison Mumbleau

*Marilyn Swan, Faculty Mentor (School of Nursing)*

Establishing peripheral intravenous (IV) access is an essential nursing skill performed in the hospital setting. Intravenous access is used to hydrate and provide nutrition, give medications, and infuse blood and blood products. Documentation of IV insertion is a standard of care, and maintains accuracy of the medical record. Research shows that the required documentation of IV insertion is not consistently performed. The purpose of this literature review is to gain understanding on the documentation of peripheral IV insertion in hospitalized patients. A literature review was initiated using the search terms “IV”, “documentation”, “intravenous therapy”, “vascular”, “peripheral intravenous therapy”, “venous access devices”, “intravenous”, and “insertion”. The databases searched included Academic Search Premier, CINAHL, Proquest, and Health Source: Nursing/Academic Edition. Articles were limited to peer reviewed articles. Documentation of peripheral IV insertion is inconsistent in clinical practice. Optimal documentation of IV insertion includes, the type of intravenous device, brand, length, size, date, time, and identification of who placed the IV. Educational interventions on proper IV documentation had a positive impact on documentation compliance. Implications for Nursing Implications include: 1) lack of a standardized documentation system; 2) knowledge gaps of the nurses performing the documentation; and 3) identifying barriers to documenting IV insertion. Further study in the United States is needed to provide up-to-date research on documenting peripheral IV insertion. The literature search advanced the understanding of documentation of peripheral IV insertion in hospitalized patients.

# Art & Dance

---

## **Expanding Art's Audience**

Tony Connors

*Curt Germundson, Faculty Mentor (Department of Art)*

## **Nudity on Display**

Amanda Holst

*Gina Wenger, Faculty Mentor (Department of Art)*

## **Process, Progress**

Tyler Schrandt

*Mika Laidlaw, Faculty Mentor (Department of Art)*

*Elizabeth Miller, Faculty Mentor (Department of Art)*

## **Researching the Differences and Commonalities of the Minnesotan Collegiate and Professional Dancer: a Documentary Exploring Individual Philosophies as the Dancer**

Sydney Burch

*Daniel Stark, Faculty Mentor (Department of Theatre & Dance)*

## **Expanding Art's Audience**

Tony Connors

*Curt Germundson, Faculty Mentor (Department of Art)*

This paper investigates the need for contemporary art museums to expand their audience to fit their role as educational institutions. It is based on research that looks at ways museums have typically been operated in the past and then focuses on newer modes of operation, using the Brooklyn Museum as an example of a museum that educates and reaches a greater audience. Lastly, the paper looks at how particular artists have broken the mold of presenting art in order to interact with and relate to audiences in new ways. This research explains ways that art can be made accessible to a wider audience through the efforts of museum and artists to educate and involve a more diverse population.

## **Nudity on Display**

Amanda Holst

*Gina Wenger, Faculty Mentor (Department of Art)*

Recently, I have been exposed to diverse attitudes toward nudity. Exploring individual characteristics and connotations associated with being nude in front of an audience; the purpose of my project is to represent different subjective views and personal characteristics of what it means to show yourself nude. I have created resin-casted sculptures of nude human bodies. By displaying human subjects as nude, there will be an emphasis on their individual feelings toward their display. As one subject may appear apprehensive to the audience, hiding behind their arms, another subject may be shown flaunting their body. My intention is to have the viewer understand the emotions within each subject individually, noticing the differences of each as well as combining them to notice how they are represented as a whole. Researching artists Philip Pearlstein and Lucian Freud, who use models to represent the figural body, inspired me to create nearly perfect representations of nude bodies. In agreement with Freud's statement on his work, I too want my work to be "portraits of the people, not portraits like them." My work leaves viewers questioning the different subjective views towards nudity, allowing for a dialogue about cultural taboos. From an audience standpoint, you not only will be able to experience how the model felt about being nude and on display, but you will also witness the opinions of the public in regards to nudity on display.

## **Process, Progress**

Tyler Schrandt

*Mika Laidlaw, Faculty Mentor (Department of Art)*

*Elizabeth Miller, Faculty Mentor (Department of Art)*

With the funds granted from the URC, I created a body work that discusses the creative process. The creative process is an interesting series of events in which every artist or researcher participates. Most experiences vary, yet everyone goes through basic steps of design, problem solving, and implementation. My specific process revolves around examining a small, complex origami object and reproducing it out of wood, in mass. I possess a strong interest in geometric design. This interest led me to examine architecture, specifically modern futurist architecture. The small geometric origami object I'm examining shares similar qualities to the small maquettes of buildings often seen on an architect's drafting table. After that observation, I began to imply architectural design tactics to the development of my own work. The use of a drafting software was a key component to my process by allowing me to calculate the complex angles and geometry of the origami object. Through trial and error, my wooden sculptures began to take shape, much like the grounds of a construction site. Along with the URC Symposium Creative Exhibition, my sculptures will be exhibited in the CSU Hearth Lounge early April, 2014. The viewer will be led through a visual representation of my process, from the first sketches to the completed product.

## **Researching the Differences and Commonalities of the Minnesotan Collegiate and Professional Dancer: a Documentary Exploring Individual Philosophies as the Dancer**

Sydney Burch

*Daniel Stark, Faculty Mentor (Department of Theatre & Dance)*

When considering our society, where objectified beauty is prized, where extreme religion beliefs can provoke negative judgments, and where there are still laws regulating women's bodies, the question arises: how do dancers navigate through these issues? Are dancers excluded from this societal pressure because they exist in an artistic sub-culture, or are dancers more aware of these issues because they are engaged in an artistic endeavor based on the human body? Dancers are a minority in an academic setting as well as a societal setting: what do they think of this? How do they view themselves as a member of society? How does being a dancer influence their personal philosophies? Do societal standards of beauty affect how they view their bodies? This documentary film, comprised of interviews with both collegiate and professional dancers, explores the complex dynamic between dancers and society. Through intimate, one-on-one interviews with dancers of varying ages, the film reveals the differences these artists have in how they perceive their personal relationship to society. Similarities and differences between the dancers' philosophies are brought to light by combining the interviews into one film. Through this documentary, the film is able to show audiences, both inside and outside of the performing arts community, how dancers think and the way by which their views on society affects their craft.

# English & Scandinavian Studies

---

## **Janteloven and Social Conformity in Thorbørn Egner's Literature**

Ellen Ahlness

*Rennesa Jessup, Faculty Mentor (Department of Scandinavian Studies)*

## **Discourse as a Solution to Problems of Self-Definition and Self-Expression in Invisible Man**

Benly Larson

*Donna Casella, Faculty Mentor (Department of English)*

## **Janteloven and Social Conformity in Thorbjørn Egner's Literature**

Ellen Ahlness

*Rennesa Jessup, Faculty Mentor (Department of Scandinavian Studies)*

Janteloven is a set of fictional laws detailed in Danish author Aksel Sandemose's 1933 book, "A Fugitive Crosses His Tracks," which satirizes the Scandinavian view towards individuality versus the collective. These laws, consisting of rules such as "thou shalt not believe thou art better than us," direct a negative attitude towards those who stand out from the cultural norm. This contradicts the ever-growing ethnic diversity in Norway today. Today, Janteloven is regarded as a sociological term describing the unified mindset in Denmark, Sweden, and Norway that champions societies where inhabitants are encouraged to set the community's needs over the individual's. This mindset is prevalent as an agent of socialization through Norwegian children's literature. A sample of eight children books by Norwegian author Thorbjørn Egner, published between 1940 and 1958, were analyzed, and examples of behaviors or speech exhibiting Janteloven behavior were recorded. These were scaled to the range of society affected: the individual, family, friends, or the community as a whole. Through this research, it was discovered that each book contains at least one example of a main character conforming to Janteloven behavior and social norms. The results of the research imply that Egner's work strongly promotes community harmony over individual social achievement, contributing to the understanding that children's literature enforces the Janteloven mindset. These findings help identify an area from which Norwegian cultural identity is shaped, and leads to the study of how this mindset creates attitudes that youth have toward their society, especially in an increasingly heterogeneous Norway.

## **Discourse as a Solution to Problems of Self-Definition and Self-Expression in Invisible Man**

Benly Larson

*Donna Casella, Faculty Mentor (Department of English)*

Twentieth-century African-American author Ralph Ellison identifies a "problem of language," words causing "segregation" to take place, a "struggle over the nature of reality." Structures outside some characters' control cause an aesthetic problem of self-definition and self-expression in the texts by employing these structures as intermediaries through which to understand the characters. I provide a reading of Ellison's novel *Invisible Man* that examines the points at which the narrator, in the act of retelling, comes to understand history discursively. I assess how the discourse of history qualifies this problem of self-definition and self-expression. By interacting with the discourse of history, the narrator not only self-defines and self-expresses on his own terms via narrative, but prioritizes the study of that "self" in relation to the historical discourse. Because *Invisible Man*'s narrator is able to define and express himself in relation to the larger discourse of history and not exclusively in terms of race, the implications of my findings are not merely aesthetic, but facilitate an alternate reading of the novel. The main character's ability to define and express himself in terms of history prompts a critical consideration of the novel based upon the narrative constructions of identity, constructions defined beyond the taxonomies of racial identity.



# Psychology

---

## **Surveying Students' Use of Test Accommodations**

Sergio Aguilar

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Melissa Stewart, Graduate Student Mentor (Department of Psychology)*

## **The Benefits of Exposure to Animals for Persons with Dementia: A Literature Review**

Stephanie Bennett

*Jeffrey Buchanan, Faculty Mentor (Department of Psychology)*

## **Using Choice as a Writing Intervention to Investigate Gender Differences**

Nicole Nohelty

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Samantha Steinman, Graduate Student Mentor (Department of Psychology)*

## **A Bibliometric Analysis of the School Psychology International Journal**

Kristen Paulsen & Katie Westermayer

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Cassandra Schreiber, Graduate Student Mentor (Department of Psychology)*

## **Surveying Students' Use of Test Accommodations**

Sergio Aguilar

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Melissa Stewart, Graduate Student Mentor (Department of Psychology)*

Extended time on a test has been reported as one of the most requested accommodations for both classroom and high-stakes exams (Lewandowski, Lovett, & Rogers, 2008). Additional information about the effectiveness of this test accommodation is still needed. This study aimed to learn more about the utilization of the extended time test accommodation in a college setting. Students utilizing test accommodations at Minnesota State University, Mankato were surveyed following the completion of a classroom exam. The survey consisted of 16 questions pertaining to the test accommodations they utilized. Previous research conducted by Stewart, Systma, Panahon, and Schreiber (2014) showed that students receiving an accommodation finished their exams, on average, within the time that their peers received. This implies that the majority of students receiving accommodations do not require them to complete their exam within the time allocated to the entire class. The findings and implications of this study will be discussed with the hopes of providing better services for college students with disabilities.

## **The Benefits of Exposure to Animals for Persons with Dementia: A Literature Review**

Stephanie Bennett

*Jeffrey Buchanan, Faculty Mentor (Department of Psychology)*

This literature review was performed to assess the current standing of the use of animals as a therapeutic agent for individuals suffering from dementia. This area of study is currently broad; therefore the intent of reviewing the current literature was to establish what has been studied at this point in time and to recommend future research directions in the field. The literature search was performed on three academic search sites (PsycINFO, PubMed, and AgeLine) using four search terms (“Pet therapy Alzheimer’s,” “Pet therapy dementia,” “Animal therapy Alzheimer’s,” “Animal therapy dementia”); search results were verified by having a second researcher independently conduct the literature search using the same criteria used by the author. A total of 26 studies meeting inclusion criteria were reviewed. The general findings of this review show that individuals suffering from dementia who are exposed to animals tend to show improvements in measured outcomes (including behavioral, social, and physiological measures). Based on these findings, it is recommended that future studies examining the impact of interactions between persons with dementia and animals are warranted. However it is recommended that future studies should be done with a more focused intent, should include larger numbers of participants, and should make use of more standardized assessments instruments so the benefits of exposure to animals can be more definitively established.

## **Using Choice as a Writing Intervention to Investigate Gender Differences**

Nicole Nohelty

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Samantha Steinman, Graduate Student Mentor (Department of Psychology)*

Writing has been specifically identified as a neglected skill within the core academic areas for elementary aged students (National Commission on Writing, 2013). Therefore, there is a need for researchers to focus on interventions that will improve students' writing skills. Unfortunately, limited research exists with regards to interventions that have proven to increase academic productivity in the area of writing. Panahon, Hilt-Panahon, and Arbolino (2012) found that when students were given a choice of story starters, students wrote more words as opposed to when they were provided only one story starter. The current study looked to further examine the use of a choice intervention on writing by comparing the performance of male and female students. Participants were randomly assigned to either the choice or no choice groups and administered curriculum-based writing probes on a weekly basis. Participants assigned to the choice group were presented two writing prompts at the beginning of each session and chose which they preferred to write about for the day. Participants assigned to the no choice group were provided one writing prompt. The total words written by both males and females were compared in both conditions to investigate any potential gender differences. Implications of the findings will be discussed.

## **A Bibliometric Analysis of the School Psychology International Journal**

Kristen Paulsen & Katie Westermayer

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Cassandra Schreiber, Graduate Student Mentor (Department of Psychology)*

As current research develops, it is important for researchers to reflect on previous studies to gather as much information as possible in order to help future studies. This process can be simplified by the means of bibliometric analysis, in which all of the articles of a journal are analyzed and specific information is recorded based on common interest questions. In this study, researchers conducted a bibliometric analysis of School Psychology International (SPI) in order to gauge how prominent international school psychology is in the world today, if there has been growth in the area, and if there is a need for researchers to begin more work in the field. To accomplish these goals, researchers replicated a previous bibliometric analysis conducted by Jennings, Ehrhardt, and Poling (2008) of SPI. The current study extended this work by conducting a bibliometric analysis on the articles from 2008 to present. Researchers analyzed all articles published in SPI during this time period using a set of five pre-set questions relating to international psychology. Through data analyses, researchers found that 27.5% of researchers in SPI collaborate multi-nationally, the three most prominent geographical authors are the United States, the United Kingdom, and Canada, and many of the studies were conducted in other areas such as China and Norway, among additional findings. Implications of the current findings will be discussed as they relate to the prominence of international school psychology.

# Biology

---

## **Determination of Protein Interactions in the Formation of Tubular Structures Using the Model Organism *C. Elegans***

Laura Chopp

*Kelly Grussendorf, Faculty Mentor (Department of Biology)*

## **Rats Can Taste Degrees of “Sweetness” and Prefer Diet Sweetened with Artificial Sweetener or Sugar Over Plain Diet**

Samantha List, Christopher Collins, & Kira Kirchberg

*Penny Knoblich, Faculty Mentor (Department of Biology)*

*Mary Hadley, Faculty Mentor (Department of Chemistry)*

*David Bissonnette, Faculty Mentor (Department of Family Consumer Science)*

## **A Behavioral Analysis of Fathead Minnow "*Pimephales promelas*" Breeding Patterns When Exposed to Anastrozole and Bisphenol-A**

Lina Wang

*Shannon Fisher, Faculty Mentor (Department of Biology)*

*Steven Mercurio, Faculty Mentor (Department of Biology)*

## **Determination of Protein Interactions in the Formation of Tubular Structures Using the Model Organism *C. Elegans***

Laura Chopp

*Kelly Grussendorf, Faculty Mentor (Department of Biology)*

Tubular structures in animals are incredibly diverse and important. The human body is full of tubular structures, for example, the digestive system, the urinary system, and the vascular (blood supply) system. In a cancerous environment, tumors require an ample supply of oxygen, and they get this oxygen by forming new blood vessels through a process known as angiogenesis. Preventing tumor angiogenesis has been the focus of numerous studies, but to do this we first need to know how tubular structures are formed. If the blood supply to the tumor is cut off, then the tumor cannot grow and eventually it will die. The roundworm *Caenorhabditis elegans* is an ideal organism to study tubular structure and formation. The excretory canals of the roundworm are composed of a single cell that forms an “H” shaped tubule that runs the length of the organism. Additionally, the roundworm is transparent, which makes observation of the tubular structure relatively easy. The formation and regulation of this tubular structure has been studied extensively and a number of proteins have been found to be important for tubular formation. Three of these identified proteins are known to play a role in tubular formation and maintenance, but it is not known whether or not these proteins interact with one another. The goal of this project is to determine if these three specific proteins of interest directly interact with one another. Determining this is an essential step in learning more about how tubular structures are formed.

## **Rats Can Taste Degrees of “Sweetness” and Prefer Diet Sweetened with Artificial Sweetener or Sugar Over Plain Diet**

Samantha List, Christopher Collins, & Kira Kirchberg

*Penny Knoblich, Faculty Mentor (Department of Biology)*

*Mary Hadley, Faculty Mentor (Department of Chemistry)*

*David Bissonnette, Faculty Mentor (Department of Family Consumer Science)*

Soda availability in the U.S is currently estimated at 54 gallons/person/year. Consumers have turned to artificial sweeteners to satisfy their preference for sweetness and to prevent weight gain. It is unclear whether an increased intake of sugar sweetened beverages causes a greater or lesser total caloric intake and body weight gain than a similar intake of artificially sweetened beverages. Although rats are often a model for sweetener studies, their taste preference for sweetness has not been well studied. Method: A total of 20 Wistar-Kyoto rats were fed a liquid diet (Osmolite—Abbott Labs). After a 3 day acclimation to the three sweeteners, each rat was offered 3 feeding bottles, each containing Osmolite sweetened at one of three concentrations of each sweetener: sucrose (5-10-15%), saccharin (0.2, 0.3, 0.4%) or Stevia (0.05, 0.10, 0.20%) to determine the rats’ preferred level of sweetness. Afterwards, each rat was offered a choice between standard Osmolite or Osmolite sweetened with the different sweeteners at the preferred concentrations. Results: The data showed that rats preferred artificially sweetened Osmolite over sugar sweetened and regular Osmolite. Rats preferred the concentrations of 15% sugar, 0.1% stevia, and 0.2% saccharin. Conclusions: Rats do perceive a difference in sweetness and prefer artificially sweetened liquid diets. The weight gain of rats that were fed sugar was not significantly different from the weight gain of rats fed artificial sweetener.

## **A Behavioral Analysis of Fathead Minnow "*Pimephales promelas*" Breeding Patterns When Exposed to Anastrozole and Bisphenol-A**

Lina Wang

*Shannon Fisher, Faculty Mentor (Department of Biology)*

*Steven Mercurio, Faculty Mentor (Department of Biology)*

Many water systems around the world have noted an increased feminization of male fish in the presence of endocrine disruptors. Bisphenol-A (BPA), Anastrozole, farm runoff, soil contaminants, and sewage (industrial and residential) can contribute to the aquatic prevalence of endocrine disruptors. BPA is a chemical used in the manufacturing of polycarbonate plastics and epoxy resins. It is an aromatase agonist and known to be estrogenic in nature. Anastrozole is a prescription drug used to treat breast cancer in postmenopausal women. It is an aromatase inhibitor, meaning it blocks the production of estrogen. This project focused on the behavioral changes that occurred when adult fathead minnows were exposed to different concentrations of BPA and Anastrozole. Two sets of 20-liter tanks were set up with a divider and nesting site for each of the following concentrations (0 ppb BPA, 0.2 ppb BPA, 20 ppb BPA, 0 ppb Anastrozole, 0.2 ppb Anastrozole, and 20 ppb Anastrozole) for a total of 12 tanks. A male and female fathead minnow were then added to the tanks and exposed to one of the concentrations for three weeks. During the exposure period, male pigmentation, frequency of nipping, and nest defense intensity based on territorial protection were used as measures of male aggression. Video analysis and daily observations showed fathead minnows exposed to 20 ppb Anastrozole had darker band coloring, became more aggressive, and stayed close to the nest area than those exposed to BPA.

# Integrated Engineering & Electrical and Computer Engineering and Technology

---

## **Wireless Power Transfer for Cardiac Re-synchronization Therapy**

Kody Kamunen, Tina Alaei, Todd Hanson, & Matt Helm

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

## **Applying the Systems Engineering Principles to the Design Process of a Mobile Aquaponics System**

Brandy Maki, Sue Benolken, & Jim McCluskey

*Leslie Flemming, Faculty Mentor (Department of Integrated Engineering)*

## **Design of a Power Substation: Technical Learning in the Context of an Industry-Sponsored Project**

Michael Lynch & Tina Alaei

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

## **A Cylindrical Antenna Array for MIMO radar applications**

Mohammad Abdalla

*Xuanhui Wu (Department of Electrical and Computer Engineering and Technology)*

## **Wireless Power Transfer for Cardiac Re-synchronization Therapy**

Kody Kamunen, Tina Alaei, Todd Hanson, & Matt Helm

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

Fourteen million people had been reported to have arrhythmia in USA. An arrhythmia is a problem with the rate or rhythm of the heartbeat. During an arrhythmia, the heart can beat too fast, too slow, or with an irregular rhythm. Arrhythmias can be caused by a variety of reasons, including age, heart damage, medications, and genetics. Cardiac re-synchronization therapy (CRT), or biventricular pacing, can be used to help improve the heart's rhythm and the symptoms associated with the arrhythmia. The procedure involves implanting a small sized pacemaker, usually just below the collarbone, and a detector. The detector monitors the heart rate and detects heart rate irregularities. In the case of heart rate irregularity, the pacemaker emits small electrical pulses to synchronize the heart. Krisara Engineering has developed an innovative approach for CRT. The approach is unique by pacing multiple regions of the heart using up to six batteries-less, lead-less electrodes which result in more favorable patient outcome. The idea is to power up the pacemaker and monitor wirelessly using radio frequency (RF) energy. The RF energy is delivered from the surface of the body and harnessed by electrodes implanted in the heart. A team of Iron Range Engineering students, has been designing and prototyping a wireless power transfer technology to eliminate the need for batteries in CRT.

## **Applying the Systems Engineering Principles to the Design Process of a Mobile Aquaponics System**

Brandy Maki, Sue Benolken, & Jim McCluskey

*Leslie Flemming, Faculty Mentor (Department of Integrated Engineering)*

Systems Engineering is an interdisciplinary approach to product development which encompasses extended design factors (e.g. manufacturing, social, economic, human factors, safety, and schedule) into the technical design process to create an optimal product and/or service. Systems Engineering principles have proven to be highly effective in managing and implementing complex projects, yet can be utilized on any design project. The implementation of Systems Engineering into the design of a mobile aquaponics system will be examined as well as the successes, challenges, and opportunity for future improvements. Aquaponics is a food production system that ecologically integrates aquaculture and hydroponics. This particular system is designed to be mobile so that it may be utilized for educational activities and events to create further awareness of and support for aquaponic agriculture. The design factors incorporated into this project are maintainability, sustainable microecosystems, transportability, reliability, audience engagement with educational value, and social awareness of food production. The tools and techniques of Systems Engineering, when properly applied to a project, will greatly increase the project's probability of success.



## **Design of a power substation: technical learning in the context of an industry-sponsored project**

Michael Lynch & Tina Alaei

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

Iron Range Engineering is a project-based, non-traditional engineering program where the IRE students gained their technical learning in the context of multidisciplinary industry-based projects. A team of students from Iron Rang Engineering completed a multidisciplinary project for Essar Steel Minnesota in spring 2012. The project included the basic design of a power substation for the main pelletizing plant. The students did not have any prior experience in designing power substations. The technical and professional skills required to complete the project were gained in the course of the semester. In this paper, we describe the program and use this project as an example of learning in the context of industry-sponsored projects.

## **A Cylindrical Antenna Array for MIMO radar applications**

Mohammad Abdalla

*Xuanhui Wu (Department of Electrical and Computer Engineering and Technology)*

Multiple-input-multiple-output (MIMO) radar is a recently proposed concept where the transmitted waveforms are different for each antenna element, and is carefully designed in order to improve the estimation, detection or tracking performance. This research introduces a cylindrical antenna array that adopts the MIMO antenna concept. It is able to achieve higher directivity, narrower beam, and lower side lobe levels so that the estimation and detection accuracy will be improved. The antenna array consists of several linear sub-arrays which are arranged along a cylindrical surface. Each sub-array has four suspended fat dipoles which are fed by a microstrip power divider. The fat dipole antenna is carefully designed and optimized using complex software packages which are based on full-wave analyses. The simulation of the entire antenna structure is also performed. The antenna array adopts a cylindrical arrangement of all the sub-arrays in order to achieve a 360 degree electrical scanning and avoid the response lag caused by a mechanical motor used in the traditional radar. Such radar provides more reliability and an instant response. Each sub-array works simultaneously with and independently to the other sub-arrays such that more degree of freedom can be exploited for estimation and detection.

# Psychology

---

## **Media Impact On Science Knowledge**

Joanna Richardson

*Dawn Albertson, Faculty Mentor (Department of Psychology)*

## **A is for App: Surveying Teachers About the Use of iPads/Tablets in the Classroom**

Christine Scheper

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*RaeLynn Lamminen, Graduate Student Mentor (Department of Psychology)*

## **An Investigation into the Level of Knowledge and Attitude Toward Science in an American College Population**

Emilee Shaw

*Dawn Albertson, Faculty Mentor (Department of Psychology)*

## **Media Impact On Science Knowledge**

Joanna Richardson

*Dawn Albertson, Faculty Mentor (Department of Psychology)*

This year, the worldwide web celebrates twenty-five years of existence. Its popularity has grown tremendously and we now see a majority of the population utilizing the Internet's various outlets to achieve greater amounts of knowledge in lesser amounts of time. The broad spectrum of media sources enables a greater access of information to all people, increasingly impacting their level of science knowledge. The current study looked to explore the relationship between level of science knowledge, preferred media source and frequency of exposure. One hundred thirty-five participants were surveyed. Questions from the Pew Research Center's "Science and Technology Knowledge Quiz" were utilized as well as additional questions covering multiple aspects of science ranging from genetics and medical research to literacy and degree of trust in various sources. Participants' science knowledge will be compared to the national averages, as reported by Pew, and organized into high, medium and low knowledge groups. Groups will further be assessed for differences on knowledge confidence, preferred media source, and frequency of science media exposure. Similarities and differences between local and national populations, as well as differences amongst science knowledge groups, will be discussed.

## **A is for App: Surveying Teachers About the Use of iPads/Tablets in the Classroom**

Christine Scheper

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*RaeLynn Lamminen, Graduate Student Mentor (Department of Psychology)*

iPads and tablets are now in classrooms for the children to use ranging from educational activities to leisure activities. Current research findings are mixed as to whether they are helping or hindering children's learning. For the purpose of this study, a 14-item survey was administered to elementary school teachers working in Southern Minnesota area school districts. The focus of this survey was to gain a better understanding of how teachers are using iPads and tablets in the classroom and which apps are most commonly used. Information on which apps are most common in different classroom subjects as well as the most common types of apps were also collected. It was hypothesized that the apps in the classroom were serving as instructional aids and curriculum supplements in order to improve the students' learning experience. Implications of the findings will be discussed as they may help teachers choose the most useful apps for their classroom.

## **An Investigation into the Level of Knowledge and Attitude Toward Science in an American College Population**

Emilee Shaw

*Dawn Albertson, Faculty Mentor (Department of Psychology)*

Science and technology are advancing faster today than ever before, creating new jobs for those willing to pursue careers in these fields. Unfortunately, many people view math and science degrees as too difficult (Many Americans Say, 2013). Federal and state agencies have been putting greater emphasis on the importance of STEM education in elementary and high schools (Mervis, 2013). The purpose of this study was to investigate the level of knowledge and attitudes toward science in an American college population compared to a sample from the UK. Data was collected using an extensive, computer-assisted interview that includes questions about interest and involvement in science, general knowledge of science, and attitudes toward science and new technology. Results will be compared to data from the Wellcome Trust Monitor to evaluate where our sample stands. Currently, the UK ranks higher than the U.S. in both science and math (Shephard, 2010) therefore, in comparison to the UK population, we expect American college students to differ significantly in science knowledge and interest in science. If there are significant discrepancies in knowledge and attitude base, identifying variables that correlate will be helpful in suggesting avenues to better target and improve the efficacy of these STEM based initiatives for the future.

# Automotive Engineering Technology

---

## **The Effect of Running a Diesel Engine on Diesel Fuel and Natural Gas**

Mitchell Beckman, Marc Johnson, Ramesh Timilsina, & Blake Whitemore

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

## **FSAE Racecar Hub Assembly Design**

Matthew Houser

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

## **Hydrogen Investigation**

Cortney LeNeave, Jeffrey Allen, & Andrew Dunlay

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

## **The Effect of Running a Diesel Engine on Diesel Fuel and Natural Gas**

Mitchell Beckman, Marc Johnson, Ramesh Timilsina, & Blake Whittimore

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

Diesel engines offer many advantages over their gasoline counterparts. Typically, diesel engines offer greater thermal efficiency which leads to lower fuel consumption rates. One of the major disadvantages of diesel engines compared to gasoline engines is the amount of soot they produce. Natural gas on the other hand burns very cleanly and currently cost less than half the price of diesel fuel. In this experiment natural gas will be burned in combination with diesel fuel in a diesel engine. The purpose of this research is to determine the fuel cost savings associated with substituting large amounts of natural gas for diesel fuel. To determine this, the fuel consumption will be measured while the engine is running on just diesel. The test will be repeated with the engine running on diesel and natural gas. Using the fuel consumption results the cost of the each test will be calculated and the savings can be found. Thus far, the engine has been set up to run on both fuels. The preliminary tests have shown that around 40-50% of the diesel fuel can be replaced by natural gas. At this time it is too early to make any conclusions about the total amount of natural gas which can be substituted for diesel fuel or the fuel savings.

## **FSAE Racecar Hub Assembly Design**

Matthew Houser

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

The Minnesota State University Formula SAE race team builds a race car each year, which they bring to an international collegiate competition in the spring. The competition is more than just building a race car, and teams are judged heavily on the manufacturing costs and marketability of each car. The hub assemblies are a key component of the car that must be designed yearly. They are the central location that the suspension, steering, brakes, speed sensors and wheels all mount to. The hubs themselves are where the wheel bolts onto, and the rest of the assembly is the package that houses everything else. In the pursuit of speed weight is very important, so every ounce that can be shaved off the total weight of the car counts. The design of the lightweight hub assemblies begins in CAD programs where the parts are drawn. From there the computer model is taken to another CAD program where a Finite Element Analysis is performed that applies forces in a virtual world. The FEA will tell us whether or not the part is strong enough, and the data can also be interpreted to find out where the areas of low stress are. Some areas that do not support any loads can be removed for weight savings. This project has been very beneficial in teaching the team the proper way to bring an idea into reality, the steps in the machining process, and how the industry deals with these real world situations.

## **Hydrogen Investigation**

Cortney LeNeave, Jeffrey Allen, & Andrew Dunlay

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

There is a problem today in national parks regarding energy sources and waste. The first part of the problem is campers use fuels that contain carbon which is harmful to the environment when combusted or burned. The second part is that the infrastructure regarding propane and gasoline promotes waste and harm to the environment. By using hydrogen, a clean burning fuel, it will reduce the negative impact on the environment while promoting the reuse of fuel canisters. The methodology is experimenting to see how a small engine runs on different types of fuels including gasoline, propane, and hydrogen. The testing being done is observing the engine under normal operating conditions, from no load to full rated load. To ensure that the hypothesis of a clean burning hydrogen engine is accurate the engine will undergo tailpipe emissions testing for each of the three fuels individually. At the moment the research is ongoing and it has uncovered facts worthy of reporting. Having successfully converted the engine's fuel delivery system to flow LPG, the next step is to manipulate the existing hardware to deliver pure hydrogen. At that point extensive emissions testing will be conducted to compare the three fuels. Currently a conclusion can be made about the delivery of hydrogen and resulting emissions reductions. Hydrogen is a carbon free fuel but CO, CO<sub>2</sub>, and HC emissions are still present due to oil consumption. Reductions of >98% in CO, CO<sub>2</sub>, and HC can be expected leading to a zero emissions engine.

# Anthropology, Family Consumer Science, & Health Science

---

## **The Power of Global Connectivity and Indigenous Peoples in the Digital Age**

Lucas Newbauer

*Chelsea Mead, Faculty Mentor (Department of Anthropology)*

## **The Effect of Artificial Sweeteners on Overeating and Weight Gain**

Christopher Collins, Samantha List, Ivy Hakala, & Shelby Johnson

*David Bissonnette, Faculty Mentor (Department of Family Consumer Science)*

*Penny Knoblich, Faculty Mentor (Department of Biology)*

## **Undergraduate Students' Knowledge and Perceived Ability to Recognize Suicide Warning Signs**

Karly Christensen

*Amy Hedman, Faculty Mentor (Department of Health Science)*



## **The Power of Global Connectivity and Indigenous Peoples in the Digital Age**

Lucas Newbauer

*Chelsea Mead, Faculty Mentor (Department of Anthropology)*

The internet adds a new level of connectivity to the entire world. Many groups of people that could not communicate previously, easily now have the ability to jointly discuss topics, opinions, and issues immediately through forums, media, and digital communications. Through modern digital culture, Indigenous peoples throughout the world have utilized online capabilities to assist in efforts of self-determination, language revitalization, and raising cultural awareness. By researching several case studies involving indigenous media, missions, and ideologies, information comes to light concerning global connectivity and the benefit of cementing Indigenous thought and goals on the World Wide Web. This information is most beneficial through online media campaigns, setting public mission statements, and addressing legal battles to the masses. Through the internet, asserting a world presence not only works as a tool to get information to the most people as possible, but also creates global connectivity and brings Indigenous peoples around the world together like never before.

## **The Effect of Artificial Sweeteners on Overeating and Weight Gain**

Christopher Collins, Samantha List, Ivy Hakala, & Shelby Johnson

*David Bissonnette, Faculty Mentor (Department of Family Consumer Science)*

*Penny Knoblich, Faculty Mentor (Department of Biology)*

The effectiveness of artificial sweeteners as a therapeutic strategy for weight control has been questioned. Artificial sweeteners added to food and beverages are believed to drive significant overeating. Consumption of non-calorie sweeteners (NNS) correlates with the incidence of obesity, Type II diabetes, and cardiovascular disease. We hypothesized that rats consuming NNS added to a liquid diet (Osmolite Abbott Labs) will over consume both total volume of diet and calories. Method: After 3 days of acclimatization to the liquid diet, rats were randomly assigned to one of 4 experimental groups: Osmolite Standard, Osmolite+sucrose (15%), Osmolite + Stevia(0.1%), Osmolite+Saccharin (0.2%) and followed for seven weeks. Another set of rats were randomly allocated to 4 experimental groups: After 3 weeks of consuming Osmolite with two possible NNS ( 0.1% stevia, and 0.2% saccharin) or two standard Osmolite diets, the rats were switched to sugar for one week, then given either a NNS or standard Osmolite for 2 weeks. On the 7th week, all rats were fed a standard Osmolite diet. Results: Sugar added to the liquid diet caused a significant 42.46% decline in volume of diet consumed, but the calories consumed were not different. When sugar was replaced by the NNS or by no sweetener, rats consumed 33.73% more volume, but 16.97% less calories regardless whether they consumed NNS or no sugar diet. Conclusions: There is no evidence supporting the notion that eating NNS either over the long period or after sugar consumption causes either increased caloric consumption or increased body weight gain.

## **Undergraduate Students' Knowledge and Perceived Ability to Recognize Suicide Warning Signs**

Karly Christensen

*Amy Hedman, Faculty Mentor (Department of Health Science)*

Suicide is a serious problem on college campuses in the United States. Among 15-24 year olds, suicide is the third leading cause of death. A study done by Drum, Brownson, Burton-Denmark, and Smith (2009), suggests that 92% of students who seriously consider committing suicide display suicide warning signs. Early detection of suicide warning signs is key. The purpose of this study is to understand college students knowledge of suicide warning signs and their perceived ability to recognize suicide warning signs among their peers. Upon a thorough literature review, the "Suicide Warning Signs Survey" was developed by the researchers to assess students' ability to identify the warning signs of suicide according to "IS PATH WARM". Also, the survey measures students' perceived ability to recognize suicide warning signs if displayed by another in addition to perceived ability to help. This study has been approved by the university's Institutional Review Board. The survey with informed consent will be distributed to students attending general education health science courses in March 2014. Results are pending. The conclusion is pending analysis of results.

# Gender and Women's Studies

---

## **Opinions on Abortion: MSU Student Definitions of Pro-Choice, Pro-Life, and How They Identify**

Audrey Brickley

*Amy Sullivan, Faculty Mentor (Department of Gender & Women's Studies)*

## **History of Women and Alternative Medicine**

Megan Eineke

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

## **Gender and Women's Studies by Degrees: What Are MSU-Mankato GWS Alumni Doing Now?**

Laura Fry, Erin Zimmerman, & Katarina Barrett

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

## **Opinions on Abortion: MSU Student Definitions of Pro-Choice, Pro-Life, and How They Identify**

Audrey Brickley

*Amy Sullivan, Faculty Mentor (Department of Gender & Women's Studies)*

Understanding how College age students engage with the abortion debate and how they identify is important to know, because both sides of the debate want to understand how young adults feel about the issue. This research looks at how students at MSU define Pro-Choice and Pro-life, as well as how they identify within those parameters. Researchers created a survey that allows students to explain their opinions on abortion in their own words. Next, researchers will review the student responses and reasons they identify one way or another, and compare them to current research on abortion attitudes that college students have to give these results context. The main goal of this research is to understand how student define Pro-Life and Pro-Choice compared to what their original definitions are, which shows that these definitions have changed and have different meanings to the general population of students at MSU.

## **History of Women and Alternative Medicine**

Megan Eineke

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

Alternative medicine has been used all over the world for centuries. From meditation to hydrotherapy, both men and women practice these modalities. Alternative medicine is an important part of the history of medicine and women have played a crucial role in traditional medical and other healing-related careers. This research project examines health activism among feminists and how that has played a role in what alternative medicine has become today. Information gathered from journals, articles, books, and biographies will be used to create a timeline to share how and when specific events and women influenced the reemergence of alternative medicine and healing practices into modern, mainstream society.

## **Gender and Women's Studies by Degrees: What Are MSU-Mankato GWS Alumni Doing Now?**

Laura Fry, Erin Zimmerman, & Katarina Barrett

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

Gender and Women's Studies students are often faced with the question, "What can you do with that degree?" In order to answer this common inquiry, researchers interviewed MSU-Mankato GWS alumni about their lives and career paths post-graduation to learn about the wide range of career paths available to future graduates. The findings of this study will educate current and future Gender and Women's Studies students about the varied career opportunities available to them, and it will also be an important collection of personal interviews for the GWS department's history and community education efforts.

# **Anthropology, Art, Communication Disorders, Construction Management, Elementary and Early Childhood Education, Ethnic Studies, Family Consumer Science, Government, Human Performance, Management, Psychology, & World Languages and Cultures**

---

**1. Musical Aptitude and Tonal Languages**

Laura Berg

*Chelsea Mead, Faculty Mentor (Department of Anthropology)*

**2. Anti-Japanese Propaganda in the United States During World War II: Characteristics and Effects**

Lindsey Lancette

*Gina Wenger, Faculty Mentor (Department of Art)*

**3. Selected Language Skills of a Child with Asperger's Syndrome**

Kristina Barton

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

**4. Selective Language Skills of Individuals with Hearing Loss**

Katelyn Gehling

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

**5. Selective Language Skills of Individuals with Autism**

Haley Lutteke

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

**6. Selected Language Skills of Individuals with Asperger's Syndrome**

Allison Schwanberg

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

**7. What Makes a Construction Company Successful**

Joseph Barton & Adam Mueller

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**8. How to Purchase an Existing Construction Company**

James Besonen & Nicholas Miller

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**9. Integration of Tablets in the Construction Industry**

Daniel Endres & Aaron Umhoefer

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**10. Minnesota State University, Mankato Construction Management Materials Lab**

Ashley Gooler & Randal Todd

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**11. Block Schedule Project**

Anthony Haga & Marcus Shurson

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**12. The Land of 4,000 Impaired Waters**

Bradley Holtz

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**13. Graduation Milestones: A Critical Path Approach to Graduating**

Thomas Hussong

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**14. Wiecking Center Work Shop**

Kody Johnson

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**15. Residential Redevelopment, Improving Urban Areas**

Roger Kleese & Christopher Franks

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**16. Soft Communication Skills**

Logan Medin & Abdullahi Abdulle

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**17. Green Roof Design on the CORE Building**

Peter Nickel

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**18. Top Reasons Construction Companies Fail**

Reid Roemhildt & Derek Grams

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**19. Safety Innovation**

John St. Lawrence & Julio Soto

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

**20. Implementing Culturally Responsive Teaching in the Elementary Classroom**

Michelle Burke & Gretchen Hinrichs

*Lori Piowlski, Faculty Mentor (Department of Elementary and Early Childhood Education)*

**21. Tradition and Tragedy: The Story of Hmong Paj Ntaub**

Mai Xee Vang, Panhia Lee, Pathy Xiong, & Pakou Lee

*Vang Xiong, Faculty Mentor (Department of Ethnic Studies)*

*Song Yang, Graduate Student Mentor (Department of Ethnic Studies)*

**22. How a Play Class Impacts Caregiver Child Interactions**

Amy Cords, Alexa VanSickle, & Stephanie Feldman

*Heather Von Bank, Faculty Mentor (Department of Family Consumer Science)*

- 23. The Facts and Fiction About the Use of Sign Language With Young Children**  
Naomi Greenblat  
*Heather Von Bank, Faculty Mentor (Department of Family Consumer Science)*
- 24. Family Dynamics as Predictors of Eating Disorders in Children: A Systematic Review**  
Alexis McCall & Michelle Altmann  
*Daniel Moen, Faculty Mentor (Department of Family Consumer Science)*
- 25. China and The Two Koreas: A New Era for the Rising Hegemon**  
Byeongho Mun  
*Jacqueline Vieceli, Faculty Mentor (Department of Government)*
- 26. Alternative Procedure of Estimating the 3-Min All-Out Exercise Test on a Computrainer**  
Jade Williams  
*Ida Clark, Faculty Mentor (Department of Human Performance)*  
*Robert Pettitt, Faculty Mentor (Department of Human Performance)*
- 27. Validation of the ‘Bottle Buoyancy’ Model for Body Composition Assessment**  
Kirill Shumilov  
*Robert Pettitt, Faculty Mentor (Department of Human Performance)*  
*Cherie Pettitt, Faculty Mentor (Department of Human Performance)*
- 28. Do Brands Targeting Women Use "Instamarketing" Differently: A Content Analysis**  
Areej Hassan  
*Queen Booker, Faculty Mentor (Department of Management)*
- 29. Stock Recovery after Negative Press**  
Gregory Reimer  
*Queen Booker, Faculty Mentor (Department of Management)*
- 30. Improving Students’ Self-Efficacy in a Psychology Research Methods Course: An Enactive Mastery Experiences Approach**  
Maria Almoite, Zoe Martin, Monica Gee, & Jared Goelz  
*Moses Langley, Faculty Mentor (Department of Psychology)*
- 31. Is Sustained Attention Important for the Testing Effect?**  
Maria Almoite & Jessica Kay  
*Karla Lassonde, Faculty Mentor (Department of Psychology)*
- 32. Opinions and Perceptions Surrounding Cognitive Enhancer Use in a College Population**  
Benjamin Ardner  
*Dawn Albertson, Faculty Mentor (Department of Psychology)*
- 33. Segmental Overlay of the Algorithms of the Brain: A Computational Model of the Visual System**  
Scott Boyd  
*Dawn Albertson, Faculty Mentor (Department of Psychology)*  
*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*

- 34. High School Students Tell All: Analyzing Facebook Confession Sites**  
Chelsea Conrad  
*Kathy Bertsch, Faculty Mentor (Department of Psychology)*  
*Rachel Burlet, Graduate Student Mentor (Department of Psychology)*
- 35. Tootling: Increasing Prosocial Behaviors in Elementary Settings**  
Paula Fischbach  
*Kevin Filter, Faculty Mentor (Department of Psychology)*  
*Natasha Olson, Graduate Student Mentor (Department of Psychology)*
- 36. Heroism and Gender Roles: Influence of Publicity, Risk, and Familiarity on Heroism**  
Shelby Flegel, Lauren Bach, & Katie Westermayer  
*Emily Stark, Faculty Mentor (Department of Psychology)*
- 37. Can Perceptually Demanding encoding Tasks Help Dissociate Recollection-based and Familiarity-based Recognition Memory?**  
Travis Hensersky  
*Moses Langley, Faculty Mentor (Department of Psychology)*
- 38. The Effects of Various Video Game Genres on Cognition and Brainwaves**  
Travis Hensersky  
*Moses Langley, Faculty Mentor (Department of Psychology)*
- 39. Tracking the Development of Students' Academic Self-Efficacy in a Psychology Research Methods Course: Statistical and Methodological Design Skills**  
Kathryn Humphrey, Benjamin Ardner, & Mikell Hebig  
*Moses Langley, Faculty Mentor (Department of Psychology)*
- 40. Functional Analysis and Paired Choice Assessments: Comparison and Behavior Intervention Planning**  
Jennifer Nelson  
*Kathy Bertsch, Faculty Mentor (Department of Psychology)*
- 41. Decision Making Under Uncertainty**  
Carter Person  
*Emily Stark, Faculty Mentor (Department of Psychology)*
- 42. Sexual Education and Attitudes Towards Masturbation**  
Jannine Ray  
*Eric Sprankle, Faculty Mentor (Department of Psychology)*  
*Shelby Afflerbach, Graduate Student Mentor (Department of Psychology)*
- 43. Pre-Service Teacher Preparation Related to Classroom Management Techniques**  
Karley Weir  
*Carlos Panahon, Faculty Mentor (Department of Psychology)*  
*Dana Shea, Graduate Student Mentor (Department of Psychology)*
- 44. Unter den Linden: A Look Into German Identity**  
Daniel Friedrichs  
*Nadja Kramer, Faculty Mentor (Department of World Languages and Cultures)*



- 45. Ideology in Stone: Emotions Evoked by Fascist Architecture in Germany**  
Allison Maleska & Anna Rice  
*Nadja Krämer, Faculty Mentor (Department of World Languages and Cultures)*
- 46. Ideology in Stone: Re-interpreting the Architecture of Albert Speer for Contemporary Germany**  
Anna Rice & Allison Maleska  
*Nadja Krämer, Faculty Mentor (Department of World Languages and Cultures)*
- 47. Family Beliefs**  
Katie McDonald, Bridget Moore, Madison Alexander, & Liz Durkee  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*
- 48. Family Waiting**  
Laura Anderson, Brianna Bickel, Samantha Broughten, & Britney Elwood  
*Patricia Young, Faculty Mentor (School of Nursing)*
- 49. Family Crisis**  
Courtney Foster, Amanda Gobin, Shannon Grovum, & Danielle Hermel  
*Patricia Young, Faculty Mentor (School of Nursing)*
- 50. Family Communication**  
Chris Rossi, Shannon Sullivan, Erica Thate, & Sonya Theis  
*Patricia Young, Faculty Mentor (School of Nursing)*
- 51. Family Support**  
Cassie Anderson, Becca Tomlinson, Katie Weidner, & Derek Wilfahrt  
*Patricia Young, Faculty Mentor (School of Nursing)*
- 52. Family Coordination**  
Laura Monson, Chelsey Peterson, Kelsey Przymus, & Jessica Rivard  
*Patricia Young, Faculty Mentor (School of Nursing)*
- 53. Family Inquiry**  
Kari Hansen, Kyle Kessler, Anessa Santiago, & Julie Sathre  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*
- 54. Family Threat**  
Katelyn Benavidez, Jessica Johnson, Taylor Oldani, & Jacqueline Tucker  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*
- 55. Family Transitions**  
Lauren Harris, Kaitlyn Kleiber, William Roettger, & Danielle Walsh  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*
- 56. Family Information Keeper**  
Nicole Hansen, Angela Klebe, John Mishek, & Danielle Shea  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

**57. Family Anxiety**

Alizabeth Elfering, Shannon Kelly, Hannah Peterson, & Victoria Swiontek  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

## **1. Musical Aptitude and Tonal Languages**

Laura Berg

*Chelsea Mead, Faculty Mentor (Department of Anthropology)*

Language and music are used on a daily basis with both phenomena employed to communicate and express human thoughts, feelings, and information. In the past, researchers have examined these methods of communication separately, but in modern research, linguists have begun to investigate the relationship between language and music. Within this area of research, there have been several studies completed on whether or not people with a tonal language as their first language have increased capabilities with music. Because this is a newer research field, very little research has been conducted on if people with Mandarin Chinese as their first language have better musical abilities. My research project, “Musical Aptitude and Tonal Languages”, addresses this issue through two interviews with native Mandarin Chinese speakers and two analyses of Gavin Bidelman and Diana Deutsch’s research. The two interviews did not yield any results, although they did provide potential topics for future research. Bidelman and Deutsch’s research suggest that there is a moderate correlation between knowing a tonal language and having musical aptitude. This is evident in Bidelman’s research as tonal language speakers could match pitch at the same accuracy as non-tonal language-speaking musicians. Deutsch’s research indicates the correlation by showing that tonal-language speakers could match pitches better than non-tonal language speakers. All of this demonstrates that there indeed is a moderate correlation between knowing a tonal language and having increased musical aptitude.

## **2. Anti-Japanese Propaganda in the United States During World War II: Characteristics and Effects**

Lindsey Lancette

*Gina Wenger, Faculty Mentor (Department of Art)*

When examining various political movements, it is beneficial to examine the propaganda associated with each movement. This is especially true regarding the Japanese American internment process that occurred in the United States from 1942 to 1946. In order to better understand this process, I investigated the characteristics of the anti-Japanese propaganda produced in the United States during this time period and how the propaganda affected those who came into contact with it. In order to do so, I analyzed anti-Japanese propaganda posters and reviewed prerecorded interviews. Based on this information, I found that the anti-Japanese propaganda negatively affected those who came into contact with it, whether they were of Japanese descent or whether they had never previously come into contact with a person of Japanese descent. After combining all of these aspects, my hypothesis is that the anti-Japanese propaganda created and reinforced the attitudes that allowed the Japanese American internment camps to exist.

### **3. Selected Language Skills of a Child with Asperger's Syndrome**

Kristina Barton

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

The purpose of this research was to learn about the selective language skills of a child with Asperger's Syndrome while using the qualitative research process. After obtaining IRB approval, an interview via email was conducted with a mother of a child with Asperger's Syndrome. After the interview was complete, I used a code and subcode process to locate emerging patterns and findings provided by the interview data. By locating these patterns with qualitative data analysis, I was able to make an assertion regarding a child's experiences growing up with Asperger's Syndrome.

### **4. Selective Language Skills of Individuals with Hearing Loss**

Katelyn Gehling

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

The purpose of this research was to study the selective language skills of individuals with hearing loss and learn about the qualitative research process. I researched background information about hearing loss and speech and language characteristics of individuals who have hearing loss. After receiving IRB approval, I conducted an interview with a mother who has a child with hearing loss. The interview was audio recorded and transcribed verbatim. Using that information, I coded and subcoded the interview. Seven patterns emerged, and after analyzing the patterns, I was able to make an assertion regarding an individual's experience growing up with hearing loss.

### **5. Selective Language Skills of Individuals with Autism**

Haley Lutteke

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

The purpose of this research was to understand the selective language skills of individuals with Autism and learn how to complete qualitative research. After IRB approval and signed consent, an interview with the participant was conducted. I then wrote down the interview verbatim to collect data. This data emerged into becoming three categories and eleven codes. Based on the categories, codes and analysis of data, the following assertion was formed: when an individual is provided with the therapy needed, appropriate environment, and effective communication devices it is possible to experience improvements and positive gains in the development of social and life skills.

## **6. Selected Language Skills of Individuals with Asperger's Syndrome**

Allison Schwanberg

*Bonnie Berg, Faculty Mentor (Department of Communication Disorders)*

The purpose of this research was to understand the selected language skills of individuals with Asperger's Syndrome and learn how to complete qualitative research. After IRB approval and signed consent, I emailed the participant related questions to collect data. I then compared the data I received to existing literature. I used the data to create codes and subcodes where four major patterns emerged. From these patterns and the analysis of the data, the following assertion was formed: parent involvement and education is crucial for the development of children, especially when an inaccurate diagnosis is determined by a professional.

## **7. What Makes a Construction Company Successful**

Joseph Barton & Adam Mueller

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

As Construction Management students we are interested in what are some key elements that make a construction company successful. We feel this is important because we will eventually be working in the industry and knowing these key elements can help us with our careers. Our plan is to contact a few of the top General Contractors in Minnesota and find out the different techniques they use, such as: software, management techniques, scheduling, company tactics, and asset management. After contacting the companies we will compare the results and come up with key elements that help make a construction company successful. We feel this research will help all construction management students because it can give them a good outlook on what kind of company to look for when job or internship searching.

## **8. How to Purchase an Existing Construction Company**

James Besonen & Nicholas Miller

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

For your business, it is a good idea to have a general understanding of what you are looking to accomplish in a certain amount of time. This concerns anyone who wants to start a business or purchase a company. Several companies go bankrupt from unknowledgeable purchases of a company. The reader should know, or have an understanding of smart investments into an existing company. It is unwise to go into a business blindly with the intent to purchase a company; it will likely backfire. Our goal is to provide the reader's simple steps and ideas on how to successfully purchase an existing construction company. We researched through scholarly articles that are about existing construction company purchases. We also called family members in the construction businesses that have already had their construction company purchased from someone else. Our results show that unknowledgeable purchases of construction companies often end in financial loss of the company. Our findings from two main articles proved to us that you have to be knowledgeable of the business that you are entering in or it's best to retain a quality work force and managers who can maintain financial success and run the business. You also have to make sure you purchase the assets.

## **9. Integration of Tablets in the Construction Industry**

Daniel Endres & Aaron Umhoefer

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

Our vast construction industry is currently making the move towards the use of smart technology in the field at an unprecedented pace. The problem we see with our construction industry is that we are behind the times when it comes to advances in technology. The use of paper copy plan sets and specification books is now a thing of the past. Not only are they cumbersome, but also time consuming when making changes and conveying those changes to the appropriate craftsman. Along with technology increasing at an exponential rate and with gaining popularity, it was only a matter of time before the construction industry followed suit. With tablets being utilized in the field; contractors, architects, designers, and engineers will now have the ability to be connected to a cloud copy of the plans and can make real time changes and mark ups for everyone to see, all while saving time and money. With increasing speed and efficiency, the tablets are physically smaller and much more accessible on site when trying to look up certain aspects on the job site. Using tablets in the construction field will change the industry for the better. The supported idea that you will be able to carry a tablet onsite instead of 100+ page plan sets will beneficially increase efficiency, cost savings, and communication within the construction industry for years to come.

## **10. Minnesota State University, Mankato Construction Management Materials Lab**

Ashley Gooler & Randal Todd

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

The Construction Management Department is requesting funds to build a materials lab. This lab would provide students with the opportunity to learn in a new atmosphere, giving them more of a real world experience. The lab would consist of a hands-on space for students to interact with the materials they would use out in the field. While planning the lab, research was done to find ways to run it in the most efficient way. One of these ways is to use solar photovoltaic panels on the roof of the building. These panels do not need direct sunlight to work, meaning energy can still be captured even on cloudy days. The main benefit of using solar panels in this project is that they require little maintenance, making the lab more self-sufficient. The second way to run the lab efficiently is to use radiant heating in the concrete floors. Tubes will be buried in the floor while waves of thermal radiation rise heating the lab. The water will be heated by the panels on the roof and run through these pipes. The main benefit of radiant heating is that it can be up to thirty percent more efficient than forced-air heating, making it the obvious choice when it comes to heating. Using solar photovoltaic panels along with radiant floors will reduce the cost of running the lab immensely. Our research shows that the lab would be beneficial to all Construction Management students and can be built to run efficiently.

## **11. Block Schedule Project**

Anthony Haga & Marcus Shurson

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

We are looking to further our majors curriculum by going through construction process. As students majoring in Construction Management we want to make sure future students receive the best education possible. The best way we can ensure this is by taking them through the actual steps of the construction process. Our research would take a set of plans to build a residential home and go through the required steps to make the plan set a reality. Before you can understand our process you need to organize a full project in sequence. Right now you go through the courses in a semi-structured way to learn all the different aspects in no particular order. Starting with estimating a plan using takeoff software (ie. Planswift) and utilizing that information to plug into an estimating software (ie. Sage Timberline) to gain a costs estimate. With a rough estimate you would be able to gain financial backing to build the house. After securing financial backing the students would ask for bids. After picking a contractor they will manage the job from start to finish. This method of teaching the CM students would make sure they know the construction management process. As this project comes to a close we will have made our program money to put towards competitions and any other extra curricular activities. We will give many students the opportunity to get some real world experience when they otherwise would have been unable to do so.

## **12. The Land of 4,000 Impaired Waters**

Bradley Holtz

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

When most people think of Minnesota they think of pristine natural resources and beautiful lakes. But is that the truth? Minnesota has a major problem under the surface, 40% of Minnesota's waters are considered impaired. Being the land of 10,000 lakes don't we have a responsibility to take care of these great waters? Minnesota is home to three great headwaters the Great Lakes, Mississippi, and Red rivers. Because of our geographical location we have a responsibility to the environment and to our neighbors not to pass off our pollutants. It's pretty obvious that we have a problem, so I would like to present a possible solution "the Owatonna Tree Pit." The city of Owatonna is tasked with creating a solution for the trees in their sidewalks. The trees are having trouble collecting rainfall because of the inability of the water to permeate through the concrete. This is causing the tree root systems to push up the concrete above them, as a response to their inability to gather water. Owatonna has thought of a clever way to water the trees and at the same time clean and purify the water before it makes its way into the storm sewer system. The city plans to plant three different trees two of which will use this system and one that will not. They will take trunk measurements to see if they grow faster with this new construction method and they will also test pollutant runoff from the trees.

### **13. Graduation Milestones: A Critical Path Approach to Graduating**

Thomas Hussong

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

Construction Management students are taking on average over 5 years to graduate from a four year curriculum program which has taken time and money from the student. I myself have taken over 5 years to graduate. My goal is to simplify the process and bring awareness to this problem. This project involves discovering the optimal curriculum path of a Construction Management student to graduate. It is also a study on where current Construction Management students are missing the path. This has been done by taking a critical path approach to the curriculum and by analyzing current students and their path that they are taking to graduate. I analyzed the graduation curriculum and entered it into P6 software and used critical path scheduling to show the optimal path with the critical path points becoming milestones. I then compared this optimal path to over 20 student's actual path to graduation. I was able to conclude that most students waited too long to get through their CM 100 and CM 200 level classes and this added time to complete their college degree. I learned that the sooner the students were able to complete their CM 100 level and CM 200 level classes the sooner they would graduate. Through showing the value of completing CM 100 level and CM 200 level classes early in a student's college career, I hope to bring awareness to current students and advisors the importance of focusing on completing these classes.

### **14. Wiecking Center Work Shop**

Kody Johnson

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

Currently the Construction Management Program is lacking a shop formatted lab. Having a workshop would allow students to view plans on proper plan tables, have a work bench for various field testing, and would support an education on building green, as it would be a green building. The program would also benefit from the planning and building phases of the project. It would allow students to work with outside contractors in a field application. We are currently benefiting from the project by creating designs. We are gaining a true accountability for our structural calculations, attention to building codes, and respect for construction/operational efficiency based on the project potentially being constructed. In our area of study there is no replacement for learning in a hand on live field application. Making the construction documents estimates and measurements apply to something you can see develop provides a motivation to learn. We would gain that motivation through the shops construction process but would gain our overall goal by providing an area for students to gain a hand on learning experience every day. In my personal experience from attending class for 4 years followed by working in the field for 3 years. I learned a lot of the business language along with other tools in the class room but that information didn't mean anything to me until I was able to apply it in a hand on environment. The shop would be a great step in brings the class room to life.



## **15. Residential Redevelopment, Improving Urban Areas**

Roger Kleese & Christopher Franks

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

Residential Redevelopment Improving Urban Areas In a world that is becoming increasingly sustainable, there lies a vast amount of unsustainable resources that we are faced with transitioning. Over the next few decades there is an opportunity to redevelop this unsustainable infrastructure into areas that will be long lasting and aesthetically pleasing. Research offers simple solutions of progression to dated resources, specifically aimed at the evolution of sustainable urban infrastructure by method of sustainable design. The incorporation of green construction and sustainability has become a standard in both new construction design, and the conversion of existing resources. Through a compilation of sustainable measures, there is evidence that redevelopment of urbanized areas can offer a positive return on investment, and benefit the community on a holistic level. Sustainable redevelopment covers a very broad spectrum; this research will focus specifically on sustainability geared towards safety, health, and energy in urban areas. If urban residential areas are able to improve transportation means, promote the addition of green features, and utilize the technological advances our generation has created, redevelopment investments will be felt, and will be duplicated for the surrounding population. This research has proven that there are many ways to redevelop urban areas, but one ever lasting issue is finding funds for such sorely needed improvements. Being able to justify a projects' importance can be a difficult task when a majority of the time the funding provider would like to see a profit. Research on sustainable redevelopments profits are focused on the long term "fix", and the provisions made that benefit the community on all fronts.

## **16. Soft Communication Skills**

Logan Medin & Abdullahi Abdulle

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

Improving one's soft communication skills should be a major goal for every student here at Minnesota State University, Mankato and everywhere else. The problem is that many students do not know what they can do to improve their soft skills. They also might not know what types of communication skills are most useful to them in the field of their respective careers. Students often confuse whether they have to do exercises or have to take classes to gain these soft skills. Also they're struggling to know how these skills can be used to maximize their potential in the workforce. All employers today are looking for recent graduates' with the best soft skills. Employers send their hiring managers to pick the best of college graduates through face to face communication. While doing this these hiring managers will most likely be picking the students with the greatest soft communication skills. There are no guidelines for these soft communication skills but it is easy understand the basic guidelines that would make things easier for them to communicate with the hiring managers. In the light of all of these circumstances it would be very beneficial to both students and employees to learn more about the most common soft communication skill that can contribute to their success in the workplace and in their daily life.

## **17. Green Roof Design on the CORE Building**

Peter Nickel

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

I am estimating and developing a green roof research project on the CORE Building at MNSU. It will consist of 3 different types of roofing dividing the roof in 3 sections to study the water runoff. The first section will be made up of native plants. The second will be gravel and the third would be a control. Then we will study the amount and type of water that is shed off on each section.

## **18. Top Reasons Construction Companies Fail**

Reid Roemhildt & Derek Grams

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

The construction industry has one of the highest rates of new business start-ups than any other occupation in the United States. This trend is important because it not only creates more jobs, but it makes the industry more competitive. The problem we are facing is that people are starting businesses with no background and is leading to a higher rate of failure. The failure of construction companies is not an uncommon thing in this industry with its relatively low entry barrier, excessive competition, and high uncertainty and risk involved. These three things cause almost 80% of new construction companies to fail within the first 2 years in business. The interesting fact is that not only are new businesses failing, but established companies are failing as well. This is why the research we are conducting can help construction companies identify areas to avoid and what important things their management team needs to focus on. Our research for this topic was attained on the web and by searching journals and articles through the MSU library website. As a result of our research, we found that there were a lot of similar causes for failure and that most of them could be easily solved and avoided with an experienced management team. Some of the top reasons were poor estimating, weak cash flow management, and companies expanding too fast. Looking into the main causes of failure can be important for entrepreneurs trying to gain insight on how to manage a new construction business.

## **19. Safety Innovation**

John St. Lawrence & Julio Soto

*Matthew Durand, Faculty Mentor (Department of Construction Management)*

Safety has always been of an utmost importance for construction companies. So, why is there accidents still occurring as often as they are every year and what can we as construction managers do to prevent them? After researching online, talking to a safety engineer, and employees from a few different construction companies, we have found that accidents do happen, regardless of how much effort goes into a safety plan, but construction companies are always looking for ways to improve safety protocols. We are looking at safety in general, but will be specifying more of in air safety ( i.e., roofing, multi-story buildings, etc.). All companies have their own safety plans to go along with PPE and OSHA, but is there something's that even OSHA should research more in to? Absolutely. Julio being in roofing, knows all too well of the dangers that are present in everyday activities in the air, and this is why we are choosing to research what can be done to protect more workers and hopefully bring attention to our solutions.

## **20. Implementing Culturally Responsive Teaching in the Elementary Classroom**

Michelle Burke & Gretchen Hinrichs

*Lori Piowlski, Faculty Mentor (Department of Elementary and Early Childhood Education)*

This is a qualitative study investigating the procedure of preparing undergraduate teacher candidates for culturally responsive teaching in the elementary classroom. The hypothesis for this study is that intentional experiences and collaborative discussion activities will increase students' knowledge of implementation of culturally responsive teaching in the classroom. "Culturally responsive teachers not only know their students well, they use what they know about their students to give them access to learning" (Lucas and Villegas). This project is significant because classrooms in the United States are rapidly growing in diversity. The twenty-first century teacher needs to be fully equipped in how to respond to culture in the classroom. According to Lucas and Villegas, teachers must move beyond the superficial notion of diversity that is prevalent classrooms today and gain a fresh vision of teaching and learning in a diverse setting to intentionally guide their curriculum (Lucas and Villegas, 2002). Undergraduate students will participate in a four-week field experience in a Midwestern school district working with kindergarten through second grade students. Teacher candidates will set three responsive teaching goals, complete a survey, and reflect on the goals and field experience. They will also complete a follow-up survey administered by researchers. For this study the population will include thirty-two undergraduate students in their first phase of professional education. Ages range from nineteen to thirty-five. Researchers predict that students will demonstrate a higher understanding of culturally responsive teaching due to intentional instruction and experiences through the college courses and field experience.

## **21. Tradition and Tragedy: The Story of Hmong Paj Ntaub**

Mai Xee Vang, Panhia Lee, Pathy Xiong, & Pakou Lee

*Vang Xiong, Faculty Mentor (Department of Ethnic Studies)*

*Song Yang, Graduate Student Mentor (Department of Ethnic Studies)*

Art is an important factor in any culture. The embroidery art of the Hmong "Paj Ntaub" also known as the "Flower Cloth" is a traditional form Hmong textile work that tells the traditions, culture values, and history of the Hmong people. The purpose of this poster presentation is to showcase this masterpiece of "Paj Ntaub" to our diverse campus community's members about the Hmong and their journey to America as well as how the story clothes is used to define and narrate stories about Hmong history and culture.

## **22. How a Play Class Impacts Caregiver Child Interactions**

Amy Cords, Alexa VanSickle, & Stephanie Feldman

*Heather Von Bank, Faculty Mentor (Department of Family Consumer Science)*

The purpose of this study was to collect data from previous students who took “The Benefits of Play and Child Development” class at MSU Mankato. Our goal was to see if the students use the information from this class in their everyday lives when interacting with children. We used a 5-point Likert Scale to determine the participants gained knowledge from the play class and if it impacted their playful interactions with children in their home and work environments. Participants’ opinions about play and the importance of play as a caregiver were questioned as well. We also asked participants open-ended questions about their personal experiences and understanding of play. Results will shed light on students understanding of play and how this knowledge has affected their behaviors and interactions with children and families.

## **23. The Facts and Fiction About the Use of Sign Language With Young Children**

Naomi Greenblat

*Heather Von Bank, Faculty Mentor (Department of Family Consumer Science)*

In this study we sought to determine how parents and caregivers perceived the use of sign language with young children. We asked participants Likert scale questions concerning their agreement with various statements about sign language. The participants were asked questions about using sign language for communication, expressing emotion, advancing intelligence, and promoting pro-social behavior. We also asked participants open ended questions about what they had previously heard about sign language use, their thoughts about using sign language, and if they had ever purchased or used materials to teach a child sign language. The responses show that on average most participants use sign language occasionally with young children. Almost all participants knew someone who used it with children and only a few participants had purchased materials while others used online materials. The data also reflect that many participants believe that sign language helps children and caregivers communicate however in expressing emotion, advancing intelligence, and promoting pro-social behavior participants are unsure if sign language is helpful.

## **24. Family Dynamics as Predictors of Eating Disorders in Children: A Systematic Review**

Alexis McCall & Michelle Altmann

*Daniel Moen, Faculty Mentor (Department of Family Consumer Science)*

This study used a systematic review process to synthesize a breadth of literature (30 peer-reviewed articles) focusing on family dynamics as predictors of eating disorders in children. The review is guided by a family systems and attachment framework as well as concepts from the Circumplex model. This study found significant qualitative themes in Family Dynamics that predicted and/or were associated with the development of an eating disorder in children. Additionally, this study provides a review of future directions as well as clinical, educational, and policy implications in accordance with qualitative themes found in the literature.

## **25. China and The Two Koreas: A New Era for the Rising Hegemon**

Byeongho Mun

*Jacqueline Vieceli, Faculty Mentor (Department of Government)*

Recently, the U.S. moved its pivot from the Middle East to East Asia. It was a belated reaction to deal with the new world order. China is rising as the sole competitor of the U.S. in world politics, and trying to consolidate its influence on the region. The Korean Peninsula seems likely to be a frontline again for U.S. and China, similar to the confrontation between the Soviet Union and the U.S. during the Cold War era. I was able to find some sources on this issue including books and scholarly articles with a great amount of information and details on this subject. China is not an unconditional ally of North Korea anymore. Today's system is more complex than the Cold War system, and I find that economic factors play a great role in determining China's foreign policy toward the peninsula. Ideological influence on making the country's policy is not powerful enough anymore to outweigh economic loss from not having good relations with other economically developed countries. The conclusion of my research is that China's sphere is becoming wider and stronger in this region. China not only still has a good relationship with North Korea, but also tries to build strong economic ties with South Korea. In light of these facts, the U.S. needs to reconsider its policy on this region to deal with China's effective strategy on the Korean Peninsula.

## **26. Alternative Procedure of Estimating the 3-Min All-Out Exercise Test on a Computrainer**

Jade Williams

*Ida Clark, Faculty Mentor (Department of Human Performance)*

*Robert Pettitt, Faculty Mentor (Department of Human Performance)*

The cycling 3-min all-out exercise test (3 MT) has been established to provide measures of critical power (CP) and one's anaerobic capacity ( $W'$ ). The biking 3 MT have been completed using an electronically brake cycle ergometer. To evaluate if it is possible to conduct a 3 MT using a computrainer. We evaluated a group of competitive cyclists and triathletes (age  $23.5 \pm 1.64$  yrs,  $VO_{2max}$   $53.6 \pm 7.14$  ml·kg<sup>-1</sup>·min<sup>-1</sup>). Each athlete completed a 3 MT, one 3 min, 6 min and 9 min exhaustive bout using their own bike mounted on a computrainer (Race mate). Predicted power for 3, 6, and 9 min were determined using the CP and  $W'$  estimated from the 3 MT. Actual and predicted times were evaluated using typical error (TE) and coefficient of variation (CV). For the 3 min bout, TE was 41 s and CV was 24.9%. For the 6 min bout, TE was 62 s and a CV was 20.3%. For the 9 min bout, TE was 79 s and CV was 17%. A more complete data set will be forth coming. Thus far it appears that the 3 MT using a computrainer is underestimating CP.

## **27. Validation of the ‘Bottle Buoyancy’ Model for Body Composition Assessment**

Kirill Shumilov

*Robert Pettitt, Faculty Mentor (Department of Human Performance)*

*Cherie Pettitt, Faculty Mentor (Department of Human Performance)*

A majority of the apparatuses that are available to accurately assess body composition are both time consuming and costly, such as DEXA, Hydrostatic weighing (HW), and the Bod Pod (BP). Several apparatuses exist for measuring body composition that are cost-effective and efficient, such as the caliper skin fold (CSF) and the bioelectrical impedance analysis (BIA). However, these devices lack accuracy, validity, and reliability. There are few validated, reliable apparatuses that are cost-effective and efficient to accurately assess body composition. The Bottle Buoyancy (BB) model, first presented by Katch et al. (1989), is a means of measuring body density through Archimedes’ principle of water displacement using the HW equation. The scientific examination of the BB model accuracy is very limited. This study aims to build a proper technical protocol from the previously-conducted studies to accurately assess body composition in athletes using the BB model. This study also aims to compare the accuracy, reliability and validity of the BB body composition assessment to the body composition models (i.e. BP, BIA, and HW) that have been thoroughly analyzed throughout the literature thus far. Six subjects (3 males, 3 females) were tested through multiple trials to assess the BB technique using a 12.150 L (3 gal) Culligan® container. Each subject’s body composition was initially assessed using HW, BP, and BIA measurements. These measurements were used to validate the BB model’s accuracy in measuring estimated body fat percentage. The HW equation was used to calculate the estimated body fat percentage of the BB model. Data analysis was used to validate the accuracy of the BB model to the HW, BP, and BIA. The investigator expects that results will show consistency between measurements. Patterns in measurements will emphasize the importance of following proper protocol techniques.

## **28. Do Brands Targeting Women Use "Instamarketing" Differently: A Content Analysis**

Areej Hassan

*Queen Booker, Faculty Mentor (Department of Management)*

This study examines the use of Instagram marketing efforts of five retail companies that specifically targets female consumers. The purpose of the study was to determine if companies that target women use a different social media strategy than companies that target the general population. The analysis was performed using content analysis. The results of this study, when compared to the results of a previous study, suggest that there is a difference between how retail companies that target women use Instagram for marketing, specifically, the brands that specifically the brands that target women primarily used a sales response strategy whereas brands targeting the general population primarily used an emotional strategy.

## **29. Stock Recovery after Negative Press**

Gregory Reimer

*Queen Booker, Faculty Mentor (Department of Management)*

When companies experience a negative event that is covered by the media, it often follows that the stock price falls as a result. The drop in stock price is a partial reaction to the negative news. This study seeks to examine how long it takes for the stock price to recover from a negative event. Data for this study is limited to US based companies that have experienced negative press between 2004 and 2014, and includes the marginal stock price and media coverage regarding steps taken to recover from the negative incident. The data was analyzed using the technical analysis approach. Preliminary results suggest that the stock price changes are directly and significantly related to the amount of media coverage received, which is related to the company's reputation prior to the incident, the social and environmental cost of the incident and whether class-action lawsuits were filed following the incidents.

## **30. Improving Students' Self-Efficacy in a Psychology Research Methods Course: An Enactive Mastery Experiences Approach**

Maria Almoite, Zoe Martin, Monica Gee, & Jared Goelz

*Moses Langley, Faculty Mentor (Department of Psychology)*

The aim of this study was to assess whether students' self-efficacy for research related skills could be improved by taking a course in research methods in psychology that purposefully incorporated mastery approaches identified as effective by the relevant literature. A research methods course was chosen because its core learning outcomes are highly representative of those held as core to the Psychology major itself. The data for this study were collected from 88 students at two state universities across five sections of the course during three semesters. Students completed a research methods self-efficacy survey once during the beginning of the semester and once during the end of the semester. On this survey, students rated their self-perceived skill on a scale of 1-5 (1 = not at all skilled, 5 = highly skilled) on six components of research methods in psychology. The data showed statistically reliable increases in students' self-efficacy between the beginning and end of the semester in all six areas. The largest gains were observed in areas showing the lowest initial efficacy (i.e., using PsycINFO) and the smallest gains were observed in areas showing the highest initial efficacy (i.e., summarizing articles and interpreting statistics). We interpret these data as evidence that a research methods course in psychology can lead to increased academic self-efficacy for students in areas of core concern to the undergraduate Psychology major. The benefit of mastery approaches along with the utility and application of measuring academic self-efficacy during a research methods course is discussed in this poster.

### **31. Is Sustained Attention Important for the Testing Effect?**

Maria Almoite & Jessica Kay

*Karla Lassonde, Faculty Mentor (Department of Psychology)*

The Testing Effect is known to enhance learning and long-term retention through repeated-testing (Roediger & Karpicke, 2006). One variable that has yet to be considered is the role of sustained attention on the efficacy of the testing effect. The goal of this study is to combine a measure of sustained attention (i.e., Sustained Attention Response Test-SART; Robertson, Manly, Andrade, Baddeley, & Yiend, 1997) with repeated quizzing of video lecture content to determine if sustained attention is important for the testing effect. Participants will be given the SART assessment and based on their score, as determined to be either high or low sustained attention, will be assigned to one of the following conditions: repeated testing, restudy, or control. We are interested in how participants with high sustained attention compare to those with low sustained attention on the video lecture tests. Specifically, we wonder whether or not high SART scores will influence the testing effect; that is, could participants with high attention do as well on the cumulative test as low sustainers who are in the repeated testing condition. Implications for teaching and learning will be discussed as well as inferring how results might be applied to populations diagnosed with attentional disorders.

### **32. Opinions and Perceptions Surrounding Cognitive Enhancer Use in a College Population**

Benjamin Ardner

*Dawn Albertson, Faculty Mentor (Department of Psychology)*

In its most general form, “cognitive enhancement” can be viewed as the utilization of external resources by an individual to improve their cognitive capacities, such as memory, concentration, and/or focus (Lanni et. al, 2008). Historically, conventional enhancement of cognitive capabilities has been obtained through avenues such as the consumption of caffeine, consumption of vitamins, or the usage of “brain training” activities, like crossword puzzles. More recently, cognitive enhancement has been made widely available through the use of prescription medications, such as Adderall. While these medications have undoubtedly aided countless students who need it and have the proper prescription, illicit usage rates have been consistently on the rise (Desantis and Hane, 2010). While many studies have shown a willingness by students to obtain cognitive enhancement through pharmaceutical means (Sattler, Sauer, Mehlkop, Graeff, 2013), less focus has been placed on why this willingness exists, which was one of the key aims to this study. In the study, 135 undergraduate students at Minnesota State were asked to anonymously and privately report details and opinions regarding their own cognitive enhancer use or abstinence. Data analysis took a look at the relationships between prescription medication use throughout three levels (students who admit to using with a prescription, admit to using without a prescription, and those who abstain from using) and a variety of other metrics, including perceived safety, perceived efficacy, and ethics of use. These metrics were also used and analyzed in comparison to perceptions about “conventional” cognitive enhancer use.



### **33. Segmental Overlay of the Algorithms of the Brain: A Computational Model of the Visual System**

Scott Boyd

*Dawn Albertson, Faculty Mentor (Department of Psychology)*

*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*

A computational model of the brain would give researchers a better understanding of the processing power of the brain as well as insight into information processing algorithms. This project takes a software engineering approach to modeling processes in the brain. Rather than attempt to describe all the actions of a neuron or collection of neurons at once, it must be shown that each component of the brain's processing can be described and then combined with the others without loss or confliction. Starting from the most basic structures to the most complex, each component can theoretically be defined as a collection of attributes and actions, such as those used in objects and classes in an object-oriented programming language. Before developing the actual code for implementation, models are first described using a unified modeling language (UML) class diagram. To narrow the scope of the computational model presented here, only the visual system is described through UML class diagrams. Only neurons that have function beyond simple information relay in the visual system are defined and their layers of algorithms described. In this model of the visual system, a photon interacts with a photoreceptor and the signal that propagates from this source is followed to the occipital lobe and returns through motor pathways that move the eye. Class diagrams and code segments representing the model will be presented here. This process can be extended to allow for additional research to help explain information gaps within the brain system as a whole.

### **34. High School Students Tell All: Analyzing Facebook Confession Sites**

Chelsea Conrad

*Kathy Bertsch, Faculty Mentor (Department of Psychology)*

*Rachel Burlet, Graduate Student Mentor (Department of Psychology)*

Social media sites are gaining popularity, giving teenagers a venue to anonymously post secrets, rants, and insults. Recently, anonymous high school related Facebook confession sites have emerged. These sites, while not endorsed by the school, often contain the school's name, mascot and location creating a forum for anonymous social interactions among high school students. Facebook confession sites have gained attention over concerns about cyber bullying and the potential negative influence on the reputation of schools. The purpose of this study is to analyze the language of Facebook confession sites to determine the degree of positive and negative emotionality as well as to begin to understand the sudden popularity of anonymous high school social media sites. Facebook confession sites were gathered using key search terms and several common search engines. A list of fifty-four high school confession sites was created based on the criteria of having identifiable features of a specific United States high school. From this list, twelve confession sites were randomly selected for the analysis of posts occurring during a common 3 month time period. The Linguistic Inquiry and Word Count software program was used to code Facebook posts on twelve emotionality categories: swear words, social, work, positive emotion, negative emotion, anxiety, anger, sadness, body, health, sexual, and death. Results reveal the degree to which anonymous social media posts include negative versus positive emotionality and the degree to which these posts receive "likes" from other Facebook users.

### **35. Tootling: Increasing Prosocial Behaviors in Elementary Settings**

Paula Fischbach

*Kevin Filter, Faculty Mentor (Department of Psychology)*

*Natasha Olson, Graduate Student Mentor (Department of Psychology)*

Classroom rules and school-wide disciplinary procedures are typically used to decrease the frequency and severity of problem behaviors. These approaches attempt to reduce the occurrence of future behaviors, but can also teach students to continue their problematic behavior as long as they avoid being caught. Peers who observe problem behaviors are then relied upon to report incidents, or engage in tattling. Tootling is a term that was created from the word tattling. Tootling is similar such that students report their peers' behaviors but report appropriate behaviors rather than problem behaviors. Tootling aims to increase positive behavior by encouraging students to behave appropriately in order for their classmates to report their behavior, or "toot their horn." The current study aimed to replicate and extend previous research by evaluating tootling with and without a group contingency on rates of positive and disruptive behavior. One second grade and one third grade classroom in a Midwest public school participated in this study. An A-B-C-A-C-B-A-C experimental design was used alternating tootling alone and tootling with a group contingency. Contrary to previous research, results did not show consistent improvements in positive and disruptive behavior during tootling with and without a group contingency in comparison to the initial baseline phase. Although the frequency of disruptive behavior decreased over the course of the study, it is unclear if these effects were a result of the intervention. Future research should investigate the relationship between the number of positive and disruptive behaviors and the total number of tootles reported across conditions.

### **36. Heroism and Gender Roles: Influence of Publicity, Risk, and Familiarity on Heroism**

Shelby Flegel, Lauren Bach, & Katie Westermayer

*Emily Stark, Faculty Mentor (Department of Psychology)*

Heroism, or any act of bravery or fearlessness, to help another person, is an occurrence that has been dramatized. Past research has investigated heroism and the perceived characteristics associated with heroism including gender. Research has shown that males are perceived to be more capable of heroism than females (Lyons, 2005). Gender differences are important to understand because of stigmas that can influence behavior. The current study explores how gender and the type of relationship with the victim influences willingness to engage in heroism. It is hypothesized that men will be more likely to help than women. The study consisted of 394 participants completing a survey along with open-ended questions. For each scenario participants were asked questions regarding whether the victim needed help and if they would help. Preliminary analysis suggests that characteristics of the scenario determined what gender thought the victim needed help  $t(388) = -3.96$ ,  $p < 0.080$ . In scenario two, involving a victim at a party, men were more likely to help than women but the opposite was true in scenario three, which involved an attack in an alley. There was also a significant effect of gender, as men reported they were more likely to help across all three scenarios,  $F(1, 386) = 11.52$ ,  $p < 0.001$ . The open-ended questions also show a gender bias. Further research is needed to look at other factors that could influence the likelihood of people engaging in heroic acts.

### **37. Can Perceptually Demanding Encoding Tasks Help Dissociate Recollection-based and Familiarity-based Recognition Memory?**

Travis Hensersky

*Moses Langley, Faculty Mentor (Department of Psychology)*

Many memory models assert that strength of familiarity-based recognition memory is based on the accumulation of evidence. A recurring question in the debate of how to model familiarity-based memory is what type of information can serve as “evidence”? This question is problematic, because although many dominant models of recognition memory assume the strength of evidence is important, they fail to define what characterizes evidence. We set out to evaluate what type of pictorial attributes might serve as evidence by displaying images that were visually transformed (mirror-reversed) while remaining identical in meaning.

### **38. The Effects of Various Video Game Genres on Cognition and Brainwaves**

Travis Hensersky

*Moses Langley, Faculty Mentor (Department of Psychology)*

As the world changes the way people entertain themselves changes. It is important to understand how these changes in entertainment impact individuals. The prevalence of video games as a medium cannot be overstated; in the United States alone, 51% of households have some sort of dedicated gaming console. As a result of the increasing exposure of video games to the general public, psychologists have been trying to pin down exactly what impact video games have on humans for decades. Research has largely focused on the effects of violence, but has been inconclusive. We sought out to see whether or not any differences exist between the brain waves of those participating in high violence games (e.g. First Person Shooters) and low violence games (e.g. Turn Based Strategy) and also whether or not exposure to these varied genres of games return different results on various affect surveys.

### **39. Tracking the Development of Students’ Academic Self-Efficacy in a Psychology Research Methods Course: Statistical and Methodological Design Skills**

Kathryn Humphrey, Benjamin Ardner, & Mikell Hebig

*Moses Langley, Faculty Mentor (Department of Psychology)*

The authors assessed students’ academic self-efficacy for fundamental research skills five times throughout a psychology research methods course. Data were collected from seven sections across two semesters and three instructors. Students showed statistically reliable gains in self-efficacy for methodological design, interpreting statistics, and using SPSS.

#### **40. Functional Analysis and Paired Choice Assessments: Comparison and Behavior Intervention Planning**

Jennifer Nelson

*Kathy Bertsch, Faculty Mentor (Department of Psychology)*

Functional Behavior Assessment (FBA) is a method of assessment used to develop behavior interventions for individuals with challenging behavior. There are several methods of collecting FBA information. Functional analysis (FA) is a process of validating the function of behavior through experimental analysis. While FA is considered a gold standard, it has limitations including requiring specialized training and problem behaviors to occur and be reinforced during assessment. Paired-choice (PC) assessment, another FBA method, is used to assess children's preference for reinforcers and various classroom arrangements. It is hypothesized that PC assessments are teacher friendly, require little training to implement and lead to accurate hypothesis of function of behavior. The purpose of this project is to validate if PC assessments accurately hypothesize function of behavior as compared to FA. Additionally the project assessed whether either method aided teachers in better understanding function of behavior. Four preschool-age children with problem behaviors were assessed using both FA and PC methods. After each assessment, teachers completed a checklist about function of behavior. Assessment data was then used to hypothesize function. PC allowed for making hypothesis about function of behavior while FA was less useful as few problem behaviors occurred resulting in inconclusive FA results. Teacher report showed that teachers consistently identify multiple functions of behavior. This research provides preliminary evidence suggesting that PC assessments may aid in intervention planning for students with mild problem behaviors and that teachers need further training in distinguishing gain from escape functions even when they are part of FBA assessments.

#### **41. Decision Making Under Uncertainty**

Carter Person

*Emily Stark, Faculty Mentor (Department of Psychology)*

People make hundreds of decisions every day, and very little is known about how they do this. A big question in decision-making is how people make decisions when faced with uncertainty. It has been shown by Tversky and Kahneman (1981) that people are affected by the framing effect when faced with an uncertain decision. This experiment was designed to look at the effects of providing a rationale for an uncertain decision, and also looked if being a rational or intuitive thinker affected the decisions. This study included an online survey of two loss of life questions and two monetary gamble questions that were framed either positively or negatively. Some participants were asked to justify their answer before submitting it, another group were asked to justify their answers after they were submitted, and the last group was not asked to submit a justification. After the four questions, everyone took survey that showed whether he or she tended to think emotionally or rationally. Preliminary analyses of the results show that frame did affect choice as predicted, but the effect of personality traits on choice is less clear.

## **42. Sexual Education and Attitudes Towards Masturbation**

Jannine Ray

*Eric Sprankle, Faculty Mentor (Department of Psychology)*

*Shelby Afflerbach, Graduate Student Mentor (Department of Psychology)*

The long-standing social stigma surrounding masturbation has led to its prohibition from being included in public school curriculum as a healthy sexual practice. Furthermore, not only is masturbation a healthy sexual practice for the individual, research has demonstrated masturbation to be helpful in treating sexual dysfunctions for couples. Therefore, if the topic of masturbation is included in comprehensive sexual education as a healthy sexual practice, it may promote sexual health among individuals both intra- and interpersonally. The present study recruited from a convenient sample from a medium sized state university in the upper Midwest. Participants completed two surveys, administered through an online data collection platform. The first survey, Attitudes Towards Masturbation, is an established measure with sound reliability and validity, which assessed the participants' comfort and beliefs about masturbation. The second survey was created specifically for this study and assessed the type of sexual education (comprehensive versus abstinence) received at home and in formal school settings. It is predicted that participants who received positive masturbation education (at home or at school) will have more positive attitudes toward masturbation than participants who received negative or no masturbation education. The results of the study indicate that positive masturbation education at school does not predict positive attitudes toward masturbation. However, positive masturbation education at home predicted positive attitudes for obtaining birth control and what masturbation is. Also, positive masturbation education at home during high school predicts positive attitudes. Lastly, positive masturbation education at school during high school does not predict positive attitudes.

## **43. Pre-Service Teacher Preparation Related to Classroom Management Techniques**

Karley Weir

*Carlos Panahon, Faculty Mentor (Department of Psychology)*

*Dana Shea, Graduate Student Mentor (Department of Psychology)*

Teachers are likely to encounter children with emotional and behavioral disorders (EBD) at least once throughout their career. These students demonstrate internalizing or externalizing behaviors that have a negative effect on their education. Pre-service teachers reported that almost a fourth of their students portrayed some forms of challenging behavior (Westling, 2010). These behaviors were described as defiance, noncompliance, disruption, and socially inappropriate behavior. Westling (2010) reported that dealing with these challenging behaviors take up a significant amount of teacher's time, reduces their effectiveness as teachers, and inhibits the ability of the other children's learning. Despite most teachers feeling inadequately prepared to work with children with EBD, it is believed that more preparation increases one's confidence in one's ability to use effective strategies while trying to improve challenging behavior. This study targeted pre-service teachers enrolled in the College of Education at Minnesota State University, Mankato. Participants were asked to complete a survey about the knowledge they possess regarding classroom management techniques and how confident they feel to utilize those techniques. Findings from the study can be taken into account when developing upcoming curriculums for education courses regarding this issue. It is important to explore this topic because all teachers are likely to work with students with EBD and they often report that they don't feel prepared.

#### **44. Unter den Linden: A Look Into German Identity**

Daniel Friedrichs

*Nadja Kramer, Faculty Mentor (Department of World Languages and Cultures)*

In the historical heart of Berlin there is a famous boulevard called Unter den Linden that reflects the diversity of German history. Originally, the linden trees were planted in the mid seventeenth century by Duke Fredrick Wilhelm to help beautify Berlin as well as the paved walk from his palace to the Tiergarten (literally garden of animals) where he hunted. During World War II Hitler tore down many of the trees, which he later had replanted. Damage from World War II left buildings in ruins; they remained, despite their prominent location in the East Berlin, which became the East German capital in 1949. Only after German reunification in 1990 and Berlin was reunified, the area saw some redevelopment. Some historical landmarks were left, others were destroyed and rebuilt. A range of questions arise in the course of the history of the boulevard that reflects on Germany's self-representation: Why would the linden tree be chosen to line the famous boulevard over the more Germanic oak tree? Why did the East German government leave this area in ruins instead of rebuilding? What guided the reconstruction of Unter den Linden? In summary, my research will look at the question as to why this boulevard Unter den Linden and its adjacent buildings and landmarks (new and old) have taken on such prominence in German national identity. My research into this project will be aided by the findings that I collect as part of a faculty-led MSU Study Abroad Tour during spring break 2014.

#### **45. Ideology in Stone: Emotions Evoked by Fascist Architecture in Germany**

Allison Maleska & Anna Rice

*Nadja Krämer, Faculty Mentor (Department of World Languages and Cultures)*

Architecture has long been used to convey the (self)-representation of the state, its people, its history, and values, and Germany is no exception. This project examines various types of fascist architecture from the era of Nazi Germany (1933-1945), based on data collected during a 2014 faculty-led MSU Study Abroad Tour. This presentation will report on the student investigators' analysis of certain styles and materials that were used to exude impressions of power and importance and how the Nazi's used these architectural designs, materials, methods, and styles to their advantage by conjuring emotion from the German population.

#### **46. Ideology in Stone: Re-interpreting the Architecture of Albert Speer for Contemporary Germany**

Anna Rice & Allison Maleska

*Nadja Krämer, Faculty Mentor (Department of World Languages and Cultures)*

Many buildings built under the reign of Adolf Hitler with the purpose to aid the Nazi party's political and ideological agenda are still in existence and located throughout present-day Germany. During a 2014 faculty-led MSU Study Abroad Tour, student investigators collected data about the work of Albert Speer. Speer, an infamous architect of these times, played a key role in the development of many structures important to the Nazi party. Speer's intent was not only to influence the people of his time; he was planning the impact the buildings would have for generations to come. This poster will present how these buildings are used in contemporary Germany and the contemporary German perspectives about the structures.

#### **47. Family Beliefs**

Katie McDonald, Bridget Moore, Madison Alexander, & Liz Durkee  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

The purpose of this poster is to explore the concept of family beliefs and how nurses can adequately use these beliefs to effectively care for patients. Beliefs are important because they shape the family and individuals as well as dictate how the family perceives care. When approaching the idea of family beliefs it is necessary to be conscious of diverse beliefs and their continual fluidity in the family. Family nursing text books, course work, and family belief literature were reviewed to identify a definition of the concept, its significance, exemplar cases, and recommendations for nursing practice. The results revealed the most effective way to gain understanding of family beliefs is through experience and continued learning through literature. Nurses need to be able to identify beliefs that constrain or facilitate family action and then intervene accordingly. Through this research further understanding of the importance of integrating family beliefs into nursing care was accomplished.

#### **Nursing Constructs**

Family influences individual health just as the illness experience of a family member influences the health of the family. This reciprocal relationship calls for nurses to practice family-focused nursing care and to “think family” in their nursing practice. Nurses who think family hold the potential to transform nursing practice and improve health outcomes for families and their members. Understanding various family concepts can help nurses begin to think family. Literature was reviewed for each of 10 family constructs (family information keeper, family waiting, family anxiety, family crisis, family communication, family support, family coordination, family inquiry, family threat, and family transitions), a definition and exemplars synthesized, research findings summarized, and recommendations for nursing practice identified. The results of exploring family constructs in this way include building nursing confidence in conducting family health interviews, ensuring translation of family nursing science to practice, and increasing family involvement in care during an illness experience.

#### **48. Family Waiting**

Laura Anderson, Brianna Bickel, Samantha Broughten, & Britney Elwood  
*Patricia Young, Faculty Mentor (School of Nursing)*

#### **49. Family Crisis**

Courtney Foster, Amanda Gobin, Shannon Grovum, & Danielle Hermel  
*Patricia Young, Faculty Mentor (School of Nursing)*

#### **50. Family Communication**

Chris Rossi, Shannon Sullivan, Erica Thate, & Sonya Theis  
*Patricia Young, Faculty Mentor (School of Nursing)*

#### **51. Family Support**

Cassie Anderson, Becca Tomlinson, Katie Weidner, & Derek Wilfahrt  
*Patricia Young, Faculty Mentor (School of Nursing)*

#### **52. Family Coordination**

Laura Monson, Chelsey Peterson, Kelsey Przymus, & Jessica Rivard  
*Patricia Young, Faculty Mentor (School of Nursing)*

**53. Family Inquiry**

Kari Hansen, Kyle Kessler, Anessa Santiago, & Julie Sathre  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

**54. Family Threat**

Katelyn Benavidez, Jessica Johnson, Taylor Oldani, & Jacqueline Tucker  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

**55. Family Transitions**

Lauren Harris, Kaitlyn Kleiber, William Roettger, & Danielle Walsh  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

**56. Family Information Keeper**

Nicole Hansen, Angela Klebe, John Mishek, & Danielle Shea  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*

**57. Family Anxiety**

Alizabeth Elfering, Shannon Kelly, Hannah Peterson, & Victoria Swiontek  
*Norma Krumwiede, Faculty Mentor (School of Nursing)*



# History & Political Science

---

## **Premarital Sexuality among Young People in Eighteenth-Century France**

Tatiana Soboleva

*Christopher Corley, Faculty Mentor (Department of History)*

## **Nationalism and International Sport: German Soccer and the Reluctance to Show Pride**

Anthony Reffke

*Joseph Kunkel, Faculty Mentor (Department of Political Science)*

## **Premarital Sexuality among Young People in Eighteenth-Century France**

Tatiana Soboleva

*Christopher Corley, Faculty Mentor (Department of History)*

Youth courtship in preindustrial Europe is often misunderstood by historians. The predominant interpretation is that youth developed sexual relationships in a predefined fashion under close parental supervision. The evidence gained through the analysis of early eighteenth-century paternity suits housed in the Archives Départementales de la Côte d'Or in Dijon, France reveal a more complex historical picture. Paternity suits containing the original complaint of the plaintiff, witness depositions, and interrogations of defendants provide detailed information about the timeline and signs indicating the development of sexual relationships, as well as the places in which they occurred. We found that these liaisons often lacked familial oversight. The investigation of the court cases allows historians to better understand and map the sexual and behavioral patterns of preindustrial French youth while also offering a reconsideration of commonplace notions about sexual relationships in traditional societies.

## **Nationalism and International Sport: German Soccer and the Reluctance to Show Pride**

Anthony Reffke

*Joseph Kunkel, Faculty Mentor (Department of Political Science)*

International sports play an integral role in the global community. In many countries, international sporting events allow fans to show their national pride as they cheer for their home country. Even though it may seem harmless for the fans, governments have been using international sports and the subsequent displays of nationalism as instruments to drive their political agendas. Historically, the German nation has experienced the ideology of socio-political movements used in the context of national sporting endeavors. Early in the 19th century, Turnvater Frederick Jahn started a gymnastic movement in order to strengthen and unify the German people in response to the Napoleonic occupation. In more recent history, this was particularly exemplified during the era of Nazi Germany through their soccer team. As one of the most popular sports in the world, soccer has been commonly used in this role as countries try to showcase their dominance on the global stage. As the master race, the German team was held to high standards while also receiving high levels of support. The extreme nationalism shown in regards to this team as well as the political movement resulted in a negative perception of German pride and the reluctance of the German people to display it. This research will examine the history of German soccer and politics as well as the negative repercussions faced due to the extremism leading up to its reemergence during the 2006 World Cup in Germany.

# Integrated Engineering & Mechanical Engineering

---

## **Designing a Logo for the First Step Mental Health App**

Mackenzie Lopez, Joshua Martin, & James Faraday

*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*

## **Arc-Flash Study of a Manufacturing Facility in Northern Minnesota**

Daniel Schmitz & Michael Rudi

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

## **Glass Inspection System**

Nicholas St. Aubin, Mark Dickey, Cody Meschke, & Subham K.C.

*Sungwon Kim, Faculty Mentor (Department of Mechanical Engineering)*

## **Designing a Logo for the First Step Mental Health App**

Mackenzie Lopez, Joshua Martin, & James Faraday

*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*

First Step is a smartphone application (app) that provides information about mental health and available resources as well as basic evaluation via a commonly used questionnaire for students at Minnesota State University, Mankato. In order for the app to be easy to use and to have quick impact, it is important to have a meaningful logo and a coherent user interface presentation. Developing the logo and interface requires the application of a visual design process. This includes researching the type of audience who would use this app, understanding the competition, i.e., similar available apps, and then coming up with a conceptual design that would stand out from the rest of the competition while conveying a message the expected audience can relate too. Through immersion in research and the development of basic concept, a sketch of a visual identity is developed. Beginning with the sketch and using an iterative feedback process, we find a symbol that effectively describes First Step's intentions. The sketched design is converted to a crisp vector image using Adobe Illustrator. The final logo is selected based on feedback from individuals who are asked to identify the symbols the logo represents. When they can do it quickly with little prompting, the logo meets the final criteria. Outcomes of this work are not just the logo for First Step, but also the creation of a story along with the design.

## **Arc-Flash Study of a Manufacturing Facility in Northern Minnesota**

Daniel Schmitz & Michael Rudi

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

An arc-flash occurs as a result of a rapid release of energy due to an arcing fault. An arcing fault happens when there is low impedance between a phase bus bar and another phase bus bar, or a ground. During an arcing fault, the air is a conductor which could cause substantial damage, fire, injury or even death. Arc faults are generally limited to systems where the bus voltage is in excess of 120 volts. In order to detect potential arc-flash hazards in a manufacturing facility, a complete power analysis is required. A team of Iron Range Engineering students delivered an arc-flash and power system analysis based on the existing power distribution system of a 70,000 square foot facility located in Saginaw, MN. The team also performed short circuit, device evaluation, and coordination studies, in addition to providing individual arc flash labels for each operable protective device, 120/208VAC and larger. Additionally, they created a one-line drawing of the system by collecting extensive power data. Furthermore, the warning labels were provided for the buses protected by protective devices that are identified in the one-line drawing. A description of the entire project, outcomes and deliverable will be described in this presentation.

## **Glass Inspection System**

Nicholas St. Aubin, Mark Dickey, Cody Meschke, & Subham K.C.

*Sungwon Kim, Faculty Mentor (Department of Mechanical Engineering)*

Viracon, a leading glass fabrication company, has submitted a project request to MNSU, Mankato to create a new warp inspection system for their glass. The principal objective of this project was to develop a process, which measured the warp in heat treated glass. Warp was defined as bending of glass. The company currently uses an inspection process that was slow, unreliable and required multiple employees to record the measurement. To meet ASTM standards Viracon must produce glass with less than 1/32" of warp per linear foot. Excessive glass warp can also cause problems throughout the manufacturing process. An automated inspection process has been designed, which measures the warp of each pane of glass, within the tolerance limit, in a non-bias and reliable process. The design consists of a constructed mock assembly line equipped with neoprene wrapped rollers to mimic the assembly lines used at Viracon. Position sensors, a data acquisition (DAQ) system and a LabVIEW program were used to calculate the warp on each pane of glass. Research and sensitivity tests were performed to select the most appropriate position sensor and DAQ system. This design, upon its completion, would be able to measure the warp for a glass size of 1/4" X 24" X 36" and could be configured for other glass sizes. The new design is faster, more accurate, and requires less employees than Viracon's current warp measurement process.

# Mathematics and Statistics & Automotive Engineering Technology

---

## **The Buzz on Malaria**

Tyler Metzger

*Riujun Zhao, Faculty Mentor (Department of Mathematics and Statistics)*

## **Historical Development and Applications of Continued Fractions**

Nan Zheng

*Namyong Lee, Faculty Mentor (Department of Mathematics and Statistics)*

## **Formula SAE Composite Intake System**

Thomas Lutz & Garrett Luce

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

## **The Buzz on Malaria**

Tyler Metzger

*Ruijun Zhao, Faculty Mentor (Department of Mathematics and Statistics)*

Malaria has been a big problem, especially in Africa, for many years. So many children die each year due to the malaria infection, but this can be prevented. The RTS,S malaria vaccine is current in phase three of its trials. With this vaccine, it could be possible to minimize the deaths of children each year. The goal of this experiment was to collect the data being done in the phase three trial in Africa to create a model of the effectiveness of the vaccine. The trial has been going on for the last 22 months and so far, there has been a trend in the effectiveness of the vaccine. This data was able to be modeled using a system of equations derived from the life cycle of the malaria transmission cycle. With this data, we will be able to figure out how often the vaccine will have to be distributed in order for there to be minimal infections.

## **Historical Development and Applications of Continued Fractions**

Nan Zheng

*Namyong Lee, Faculty Mentor (Department of Mathematics and Statistics)*

Continued Fraction is origin back about two thousand years ago, but it was officially named in 1695, by John Wallis. During the seventeenth centuries, Continued Fraction were studied by many great mathematicians. It has been used in many different mathematical fields, such as, number theory, series and recursion, approximation theory, and theory of probability, to name a few. Even though Continued Fraction is not covered in typical undergraduate curriculum in mathematics, it has many fascinating properties and it has wonderful series of applications. In this research, we surveyed the topic through many different classic literature. Especially we have focused some applications of Continued Fractions, including the modern calendar system, some mechanical design, and solving the Diophantine equations.

## **Formula SAE Composite Intake System**

Thomas Lutz & Garrett Luce

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

The reasoning for this research is to investigate the best method for manufacturing a composite intake plenum for use in the Formula SAE competition. The competition is a performance-based event, so it is critical that the engine makes as much horsepower as possible. So the intake must have high performance characterizes. The goals for the intake were to flow 120 CFM, have high manufacture quality meaning that it had no air leaks or imperfections after being made, and have as high of air velocity as possible for good fuel atomization while still meeting the first goal of airflow above 120 CFM. In order to meet this goal various manufacturing methods were researched and the results of their success from other teams was analyzed. Research was also done in order to determine the proper size of our plenum that would yield the best performance for our engine. The first method that was tried was using a foam core to manufacture our part around. This method had a lower cost and a quicker manufacture time than other methods explored, but the ability to lay composite fiber around the 3D shape proved difficult and did not give us the sealing or air flow goals we had set out for. The next method that was explored was using a plastic mold of only half the plenum, and then making two halves to combine into a finished product. This method had much better results and met the goals we set out to achieve.



# Automotive Engineering Technology

---

## **Formula SAE Chassis Design & Materials**

Kyle Peterson & Tim Nelson

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

## **SMART ForTwo Hybrid**

Peter Sparks

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

## **FSAE Fuel System**

Bradley Tupa & Garrett Graff

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

## **Formula SAE Chassis Design & Materials**

Kyle Peterson & Tim Nelson

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

Each year, Minnesota State University, Mankato participates in an international motorsports competition in Brooklyn, MI as a senior year capstone project. One of the main goals of the 2013-14 team was to have a stronger and lighter chassis than the 2011-12 team. The chassis of the Formula SAE vehicle is one of the most important components of the project, it is what forms the basis for the car, and holds all the parts together to make a running vehicle. Having a stronger and lighter chassis contributes drastically to overall driving performance of the vehicle. Throughout the first semester of the project, the team created the original designs for the chassis. PTC Pro Engineer, a 3-dimensional computer modeling software, was used along with other software to make sure other components of the chassis were compatible with the frame design, as well as improving in the areas that had been chosen. Using the modeling and simulation software, tests were run to analyze and adjust the material composition of the chassis to meet the goal requirements. In order to achieve these improvement goals, it was necessary not only to design an efficient chassis architecture, but also to evaluate the strength characteristics of the chosen materials to keep the weight of the chassis low. These chosen materials were the subject of the grant applied for in Fall 2013. At this point, the design has been translated from the computer into a tangible chassis, from which the 2013-14 Formula SAE car is being fabricated.

## **SMART ForTwo Hybrid**

Peter Sparks

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

Oil and gas prices are going up each year and at some point the reserves are going to run out of fossil fuels creating a shortage. The research being conducted is to implement a hybrid system on 2005 SMART ForTwo to reduce the amount of fossil fuels used. The SMART ForTwo project was intended to create a hybrid vehicle that would be powered by a Cal Motors electric motor in addition to a diesel engine. Integration works by using LabVIEW to program the vehicle; it will run 100% electric motor to 20km/hr, switch to use both the electric and diesel motors together up to 40 km/hr while slowly reducing the amount of input from the electric motor, and finally only the diesel motor above 40km/hr. The goals of this project were to set up a battery management system that can effectively communicate with each battery cell and provide real time data on voltage, temperature, and will balance the cells. In order to achieve these goals the right battery management system needed to be selected to communicate with the 3.4V lithium ion batteries that are already in place. The elithion battery management system was selected and is currently being installed. Although it is too early in the project to have any results the vehicle is expected to have a fully functional hybrid system that switches from electric to diesel at predetermined points, communicates effectively with the batteries, and achieves over 100mpg which greatly cuts down on the use of fossil fuels.

## **FSAE Fuel System**

Bradley Tupa & Garrett Graff

*Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)*

The fuel system is the heart of any racing application. Not only is the fuel system an essential part of a race car, the designed system is also incorporating a new theory of injection which utilizes an opposed flow injector to cool the intake air charge and eliminating the need for an intercooler. This technology will be applied to the Formula SAE car that will be taken to competition in May to compete against 120 schools from around the world. By utilizing advanced tuning techniques the hope was to be able to optimize the performance of the fuel system to achieve the cooling effects that were desired in replacement of a traditional intercooler. Currently an engine dynamometer is used to replicate real world engine conditions and tuning the engine accordingly to determine the results of the opposed flow cooling effect. At this time, there is limited test time and data to support our findings however there has been a cooling of the intake charge in result of the opposed flow fuel system. Additional testing and data recording will be needed to fully validate the findings but there is a lot of optimism for the results. By implementing an opposed flow injection system the need for an intercooler will be eliminated due to the cooling effect achieved by the opposed flow injector set up. Therefore, additional weight is removed from the car and overall performance is increased.

# Elementary and Early Childhood Education & Special Education

---

## **The Relationship Between Temperament and Changes in Cultural Competency Among Undergraduate Students**

Kwame Opoku Akyeampong, Olufolajimi Onadipe, Anastasia Stanceva, & Laura Donley  
*Elizabeth Sandell, Faculty Mentor (Department of Educational Studies: Elementary and Early Childhood Education)*

## **What Constitutes a Welcoming Community? Mankato Leaders Go Beyond the 'Welcome Wagon' for New Immigrants**

Sarah Lieske, Sadie Leidall, & Philip Munkvold  
*Elizabeth Sandell, Faculty Mentor (Department of Elementary and Early Childhood Education)*

## **Evaluating the Effects of Task Interspersal Math Assignments for Students Receiving Behavioral Support**

Raechel Erdman  
*Alexandra Hilt-Panahon, Faculty Mentor (Department of Special Education)*  
*Natasha Olson, Graduate Student Mentor (Department of Psychology)*

## **The Relationship Between Temperament and Changes in Cultural Competency Among Undergraduate Students**

Kwame Opoku Akyeampong, Olufolajimi Onadipe, Anastasia Stanceva, & Laura Donley  
*Elizabeth Sandell, Faculty Mentor (Department of Elementary and Early Childhood Education)*

The study examined the relationship between Temperament Type and changes in Cultural Competency among a group of university undergraduate students. For this study, Temperament Type (Keirsey, 1998) was considered to be a set of observable personality traits, e.g., communication, habits, behavior patterns, values, attitudes, talents, etc. Cultural Competency, according to Hammer and Bennett (2010), was defined as “the capability to accurately understand and adapt behavior to cultural difference and commonality.” The study responded to this research question: To what extent does Temperament Type affect changes in the Cultural Competency of undergraduates? Data was collected using two computer-based, online inventories. First 50 undergraduate students completed the 70-question Keirsey Temperament Sorter – II (KTS-II) to categorize their personality type. These types are based on four categories of personality: (a) introvert – extrovert; (b) intuitive – sensory; (c) feeling – thinking; and (d) judging – perceiving. Second, students completed the Intercultural Development Inventory (IDI), developed by Hammer and Bennett (1998, 2001.) The IDI had 50 Likert-type items that were answered in 20 to 30 minutes. The IDI was based on Bennett’s Developmental Model of Intercultural Sensitivity (1986), which identified five orientations toward cultural differences: denial, polarization, minimization, acceptance, and adaptation. Data was collected at the beginning and at the conclusion of the 16-week course, in order to measure changes in Cultural Competency that occurred possibly as a result of the course experiences. The results of this study will help determine the efficacy of teaching methods used by the instructors to develop Cultural Competency.

## **What Constitutes a Welcoming Community? Mankato Leaders Go Beyond the 'Welcome Wagon' for New Immigrants**

Sarah Lieske, Sadie Leidall, & Philip Munkvold  
*Elizabeth Sandell, Faculty Mentor (Department of Elementary and Early Childhood Education)*

The purpose of this study was to understand how leaders responded to the community’s increasing diversity. According to previous research, “adults in the state demonstrate both marked support for programs and policies supporting immigrants and refugees, and considerable xenophobia” (Fennelly, 2006). Of all the states receiving new immigrants, Minnesota has the greatest diversity (Somali, Hmong, Sudanese, Hispanic, Russian, South Asian) (Brower, 2013). Fennelly & Federico (2008) also found that rural residents hold more negative attitudes toward immigrants. Intergroup contact theory and acculturation studies address these issues. The study responded to these research questions: How do leaders conceptualize the ideas of diversity and welcoming? What are the leaders’ goals for creating a community that welcomes non-European Americans? How do the leaders operationalize their concepts of diversity and welcoming? Acculturation, intergroup contact theory, and the Minnesota context form the foundation of the research project. Ten to twelve community leaders (key actors) were purposefully selected from the education, non-profit, business, and government sectors (such as city administrators, school principals). Interviews took place to elicit information about what leaders think diversity and welcoming mean; their goals for a welcoming community; and how leaders implement those goals. Interviews were transcribed, coded, and analyzed using software to identify themes and trends. Outcomes of the study may be used by leaders to identify the community’s strengths and weaknesses. The analysis could form the basis for additional educational or cultural programming.

## **Evaluating the Effects of Task Interspersal Math Assignments for Students Receiving Behavioral Support**

Raechel Erdman

*Alexandra Hilt-Panahon, Faculty Mentor (Department of Special Education)*

*Natasha Olson, Graduate Student Mentor (Department of Psychology)*

Current research supports the task interspersal technique as a tool to improve student performance on math assignments, specifically concerning number of problems completed and accuracy of completed problems. The task interspersal method consists of the addition of easier math problems amidst target problems that are required for mastery at a student's grade level. Essentially, the implementation of this technique allows students the confidence that comes with the completion of each problem, and therefore motivation to continue, as well as a respite between difficult problems. As math is a core academic discipline, it is necessary for professionals to be informed of interventions that increase both accuracy and productivity on target coursework, particularly methods of practice that do not reduce that mastery level activity. The purpose of this study will be to investigate the task interspersal method for students receiving behavioral support. Since most research has focused on students in general education classrooms, there is a lack of evidence that task interspersal is an effective technique for other students, such as those with behavioral problems. Middle school students will be given two types of assignments, including a control assignment and an interspersal assignment, in order to measure how the task interspersal method affects student performance. Results of this study are pending the conclusion of data collection. Results will indicate the effectiveness of this method for students receiving behavioral support, as well as the benefits the intervention has for professionals that apply task interspersal to increase student success in the area of math.

# Gender and Women's Studies

---

## **Sexual Assault on College Campuses**

Kelsey Goeman

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

## **A Critical Analysis of Media Images Depicting the New Athletic Body Ideal and One Woman's Experience with Them**

Kelsey Mischke

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

## **Organizing for Justice: The Critical Constructivist Approach to Reproductive Justice**

Omolayo Ogunnowo, Elaine Lossing, KariAnn Uecker, & Natasha Theissen

*Laura Harrison, Faculty Mentor (Department of Gender and Women's Studies)*

## **An Oral History and Auto-ethnography of Sexuality Privilege and Gender Inequity in LGBTQ Hmong America**

Chong Vang

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

## **Sexual Assault on College Campuses**

Kelsey Goeman

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

This research project is the culmination of interviews, scholarly sources, magazine articles and various books regarding the incidence of sexual assault on college campuses. This also contains findings on how various U.S. universities have implemented sexual assault awareness campaigns and what methods they employ to alleviate the widespread social problem of sexual assault. This research project will contain information that will help other colleges successfully implement their own sexual assault prevention/rape culture campaign based on the success of other projects. Also addressed are the reasons for why such campaigns were founded, if it was entirely motivated on feminist activism or was in response to the university mishandling incidences of sexual assault.

## **A Critical Analysis of Media Images Depicting the New Athletic Body Ideal and One Woman's Experience with Them**

Kelsey Mischke

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

The idea body type for women in the United States now requires not only a thin physique, but visible muscle definition and fitness, as well. This athletic body type must still poses feminine qualities such as large breasts, a small frame, and curves. This new level of perfection has been created by advertisements, fitness magazines, and internet memes. However, this ideal body type is still computer generated, created from parts of multiple women, and largely unobtainable. Since its emergence, little research has critically assessed these images and their effects of women's self-evaluations. A feminist perspective will be used to determine what these advertisements, photographs, and memes are really conveying to women. A sample size of 50 advertisements will be used and patterns will be identified such as extremely fit and thin bodies, emphasis on impossible levels of socially defined beauty, and the sexualization of the female body. Auto-ethnographic findings are expected to indicate that these images lead to internalization and idolization, which result in feelings of shame, guilt, embarrassment, excessive exercising, and dieting in pursuit of this impossible physique. Though this study focuses on a single woman's experience with these images, it has large implications for women everywhere. Those who internalize these images may experience similar psychological discomfort and physical injury in pursuit of an impossible ideal. Education provided by this study could deter such harms and prevent psychological and biological issues associated with striving for this new ideal body type.



## **Organizing for Justice: The Critical Constructivist Approach to Reproductive Justice**

Omolayo Ogunnowo, Elaine Lossing, KariAnn Uecker, & Natasha Theissen  
*Laura Harrison, Faculty Mentor (Department of Gender and Women's Studies)*

Women's reproductive capacities have always played an important role in society. This has given rise to women being the sole bearers for the continuation of life. As such, the reproductive ability of women has continued to be viewed with critical eyes. Historically, good motherhood has meant never to terminate pregnancy, since it holds the potential of life. Herein lays the issue of what Nancy Ehrenreich calls the Liberal Individualist approach to reproductive rights, which indicates that there should be a non-interventional role of government. This approach indicates that a woman is an individual, rational agent with a constitutional protected right to privacy. On the other hand, Ehrenreich notes that the Critical Constructivist approach takes into consideration that choices are not merely individual, but socially constructed. This project was conducted to familiarize individuals with the concept of reproductive justice. The Pro-Choice Public Education Project (PEP) website was selected for its organizational structure and mission towards contributing to reproductive justice. This website was further analyzed to inquire if it fits into the framework of either Liberal Individualist or Critical Constructivist approaches to reproductive rights/justice. Based on its holistic nature of addressing issues of reproductive justice, we found that the framework of Pro-Choice PEP fits the Critical Constructivist model. As a result, this project contributes to our existing knowledge of reproductive justice and offers explanations of the Critical Constructivist approach.

## **An Oral History and Auto-ethnography of Sexuality Privilege and Gender Inequity in LGBTQ Hmong America**

Chong Vang

*Amy Sullivan, Faculty Mentor (Department of Gender and Women's Studies)*

Within the last decade, issues of Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) individuals have surfaced the Hmong American community. This research project is an oral history and auto-ethnography with two parts. The first part examines the formation of Hmong American LGBTQ identities through the experiences of migration and immigration, acculturation, and participation in capitalism. This demonstrates how LGBTQ identities are created and adopted into mainstream Hmong American LGBTQ communities. The next part takes a feminist intersectionality approach to examine the experiences whereby sexual privilege is formed in Hmong American LGBTQ communities that have been conditioned by historic gender inequity within Hmong American community. This second angle of examination will not only critique the role of privilege in Hmong LGBTQ sexuality, but the role in which gender inequity conditions critical consciousness of LGBTQ identities in Hmong America. Results may indicate a varying consciousness of sexual identity from experiences of gender inequity. In the future, we hope that this research will inspire emerging Hmong American LGBTQ activists, organizers, artists, and scholars to build towards a holistic and critical consciousness of what their own sexual and gender identity means to them; and to further contribute their own knowledge and experiences of intersectionality as Hmong American LGBTQ individuals towards the scholarship of Hmong Trans\* and Queer Feminism and Critique.

# STUDENT INDEX

## A

Abdalla, Mohammad..... 54, 56  
 Abdulle, Abdullahi..... 69, 80  
 Abugre, Henruka..... 4, 10, 26  
 Aguilar, Sergio..... 48, 49  
 Ahlness, Ellen..... 46, 47  
 Ahmad, Faimi..... 12, 38  
 Akyeampong, Kwame Opoku..... 107, 108  
 Alaei, Tina..... 54, 55, 56  
 Alexander, Madison..... 72, 94  
 Allen, Jeffrey..... 60, 62  
 Almoite, Maria..... 70, 86, 87  
 Altmann, Michelle..... 70, 83  
 Anderson, Cassie..... 72, 94  
 Anderson, Laura..... 72, 94  
 Ardner, Benjamin..... 70, 71, 87, 90  
 Asaolu, Bisola..... 8, 14

## B

Bach, Lauren..... 4, 71, 89  
 Ball, Jacob..... 11, 30  
 Balster, Jeremy..... 4, 8, 14  
 Barrett, Katarina..... 66, 67  
 Barton, Joseph..... 68, 76  
 Barton, Kristina..... 68, 75  
 Beckman, Mitchell..... 4, 60, 61  
 Benavidez, Katelyn..... 72, 95  
 Bennett, Stephanie..... 48, 49  
 Benolken, Sue..... 54, 55  
 Berg, Laura..... 68, 74  
 Bermel, Brock..... 8, 15  
 Besonen, James..... 68, 76  
 Bhandari, Pradeep..... 8, 15  
 Bickel, Brianna..... 72, 94  
 Boon, Laura..... 8, 16  
 Bowman, Jenna..... 11, 30  
 Boyd, Scott..... 70, 88  
 Boynton, Dale..... 12, 39  
 Brickley, Audrey..... 66, 67  
 Broughten, Samantha..... 72, 94  
 Burch, Sydney..... 43, 45  
 Burke, Michelle..... 69, 82  
 Burns, Randall..... 4, 8, 17

## C

Cederholm, Amber..... 12, 40

Chopp, Laura..... 4, 51, 52  
 Christensen, Karly..... 63, 65  
 Colakovic, Ryan..... 8, 17  
 Collins, Christopher..... 4, 51, 52, 63, 64  
 Connolly, Patrick..... 9, 19  
 Connors, Tony..... 43, 44  
 Conrad, Chelsea..... 4, 71, 88  
 Cords, Amy..... 69, 83  
 Creger, Paul..... 9, 20

## D

Dickey, Mark..... 98, 100  
 Doering, Karleen..... 9, 24  
 Donley, Laura..... 107, 108  
 Dose, Katie..... 4, 8, 17  
 Doyle, Michael..... 12, 40  
 Dunlay, Andrew..... 60, 62  
 Durkee, Liz..... 72, 94

## E

Eaton, Dylan..... 8, 18  
 Eatwell, Maegan..... 8, 18  
 Eineke, Megan..... 66, 67  
 Elwood, Britney..... 72, 94  
 Endres, Daniel..... 68, 77  
 Englin, Hannah..... 12, 40  
 Erdman, Raechel..... 4, 107, 109

## F

Faraday, James..... 12, 39, 98, 99  
 Feldman, Stephanie..... 69, 83  
 Fischbach, Paula..... 4, 71, 89  
 Flegel, Shelby..... 4, 71, 89  
 Foster, Courtney..... 72, 94  
 Franks, Christopher..... 69, 80  
 Friedrichs, Daniel..... 71, 93  
 Fry, Laura..... 66, 67

## G

Gee, Monica..... 70, 86  
 Gehling, Katelyn..... 68, 75  
 Gilbert, Brian..... 9, 19  
 Gilbert, Steven..... 9, 19  
 Gobin, Amanda..... 72, 94  
 Goelz, Jared..... 70, 86  
 Goeman, Kelsey..... 110, 111  
 Gooler, Ashley..... 68, 77

Graber, Cari..... 10, 27  
 Graff, Garrett..... 104, 106  
 Grams, Derek ..... 69, 81  
 Greenblat, Naomi..... 70, 83  
 Gronewold, Katy..... 9, 19  
 Grovum, Shannon ..... 72, 94  
 Gute, Jessa..... 4

## H

Haga, Anthony ..... 69, 78  
 Hakala, Ivy ..... 63, 64  
 Hansen, Kari ..... 72, 95  
 Hansen, Nicole..... 72, 95  
 Hanson, Taylour..... 9, 20  
 Hanson, Todd..... 54, 55  
 Harris, Lauren ..... 72, 95  
 Hassan, Areej ..... 4, 70, 85  
 Hebig, Mikell ..... 71, 90  
 Helm, Matt ..... 54, 55  
 Hensersky, Travis ..... 4, 71, 90  
 Hermansen, Eric..... 8, 15  
 Hermel, Danielle ..... 72, 94  
 Hinrichs, Gretchen ..... 69, 82  
 Hofmann, Quinn ..... 9, 21  
 Holst, Amanda ..... 43, 44  
 Holtz, Bradley..... 69, 78  
 Houser, Matthew..... 60, 61  
 Howley, Peter..... 12, 41  
 Hron, Danielle..... 4, 11, 31  
 Humphrey, Kathryn ..... 71, 90  
 Hunde, Tigist..... 11, 31  
 Hussong, Thomas..... 69, 79  
 Huwae, Karenzha..... 9, 22

## J

Jaros, Matthew ..... 12, 37  
 Jobeun, Nicholas..... 4, 10, 28  
 Johnson, Jessica ..... 72, 95  
 Johnson, Kody..... 69, 79  
 Johnson, Marc ..... 60, 61  
 Johnson, Shelby ..... 63, 64  
 Jordan, Samuel..... 4  
 Jorgensen, Elliott..... 4

## K

K.C., Subham..... 98, 100  
 Kampmeyer, Drew ..... 9, 22  
 Kamunen, Kody ..... 54, 55  
 Kay, Jessica..... 70, 87

Kessler, Kyle..... 72, 95  
 Kirchberg, Kira ..... 4, 51, 52  
 Klebe, Angela ..... 72, 95  
 Kleese, Roger ..... 69, 80  
 Kleiber, Kaitlyn..... 72, 95  
 Koonst, Tyler ..... 4, 9, 23  
 Kronebusch, Adam ..... 4, 9, 23

## L

Lancette, Lindsey ..... 68, 74  
 Larson, Benly ..... 46, 47  
 Ledding, Ashley ..... 10, 28  
 Ledding, Rachel ..... 10, 28  
 Lee, Jooyoung..... 9, 24  
 Lee, Pakou..... 69, 82  
 Lee, Panhia..... 69, 82  
 Leeder, Brittany ..... 11, 32  
 Leidall, Sadie ..... 4, 107, 108  
 LeNeave, Cortney ..... 60, 62  
 Lieske, Sarah..... 4, 107, 108  
 List, Samantha..... 4, 51, 52, 63, 64  
 Lopez, Mackenzie ..... 12, 39, 98, 99  
 Lossing, Elaine..... 110, 112  
 Luce, Garrett ..... 4, 101, 103  
 Lutteke, Haley..... 68, 75  
 Lutz, Thomas ..... 4, 101, 103  
 Lynch, Michael ..... 54, 56

## M

Magnusson, Erika ..... 10, 25  
 Maki, Brandy ..... 54, 55  
 Maleska, Allison ..... 72, 93  
 Martin, Joshua..... 12, 39, 98, 99  
 Martin, Zoe ..... 70, 86  
 McCall, Alexis ..... 70, 83  
 McCluskey, Jim ..... 54, 55  
 McDonald, Katie..... 72, 94  
 Medin, Logan..... 69, 80  
 Menuba, Stella ..... 4, 10, 25  
 Meschke, Cody ..... 98, 100  
 Metzger, Tyler..... 101, 102  
 Miller, Nicholas ..... 68, 76  
 Mischke, Kelsey..... 110, 111  
 Mishek, John ..... 72, 95  
 Mohamed, Abdikadir ..... 4, 11, 32  
 Moller, Christa ..... 10, 26  
 Monson, Laura ..... 72, 94  
 Monson, Marc ..... 4  
 Moore, Bridget..... 72, 94

Moteng, Auriol..... 13, 42  
 Mueller, Adam ..... 68, 76  
 Mumbleau, Allison ..... 13, 42  
 Mun, Byeongho..... 70, 84  
 Munkvold, Philip ..... 4, 107, 108

**N**

Nakamura, Yuko ..... 9, 21  
 Nelson, Jennifer ..... 71, 91  
 Nelson, Tim..... 104, 105  
 Newbauer, Lucas..... 63, 64  
 Nguyen, Thu ..... 12, 38  
 Nichols, Ethan..... 4, 10, 26  
 Nicholson, Andrew ..... 10, 27  
 Nickel, Peter..... 69, 81  
 Nohelty, Nicole..... 48, 50  
 Ntoka, Michael..... 11, 33

**O**

Ogunnowo, Omolayo..... 110, 112  
 Oldani, Taylor ..... 72, 95  
 Onadipe, Olufolajimi ..... 107, 108

**P**

Pasquale, Rebecca..... 12, 41  
 Paulsen, Kristen ..... 48, 50  
 Person, Carter..... 71, 91  
 Peterson, Chelsey..... 72, 94  
 Peterson, Kyle ..... 104, 105  
 Pfeffer, Andrew..... 12, 38  
 Phelps, Emma ..... 4, 11, 33  
 Przymus, Kelsey ..... 72, 94  
 Putrah, Samuel ..... 13, 41

**R**

Raddatz, Ridge..... 12, 41  
 Rajaguru, Dulanjani ..... 4, 11, 34  
 Ranals, Neil..... 4, 11, 34  
 Ray, Jannine..... 71, 92  
 Reffke, Anthony..... 96, 97  
 Reimer, Gregory ..... 70, 86  
 Rice, Anna..... 72, 93  
 Richardson, Joanna ..... 57, 58  
 Rivard, Jessica..... 72, 94  
 Roemhildt, Reid ..... 69, 81  
 Roettger, William..... 72, 95  
 Rossi, Chris..... 72, 94  
 Rudi, Michael..... 98, 99

**S**

Santiago, Anessa ..... 72, 95  
 Sathre, Julie..... 72, 95  
 Scheper, Christine..... 4, 57, 58  
 Schmitz, Daniel..... 98, 99  
 Schrandt, Tyler..... 4, 43, 45  
 Schwanberg, Allison..... 68, 76  
 Sellner, Andria ..... 11, 35  
 Shabab, Sarzana ..... 12, 38  
 Shaw, Emilee ..... 57, 59  
 Shea, Danielle ..... 72, 95  
 Shumilov, Kirill ..... 70, 85  
 Shurson, Marcus ..... 69, 78  
 Sim, Jaekook..... 4, 9, 10, 24  
 Snyder, Nicole..... 4, 10, 27  
 Soboleva, Tatiana..... 4, 8, 16, 17, 96, 97  
 Sobota, Sara ..... 4, 9, 20, 21  
 Sonnabend, Katie ..... 4, 10, 28  
 Soto, Julio ..... 69, 81  
 Sparks, Peter ..... 104, 105  
 St. Aubin, Nicholas ..... 98, 100  
 St. Lawrence, John..... 69, 81  
 Stanceva, Anastasia..... 107, 108  
 Stong, Emma..... 4, 12, 35  
 Sullivan, Shannon ..... 72, 94

**T**

Tasha, Natacha..... 4, 10, 26  
 Thate, Erica ..... 72, 94  
 Theis, Sonya..... 72, 94  
 Theissen, Natasha ..... 110, 112  
 Tietje, Shayna ..... 4  
 Timilsina, Ramesh ..... 4, 60, 61  
 Todd, Randal..... 68, 77  
 Tollefson, Daniel..... 4, 12, 36  
 Tomlinson, Becca ..... 72, 94  
 Trukki, Kali..... 10, 28  
 Tucker, Jacqueline ..... 72, 95  
 Tupa, Bradley..... 104, 106

**U**

Uecker, KariAnn ..... 110, 112  
 Umhoefer, Aaron ..... 68, 77

**V**

Van Vleet, Kyle ..... 10, 29  
 Vang, Chong ..... 110, 112  
 Vang, Mai Xee ..... 69, 82

VanSickle, Alexa ..... 69, 83  
Vue, Mai ..... 8, 14

## **W**

Walsh, Danielle..... 72, 95  
Wang, Lina..... 51, 53  
Weidner, Katie ..... 72, 94  
Weir, Karley..... 71, 92  
Westermayer, Katie..... 4, 48, 50, 71, 89  
Whittemore, Blake ..... 4, 60, 61  
Wilfahrt, Derek ..... 72, 94  
Willaert, Sean..... 4, 10, 27  
Williams, Jade..... 70, 84

## **X**

Xiong, Pathy ..... 69, 82

## **Y**

Yahya, Robera..... 4, 12, 36  
Yates Swedberg, Rachael..... 9, 21  
Young, Natalie ..... 4, 12, 37

## **Z**

Zawed, Abrar ..... 10, 29  
Zheng, Nan..... 101, 102  
Zimmerman, Erin..... 66, 67

# FACULTY INDEX

## A

Abdalla, Mohammad..... 54, 56  
Agarwal, Kuldeep ..... 12, 40  
Albertson, Dawn ..... 2, 57, 58, 59, 70, 87, 88

## B

Bates, Rebecca ..... 12, 39, 70, 88, 98, 99  
Bentley, Michael ..... 9, 10, 24, 26, 28  
Berg, Bonnie ..... 68, 75, 76  
Bergman, Barbara ..... 2  
Bergstrom, Rachel..... 9, 20  
Bertsch, Kathy..... 71, 88, 91  
Bissonnette, David ..... 51, 52, 63, 64  
Booker, Queen ..... 2, 70, 85, 86  
Buchanan, Jeffrey ..... 48, 49

## C

Casella, Donna ..... 46, 47  
Clark, Ida..... 70, 84  
Cohen, Rachel ..... 9, 19  
Conlin, Christopher..... 10, 25  
Corley, Cristopher..... 2, 96, 97

## D

Druschel, Stephen ..... 12, 38  
Durand, Matthew .. 68, 69, 76, 77, 78, 79, 80, 81

## E

Esenabhalu, Victor ..... 8, 14

## F

Filter, Kevin ..... 71, 89  
Fisher, Shannon..... 8, 17, 51, 53

## G

Germundson, Curt..... 43, 44  
Grussendorf, Kelly..... 9, 22, 51, 52

## H

Habibi, Mohammad ..... 54, 55, 56, 98, 99  
Hadley, Mary ..... 11, 30, 32, 34, 51, 52  
Harrison, Laura ..... 110, 112  
Hart, Marilyn..... 1, 2, 9, 10, 19, 23, 24  
He, Nannan ..... 12, 38  
Hedman, Amy ..... 63, 65

Hilt-Panahon, Alexandra..... 2, 107, 109  
Holtermann, Joseph..... 2

## J

Jessup, Rennesa..... 46, 47  
Johnston, Mary Susan ..... 2  
Jones, Bruce ..... 60, 61, 62, 101, 103, 104, 105

## K

Kamphoff, Cindra ..... 2  
Kim, Sungwon ..... 98, 100  
Knoblich, Penny..... 51, 52, 63, 64  
Kramer, Nadja..... 71, 93  
Krenz, John ..... 10, 29  
Kunkel, Joseph..... 96, 97

## L

Laidlaw, Mika ..... 43, 45  
Langley, Moses ..... 70, 71, 86, 90  
Lassonde, Karla..... 2, 70, 87  
Lee, Namyong..... 13, 42, 101, 102  
Losh, Steven..... 2, 12, 37

## M

McCullough, Mark..... 2  
Mead, Chelsea..... 63, 64, 68, 74  
Mead, Gary ..... 60, 61, 101, 103, 104, 105, 106  
Mercurio, Steven..... 9, 21, 51, 53  
Moen, Daniel..... 70, 83

## P

Panahon, Carlos ..... 2, 48, 49, 50, 57, 58, 71, 92  
Pettitt, Robert ..... 70, 84, 85  
Piowlski, Lori..... 2, 69, 82

## Q

Quirk-Dorr, Danae ..... 11, 34

## R

Ries, Barry ..... 2, 5  
Rife, James ..... 11, 12, 33, 36  
Riness, Laura..... 6  
Ruhland, Christopher ..... 8, 10, 15, 18, 25, 29

## S

Salerno, Theresa..... 8, 9, 11, 12, 17, 20, 30, 37

Sandell, Elizabeth ..... 1, 2, 107, 108  
Sanjel, Deepak ..... 13, 42  
Sealy, Winston ..... 12, 13, 39, 40, 41  
Secott, Timothy..... 8, 10, 18, 26, 27  
Seth, Kristel..... 2  
Sharlin, David ..... 10, 27, 29  
Sprankle, Eric..... 71, 92  
Stackpool, Lyudmyla ..... 11, 31  
Stark, Daniel ..... 43, 45  
Stark, Emily ..... 71, 89, 91  
Sullivan, Amy ..... 66, 67, 110, 111, 112  
Swan, Marilyn..... 2, 13, 42

**T**

Thoemke, John..... 11, 12, 31, 32, 33, 35, 36  
Toma, Daniel..... 8, 16

**V**

Vieceli, Jacqueline ..... 70, 84  
Von Bank, Heather..... 2, 69, 70, 83  
Vorlicek, Trent..... 2, 12, 35

**W**

Wenger, Gina ..... 2, 43, 44, 68, 74  
Wrigley, Dorothy ..... 8, 9, 14, 15, 22  
Wu, Xuanhui ..... 54, 56

**Y**

Yang, Song..... 69, 82  
Young, Patricia ..... 72, 94  
Yuan, Fei..... 2

**Z**

Zhao, Riujun ..... 101, 102

**10:00-11:30am**

**Poster Session A**

**CSU Ballroom**

**59. A Mathematical Modeling and Simulation of Bone Remodeling Control Mechanism**

Sobyuk Son, Sangil Yi, Jooyoung Lee, Youna Lee, & Anna Kang

*Namyong Lee, Faculty Mentor (Department of Mathematics and Statistics)*

Bone remodeling occurs at spatially and temporally discrete sites of the skeleton and involves resorption by osteoclasts, followed by formation of new bone by osteoblasts. Specific region of bone are targeted for remodeling due to structural defects, thus maintaining the mechanical strength of the skeleton. Bone remodeling plays a major role in bone homeostasis in human body, so it should work in accordance with other factors. A number of studies related to bone remodeling process had been conducted, but they mainly focused on biological and chemical mechanisms. In this study, we approached the bone remodeling by mathematical modeling based on existing biological and chemical understandings. The aim of the research was to explain the process of bone remodeling and to simulate the control mechanism in a mathematical method. We constructed a mathematical model describing temporal changes in osteoblast and osteoclast populations and consequent changes in bone mass at a single site of bone remodeling. To summarize the net effect of factors on the rates of cell production, we also employed a power law approximation developed by Savageau which is now widely used in exploratory modeling and can be used with a wide range of analytical and computational techniques. Then, we validated the generated mathematical model by data from previously performed by others in scientific researches. As a result, we found an integrated model that explained bone remodeling process and control mechanism. The model was applied in computer simulation, and this model was in agreement with experimental data in scientific articles. The new mathematical modeling for bone remodeling was able to efficiently explain how other factors affect bone remodeling mechanism in the human skeleton. The new model can therefore become a highly useful tool in the medical field and exercise training program.

**60. Sun-Tracking vs. Stationary Solar Panel**

John Burt, Tina Alaei, & Dan Schmitz

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

Solar energy is one of the solutions to satisfy the world's growing demand for energy. However, cost, efficiency and dependability on weather condition are the major drawbacks of solar energy. The daily and seasonal movement of earth affects the radiation intensity on solar systems and accordingly generated electric power. The efficiency of solar panels can be improved by using sun-tracking devices. Sun-trackers move the solar systems to compensate for the daily and seasonal movement of earth, keeping the best orientation relative to the Sun. The aim of this study is to evaluate the cost and reliability of sun-tracking versus stationary solar panels. This project was completed by Iron Range Engineering students in fall 2013 and Spring 2014. The faculty mentor and three Iron Range Engineering students finalized the design and prototyped an efficient sun-tracking system and then studied the associated cost, reliability and sustainability.



**58. Interdisciplinary Experimentation**

Ashton Bird & Dustin Swiers

*Liz Miller, Faculty Mentor (Department of Art)*

*Mika Laidlaw, Faculty Mentor (Department of Art)*

The purpose of our creative work is to broaden our skills as multidisciplinary artists. We were able to construct four unique, large installation works that utilize various mediums from different genres. This presentation will discuss the applied techniques and inspirations from sculpture, printmaking, drawing, photography and video to make each installation, along with discussing the importance of crossing boundaries within disciplines. In addition, a discussion of inspirations and procedures will be shared. This work is included in the URS Creative Works Exhibition in the CSU gallery.

**59. Rural Reverie**

Weston Zarecky

*Brian Frink, Faculty Mentor (Department of Art)*

I create paintings that examine the human ego and memory. My work is a metaphor for awareness. I am currently working on paintings that bring the viewer into a space where they experience a transformative state of mind and reach higher levels of consciousness. I am highly influenced by nature and landscapes. I am interested in combining many mediums together and painting subject matter on top of layers depicting the rural landscape in a unique way. My goal is to represent landscapes and abstract pieces in a different way than we normally perceive it. I have been creating paintings that involve many different techniques and processes involved in the conception of the work. In the past I have painted many landscapes from photographs that I have taken but my concept for Rural Reverie is painting subjects in the landscape in a more representational way. The landscape becomes more of a plane of consciousness. Photography is still a powerful tool that helps me hone my interests into subject matters that I paint. I paint less from photographs but more from memory of photos that I have taken. I am interested in urban, rural buildings and manmade decay.

# CORRECTIONS

**1:05-2:05pm**

**Oral Session 7**

**CSU 204**

**The Effect of Running a Diesel Engine on Diesel Fuel and Natural Gas**

Mitchell Beckman, Marc Monson, Ramesh Timilsina, & Blake Whitemore

*Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)*

**2:10-3:10pm**

**Oral Session 11**

**CSU 203**

**Arc-Flash Study of a Manufacturing Facility in Northern Minnesota**

Daniel Schmitz, Michael Rudi, John Burt, & Jon Fors

*Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)*

---

**Creative Works Gallery**

---

**1. Interdisciplinary Experimentation**

Ashton Bird & Dustin Swiers

*Liz Miller, Faculty Mentor (Department of Art)*

*Mika Laidlaw, Faculty Mentor (Department of Art)*

**2. Researching the Differences and Commonalities of the Minnesotan Collegiate and Professional Dancer: a Documentary Exploring Individual Philosophies as the Dancer**

Sydney Burch *Daniel Stark, Faculty Mentor (Department of Theatre & Dance)*

**3. Nudity on Display**

Amanda Holst

*Gina Wenger, Faculty Mentor (Department of Art)*

**4. Designing a Logo for the First Step Mental Health App**

Mackenzie Lopez, Joshua Martin, & James Faraday

*Rebecca Bates, Faculty Mentor (Department of Integrated Engineering)*

**5. Process, Progress**

Tyler Schrandt

*Mika Laidlaw, Faculty Mentor (Department of Art)*

*Liz Miller, Faculty Mentor (Department of Art)*

**6. Rural Reverie**

Weston Zarecky

*Brian Frink, Faculty Mentor (Department of Art)*





undergraduate  
research  
symposium

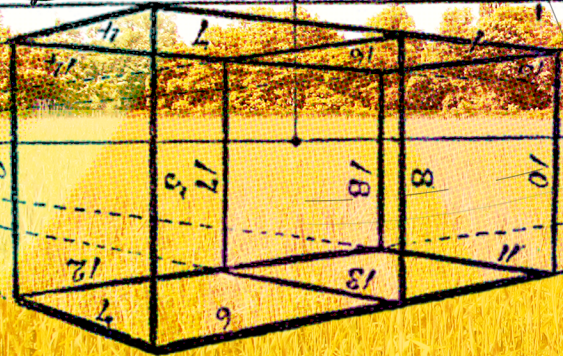
creative



- featuring works by:
- Amanda Holst
  - James Faraday
  - Joshua Martin
  - Mackenzie Lopez
  - Mai Xee Vang
  - Pakov Lee
  - Panhia Lee
  - Pathy Xiong
  - Sydney Burch
  - Tyler Schrandt

unveiling april 21  
7-9 pm  
CSU gallery

open April 14 to  
May 2



U|R|C

UNDERGRADUATE RESEARCH CENTER  
MINNESOTA STATE UNIVERSITY, MANKATO

A member of the Minnesota State Colleges and Universities System and an Affirmative Action/Equal Opportunity University. Individuals with a disability who need a reasonable accommodation to participate in this event, please contact The Undergraduate Research Center at 507-389-5732 (V), 800-627-3529 or 711 (MRS/TTY) at least 10 days prior to the event. This document is available in alternative format to individuals with disabilities by calling the above numbers.