

Apr 9th, 9:00 AM - 9:00 PM

2012 Abstract Booklet

Undergraduate Research Center, Minnesota State University, Mankato

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Undergraduate Research Center, Minnesota State University, Mankato. "2012 Abstract Booklet." Undergraduate Research Symposium, Mankato, MN, April 9, 2012.

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Undergraduate Research Symposium

April 9 2012



Launch *Your* Life U|R|C

Presenting your *undergraduate* research

UNDERGRADUATE RESEARCH CENTER

 MINNESOTA STATE UNIVERSITY MANKATO

A MESSAGE FROM THE UNDERGRADUATE RESEARCH CENTER

We would like to welcome student presenters, faculty mentors and attendees to the 14th Annual Undergraduate Research Symposium. We are excited to be able to showcase the excellent undergraduate research that takes place on campus through this annual event at Minnesota State Mankato.

This year we have used “*Launch Your Life*” to describe the impact that undergraduate research has on students’ lives. Studies have shown that involvement in undergraduate research can open the door to one-on-one student/faculty collaborations that lead to life-long relationships. It is a life-changing opportunity that has the potential to transform not only students’ college careers but also their life beyond the University.

The impact undergraduate research has on students at this campus would not be possible without many volunteers. We have worked under the guidance of the Undergraduate Research Council and would like to thank all Council members for their essential contributions to the success of this day. The inside back cover names several others who we would like to personally thank for their help in making this day possible.

As you attend the Undergraduate Research Symposium this year, we hope you are able to see the many forms of undergraduate scholarship happening on this campus and the tremendous impact that involvement in undergraduate research has on students’ lives.



Cindra Kamphoff, Ph.D.
Coordinator, Undergraduate Research
Symposium



Marilyn Hart, Ph.D.
Director, Undergraduate Research
Center



Jackie Zimski, B.A.
Graduate Assistant

2011-2012 Undergraduate Research Council Members

Barbara Bergman
Emily Boyd
Christopher Corley
Joseph Holtermann
Mary Susan Johnston
Karla Lassonde
Ihsuan Li
Steven Losh
Mark McCullough
Alexandra Panahon

Barry Reis
Laura Riness
Elizabeth Sandell
Kristin Scott
Mary Visser
Heather Von Bank
Trenton Vorlicek
Gina Wenger
Forrest Wilkerson
Hongxia Yin



Monday, April 9 Schedule of Events

8:15 – 4:00	Student Presenter, Moderator, and Judge Check-in	Lobby by CSU Ballroom
	Coffee and Snacks Available	CSU Ballroom
8:15 – 5:00	Judging Room	CSU 256
9:00 – 10:00	Oral Session 1 Automotive Engineering Technology, Electrical Engineering, Manufacturing Engineering Technology, and Integrated Engineering	CSU 201
9:00 – 10:00	Oral Session 2 Psychology	CSU 202
10:00 – 11:00	Oral Session 3 Art	CSU 203
10:00 – 11:00	Oral Session 4 Mathematics and Integrated Engineering	CSU 204
10:00 – 11:00	Oral Session 5 Health Science, Human Performance, and Nursing	CSU 253
10:00 – 11:30	Poster Session A Automotive Engineering Technology, Biological Sciences, Chemistry and Geology, Civil Engineering, Electrical Engineering, Geology, Integrated Engineering, Manufacturing Engineering Technology, and Mechanical Engineering	CSU Ballroom
11:00 – 12:00	Oral Session 6 Art	CSU 201
11:00 – 12:00	Oral Session 7 Psychology, Social Work, and Communication Studies	CSU 202
12:00 – 1:00	BREAK	
1:00 – 2:00	Oral Session 8 Biological Sciences and Philosophy	CSU 203
1:00 – 2:00	Oral Session 9 Automotive Engineering Technology	CSU 204

1:00 – 2:30	Poster Session B Art, Business, Communication Disorders, Dental Hygiene, Economics, Family and Consumer Sciences, Gender and Women’s Studies, Geography, Human Performance, Humanities, Communication Studies, Mathematics, Nursing, Political Science, and Psychology	CSU Ballroom
2:00 – 3:00	Oral Session 10 Sociology, Government and Gender and Women’s Studies	CSU 201
2:00 – 3:00	Oral Session 11 Economics	CSU 202
3:00 – 4:00	Oral Session 12 Elementary Education, English, and World Languages and Cultures	CSU 203
3:00 – 4:00	Oral Session 13 Geology, Physics and Integrated Engineering	CSU 204
4:00 – 5:00	Oral Session 14 Mathematics and Civil Engineering	CSU 203
4:00 – 5:00	Oral Session 15 Art	CSU 202
4:00 – 5:00	Oral Session 16 History, German and Theatre	CSU 285
5:30 pm	Undergraduate Research Symposium Dinner Celebration	CSU Ballroom
7:00– 9:00 pm	Creative Works Exhibit	CSU Gallery

Automotive Engineering Technology, Electrical Engineering, Manufacturing Engineering Technology, and Integrated Engineering

DESIGN AND ANALYSIS OF SPACE FRAME CHASSIS

Barry Johnson (Department of Automotive Engineering Technology)

Winston Sealy, Faculty Mentor (Department of Automotive Engineering Technology)

POLARIZATION RECOVERY IN MIMO OPTICAL RECEIVERS USING BLIND EQUALIZATION

Bushara Dosa (Department of Electrical Engineering)

Qun Zhang, Faculty Mentor (Department of Engineering)

Craig Huang, Graduate Student Mentor (Department of Electrical Engineering)

A STUDY ON LEAN MANUFACTURING PRINCIPLES: USAGE OF LEAN MANUFACTURING TOOLS FOR THE PROCESS & QUALITY IMPROVEMENT

Pawan Bhandari (Department of Manufacturing Engineering Technology)

Guanghsu Chang, Faculty Mentor (Department of Manufacturing Engineering Technology)

MINNESOTA POWER HEATING SYSTEM DESIGN PROJECT

Grant Roy (Department of Integrated Engineering)

Emmy Stage (Department of Integrated Engineering)

Emily Kilpatrick (Department of Integrated Engineering)

Katherine Marking (Department of Integrated Engineering)

Ronald Ulseth, Faculty Mentor (Department of Integrated Engineering)

DESIGN AND ANALYSIS OF SPACE FRAME CHASSIS

Barry Johnson (Department of Automotive Engineering Technology)

Winston Sealy, Faculty Mentor (Department of Automotive Engineering Technology)

A space frame chassis was designed and analyzed using Expert Framework Extension (EFX) ver. 7.0 and Finite Element Analysis (FEA) tools within ProEngineer ver. 5.0. The chassis was designed to be as rigid and lightweight as possible while meeting the technical specifications given by the sanctioning body that we'll be racing under. EFX ver. 7.0 was used to draw a three-dimensional wireframe of the chassis. Every line of the wireframe was given a profile for the dimensions of steel tubing. In addition the frame design was analyzed for resultant strains by simulating stresses of what would be created by the suspension system as the car went around the track. Before it could take hours to run a simulation using a solid model of a chassis and the simulation would often fail, but using the wireframe sketch with beam and frame tool analysis a simulation would run in under thirty seconds and would rarely fail. EFX ver. 7.0 reduced the amount of time and the complexity to create a model of the frame. Using EFX ver. 7.0 and FEA tools we were able to simulate the changes in rigidity and weight in each design iteration.

POLARIZATION RECOVERY IN MIMO OPTICAL RECEIVERS USING BLIND EQUALIZATION

Bushara Dosa (Department of Electrical Engineering)

Qun Zhang, Faculty Mentor (Department of Engineering)

Craig Huang, Graduate Student Mentor (Department of Electrical Engineering)

Adaptive filters are smart signal processing devices that can learn from their concerned system environment, and configure themselves accordingly to perform desired functions. Furthermore, adaptive filters have the capability to adapt to environmental change and continuously update themselves to deliver designed performance. In this regards, adaptive filters are true artificial intelligent machines. Here we study the performance of an adaptive filter with blind equalization (i.e., without firstly giving the filter any training) in optical receivers, for a multiple input multiple output (MIMO) communication channel. In this research, two signals with orthogonal polarizations can be used to carry different information, so that the capacity of the system doubles compared to using only one signal with a single polarization. During signal propagation, the two input polarizations will be mixed together by the optical fiber channel and cannot be separated by a simple receiver. To recover the polarization and separate the received signal into the original transmitted signals, a polarization diversity receiver is used to convert the received signal to multiple outputs for use by an adaptive filter using one kind of blind equalization method i.e., the constant modulus method (CMA). After a brief introduction to simulation system setup for a realistic dual polarization optical fiber communication channel, we present the performance of the adaptive filter on the filter startup state, filter updating step-size, and gradient noise.

A STUDY ON LEAN MANUFACTURING PRINCIPLES: USAGE OF LEAN MANUFACTURING TOOLS FOR THE PROCESS & QUALITY IMPROVEMENT

Pawan Bhandari (Department of Manufacturing Engineering Technology)

Guanghsu Chang, Faculty Mentor (Department of Manufacturing Engineering Technology)

America's manufacturers are at the soul of country's economy, providing good-paying jobs for millions of Americans. The U.S. manufacturing sector is today the world's largest and is number one in GDP as indicated by International Monetary Fund (IMF) 2011. Despite few challenges, many sectors of American manufacturing have the potential to enjoy significant growth and success. Over the last 30 years, the United States has had the largest increase in manufacturing output among major developed countries. Our enterprise, An American manufacturer, carries a long history of industrial manufacturing service to the local as well as international market. In order to maximize the production, profit and quality with minimized loss in the process, certain manufacturing and process improvement techniques were carried out at the site. Today these tools are practiced and studied not only in manufacturing enterprises but also in various sectors such as hospitals, recreational centers, government and private sectors and so on. Utilizing lean manufacturing principles, we studied the existing process status, analyzed all the data drafted and suggested appropriate solutions and methodologies to the leadership to overcome the discrepancies found and to increase the efficiency and quality of the manufacturing process and products. Companies today are spending millions of dollars in research and development projects to enhance manufacturing processes and their products so that they can lead the competing market with one step ahead of all. The research was greatly helpful to plan and achieve the enterprise's future incentives and revenue as well as other core goals.

MINNESOTA POWER HEATING SYSTEM DESIGN PROJECT

Grant Roy (Department of Integrated Engineering)

Emmy Stage (Department of Integrated Engineering)

Emily Kilpatrick (Department of Integrated Engineering)

Katherine Marking (Department of Integrated Engineering)

Ronald Ulseth, Faculty Mentor (Department of Integrated Engineering)

Project - Design a heating system for the fuels area of a coal burning power plant.

Background—Conduct research on Minnesota Power Boswell Energy Center. Gain a basic knowledge for the company and the processes they use, as well as a deeper level of understanding of the Fuels department for the focus of the project.

Scoping—A preliminary meeting with client where they explained the parameters of the project and deliverables. A secondary meeting was given by the students to confirm the project scope.

Options—The students conducted research on various heat options that could potential be used to heat the fuels department. Once the team evaluated several options the students presented the options to their clients. The clients expressed interest in a few options to move forward with.

Design—After doing further calculations on the chosen heating options the team will chose the most feasible heating source. From there they will design a heating system for implementation.

Test—Run math models and experiments on design elements used in the final design.

Evaluate—Analyze data from tests

Improve—Use evaluations to improve experiment tests. Continue improvement process till desired outcome is achieved.

After the completion of this engineering design process the students will have a final deliverable for Minnesota Power.

Psychology

JOB APPLICANT SURVEY

Timothy Akhalu (Department of Psychology)

Kristie Campana, Faculty Mentor (Department of Psychology)

NEUROLOGICAL ABNORMALITIES IN AUTISM

Melyssa Kramer (Department of Psychology)

Daniel Houlihan, Faculty Mentor (Department of Psychology)

CHILD SEXUAL ABUSE

Ayomide Ojo (Department of Psychology)

Kevin J. Filter, Faculty Mentor (Department of Psychology)

EFFECT OF INTIMATE PARTNER VIOLENCE ON CHILDREN

Francois Vang (Department of Psychology)

Sarah Sifers, Faculty Mentor (Department of Psychology)

JOB APPLICANT SURVEY

Timothy Akhalu (Department of Psychology)

Kristie Campana, Faculty Mentor (Department of Psychology)

This research is to examine the effect of race and stereotypically African-American/ Caucasian names on how people perceive and rate resumes. Specifically, we expect that when an African American has a stereotypically African-American name, they will be rated lower than when they have a stereotypically Caucasian name. We do not expect similar results for a Caucasian applicant due to the name. Participants will be recruited by being asked to spend 10 minutes filling out a survey. The researcher will approach people on campus, and ask if they would be willing to fill out a survey. If they agree, the researcher will obtain their written consent, provide them with the materials, and will give them approximately 10 minutes to complete the survey. This research has important implications, as when individuals are barred from organizations because of racial characteristics, it prevents fair access to employment opportunities, and decreases diversity within the workforce.

NEUROLOGICAL ABNORMALITIES IN AUTISM

Melyssa Kramer (Department of Psychology)

Daniel Houlihan, Faculty Mentor (Department of Psychology)

Autism is currently diagnosed based solely on behavioral observations. This can result in missing a diagnosis of someone who is on the spectrum, as well as putting someone on the spectrum that does not belong. Looking at the neurological structures of individuals with autism could lead to a more sound diagnosis of the disorder, as well as lead to clues into the cause and treatment of Autism. This review of the literature looks at the abnormalities in brain structures including the amygdala and hippocampus, corpus callosum, cerebellum, head circumference and brain volume, as well as the abnormalities in the different lobes of the brain. This review also delves into the genes implicated in an Autism diagnosis as well as identifying other known genetic disorders with behavioral similarities to Autism. Findings suggest there are signs of Autism that can lead to a diagnosis based on MRI scans; showing greater brain volume, enlarged amygdala, and hippocampus, and above average head circumference, as well as a reduction in size of the corpus callosum, cerebellum, and loss of Purkinje cells. The results of this literature review indicate that there are telling abnormalities in brains of children with autism, which if developed, could lead to a diagnosis based on physical, as well as behavioral characteristics.

CHILD SEXUAL ABUSE

Ayomide Ojo (Department of Psychology)

Kevin J. Filter, Faculty Mentor (Department of Psychology)

The purpose for this research is to learn about child sexual abuse and how it is addressed in the schools. Child sexual abuse can have significant impacts on child development and we hope to learn more about ways in which supports for these children can be enhanced. Data were collected via phone interviews with school social workers in MN and their responses to 20 open-ended questions. Notes taken from phone interviews were summarized qualitatively relative to the existing literature on understanding and supporting children who have been sexually abused. Specific topics addressed include (a) demographics of victims, (b) indicators/symptoms of abuse, (c) family functioning amongst those abused, (d) supports provided to victims, and (e) how victims cope with the experience. We hope that this study will increase awareness about child sexual abuse and how it being addressed in school.

EFFECT OF INTIMATE PARTNER VIOLENCE ON CHILDREN

Francois Vang (Department of Psychology)

Sarah Sifers, Faculty Mentor (Department of Psychology)

The relationship between mothers and their children is baffling to the eyes of many when dealing with IPV (Intimate Partner Violence). Previous research shows that mothers' stress results in negative outcomes for their children's behavior. In this study, we examined how the negative talk (criticism and sarcasm) of mothers who had experienced IPV affects their children's social skills. Findings were collected and assessed from a sample of eight children aged from 2-6 years old in a domestic violence shelter. Mothers completed the Behavior Assessment System for Children, Second Edition and a trained observer coded mother-child interactions with the Dyadic Parent-Child Interaction Coding System. It was predicted that mothers who had experienced IPV would engage in more negative talk than parents in general community samples and that children who had been in homes with IPV would have poorer social skills than children in the general population normative sample. Furthermore, it was hypothesized that maternal negative talk would be negatively correlated with children's social skills. Results show that negative talk was non-significantly higher in the mothers exposed to IPV and the social skills of children from homes with IPV were non-significantly lower. The correlation between maternal negative talk and child social skills was not significant either. It could be that mothers were avoiding negative talk because they were being observed. The children in this sample also may have been particularly resilient to the negative effects of IPV and maternal negative talk. However, it is more likely that the lack of significant results are due to the small sample size. Therefore, more research should be done on this topic to determine if the hypothesized results can be found in a larger sample.

Art

VOICES OF THE FLESH

Hope Thier (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

WATCHING PAINT DRY

Samantha Allen (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

PAINTING: PROXIMITY AND REACH

Tyler Abrahamson (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

MONA HATOUM AND THE BIOGRAPHICAL INFLUENCE ON CROSS-CULTURAL EXCHANGE

Nicole Shelton (Department of Art)

Curt Germundson, Faculty Mentor (Department of Art)

VOICES OF THE FLESH

Hope Thier (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

The purpose of this project is to seek a personal and metaphorical connection to the women of my past through the symbolic performative act of scrubbing and abolishing the surface I am painting them on. Through this act I am fostering a relationship between the paint and the idea of women having their presence and history erased. By first painting the women in a more photo-realistic manner and then altering them, through the process of scrubbing, into ghostly images I will show where they were then and where they are now. I am fusing the act of scrubbing with the process of painting, thus re-contextualizing the formal choices in nature made through the removal of paint and addition of mark making with a scrubbing brush. The performative act is a way for me to experience the physical drudgery and trials they withstood, such as the domestic duties that have been associated with women, and to make a record of that action. I feel this act of scrubbing is a metaphorical comment on women, their roles and their history. By doing so my goal is to make the viewer examine how they see women.

WATCHING PAINT DRY

Samantha Allen (Department of Art)

Brian Fink, Faculty Mentor (Department of Art)

How can paint be used as more than just a material but as a subject in itself? In my work paint is more than just a material, it is a surface. By pouring paint onto plastic I create more of a sculptural work than if I were applying it with a brush. Changing the way I apply it alters the way the viewer responds to the painting. I want to challenge the viewer. By challenging the viewer, I create a more engaging relationship with the piece, the viewer and the audience. It is critical to me to stretch the idea of painting to its limits. I want the paint to consume, and hold the work together. By pouring paint I give up control and let the paint move and mix on its own. I allow myself to paint a single moment that will exist in time forever. After taking the paint off the plastic I arrange the work onto the plastic into a shape of my choosing. It opens up very different ideas of what the definition of painting should be, and even the definition of beauty. It gives me the opportunity to break down barriers and explore my own definition of painting.

PAINTING: PROXIMITY AND REACH

Tyler Abrahamson (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

Most paintings have a preferred viewing distance on average from 3 to 15 feet and directly in front of the painting; I call this the “reach”. In this series of paintings I explore the physical reach a painting has with its viewer. My intention with this series of works is to expand the paintings reach to further encapsulate the viewer literally and as usual, cognitively. I have done this by allowing works to communicate directly with one another, sometimes across spaces on the wall or floor and sometimes even across a room. The proximity, imagery, color and composition allow the viewer to easily distinguish works that relate to one another. In a sense, I want to communicate the reach of the paintings in a similar fashion to 3-dimensional art.

MONA HATOUM AND THE BIOGRAPHICAL INFLUENCE ON CROSS-CULTURAL EXCHANGE

Nicole Shelton (Department of Art)

Curt Germundson, Faculty Mentor (Department of Art)

Artist Mona Hatoum, a Palestinian born in Beirut and educated in London, has experienced the boundaries and displacement of exile. These have become influential in her work and are implied within some of her statements. My research of 14 scholarly articles and books compares the external experiences of a double-exile directly to her subjectivity. This artist is one of many with the potential to exhibit cultural exchange within art as a manifestation of hybridization of different cultures, but often times she does not acknowledge this multiplicity. Because Hatoum values the way viewers experience and interpret her installations, her themes are made ambiguous promoting a type of universality, although, as I want to argue, are linked to her biography. Hatoum creates a distance by requiring the body or the absence thereof. Her intentions are given physical form through the space of her minimalistic installations, creating an experience of displacement, which resonates with themes of exile. I have found through research and personal analysis that misinterpretation of her work occurs when over-emphasis is placed on her origins and a separation from western influences is assumed. Although her aesthetic concerns are important, I see her biography equally important towards affecting the subject matter and communication of her work. Hatoum’s denial of the importance of biography complicates the ability of her works to communicate her experiences, ultimately limiting possibilities. I have found the connection of biography to creation essential to thorough understanding and something that would present audiences with opportunity for authentic cultural exchange.

Mathematics and Integrated Engineering

MATHEMATICAL MODELING AND SIMULATION OF DIABETES DYNAMICS

Sara DeBoer (Department of Mathematics)
Jordan Tait (Department of Mathematics)
Bang Huang (Department of Mathematics)
Alyssa Van Klei (Department of Mathematics)
Namyong Lee, Faculty Mentor (Department of Mathematics)

MATHEMATICAL MODELING AND OPTIMAL CONTROL OF PATHOGEN DYNAMICS

Patrick Manfo Paguem (Department of Mathematics)
Tyler Metzger (Department of Mathematics)
Tyler Jones (Department of Mathematics)
Namyong Lee, Faculty Mentor (Department of Mathematics)

CROWD CONTROL: MATHEMATICALLY MODELING HUMAN CROWDS FOR EMERGENCY BEHAVIOR

John Grooms (Department of Mathematics)
Namyong Lee, Faculty Mentor (Department of Mathematics)

DESIGN A POWER SUBSTATION FOR ESSAR STEEL MINNESOTA

Jeremy Goodell (Department of Integrated Engineering)
Daniel Marshall, (Department of Integrated Engineering)
Cord Semotink (Department of Intergrated Engineering)
Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)

MATHEMATICAL MODELING AND SIMULATION OF DIABETES DYNAMICS

Sara DeBoer (Department of Mathematics)

Jordan Tait (Department of Mathematics)

Bang Huang (Department of Mathematics)

Alyssa Van Klei (Department of Mathematics)

Namyong Lee, Faculty Mentor (Department of Mathematics)

Among Americans, 25.8 million are currently affected by diabetes. That is nearly 1 out of 10 Americans over the age 20 with 1.6 new million cases diagnosed every year. If the current trend continues, 1 out of every 3 adults will have diabetes by the year 2050. A few of the leading causes of diabetes consists of physical inactivity, ethnicity, family history, obesity, high blood pressure and abnormal cholesterol. A person's lifestyle and diet incorporates most of those factors.

Understanding how people's lifestyles and diets have changed over the past generations has always been a major area of interest, more so now with the rapid transition from natural and unprocessed food to fried and highly processed foods combined with a steep decline in activity in everyday life. In this study, we experimentally tested how different lifestyles and food affect the likelihood of developing diabetes through mathematical modeling and analysis.

MATHEMATICAL MODELING AND OPTIMAL CONTROL OF PATHOGEN DYNAMICS

Patrick Manfo Pague (Department of Mathematics)

Tyler Metzger (Department of Mathematics)

Tyler Jones (Department of Mathematics)

Namyong Lee, Faculty Mentor (Department of Mathematics)

Even with recent improvements, the agricultural production is still highly affected by pathogens. In many agricultural systems, farmers use chemicals to fight against pathogens which degrade the overall farming production. However, those excessive using of chemicals create health issues for consumers and the environmental problems.

In this project, we suggested an alternative way of controlling strategy for pathogen dynamics such that the output of the farming system (food) contributes in the preservation of human health. For this purpose, we adopted various population dynamics models, such as predator-prey model for instance, to understand the interaction between crop and pathogens. In addition, base on our experimental models, we performed optimal control through the Pontryagin's maximum principle. Computer simulations were performed for these mathematical models and the results were analyzed.

CROWD CONTROL: MATHEMATICALLY MODELING HUMAN CROWDS FOR EMERGENCY BEHAVIOR

John Grooms (Department of Mathematics)

Namyong Lee, Faculty Mentor (Department of Mathematics)

Crowds are an inevitable part of today's society. Whether it is a popular new book that has come out, or a new movie has been released in theaters, humans create crowds. This is often due to small distributions of a certain specific product. What happens when a third party factor is introduced into these crowds? For instance, what happens if a crowd of people are in a movie theater when a fire starts? The goal of this research was to understand this crowd dynamics through mathematically modeling and simulation. The total effect was examined using a modified S-I-R model, with a specific concentration on how the idea is spread. To model this, both rumor based protocols and stochastic models were used. The purpose for this research was to gain a better understanding of how human crowds move, and think in specific emergency situations using mathematical models. With this information, inferences can be made to the purpose/reason that crowds behave the way that they do.

DESIGN A POWER SUBSTATION FOR ESSAR STEEL MINNESOTA

Jeremy Goodell (Department of Integrated Engineering)

Daniel Marshall, (Department of Integrated Engineering)

Cord Semotink (Department of Integrated Engineering)

Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)

Power substations are the important sections of any industry. Substations may be categorized as distribution, transmission, switching, or any combination thereof. In this multidisciplinary engineering project, which was offered by Essar Steel Minnesota, we designed a distribution power substation. A distribution substation is a combination of switching, controlling, and voltage step-down equipment arranged to reduce voltage to primary distribution voltage for different applications such as high power variable frequency drives. In this design, we investigated a number of engineering considerations such as building foundation, structure, building material, physical layout, grounding, equipment selection, cable trays, power fault analysis, safety, code and regulation. This substation will house approximately 20 medium voltage circuit breakers/switch gears, 9 transformers, and 7 medium voltage variable frequency drive units. Engineering safety analysis was performed to ensure that our design follows all codes and regulations.

Human Performance and Nursing

BEYOND LIMITS: EXPLORING MOTIVATION AND GENDER BARRIERS IN ULTRAMARATHONING

Amy Harris (Department of Human Performance)

Cindra Kamphoff, Faculty Mentor (Department of Human Performance)

Suzannah Armentrout, Faculty Mentor (Department of Human Performance)

IMPORTANCE OF FAMILY CENTERED CARE FOR UNDERGRADUATE NURSING STUDENTS

Shamso Khandid (Department of Nursing)

Stacey VanGelderren, Faculty Mentor (Department of Nursing)

Norma Krumwiede, Faculty Mentor (Department of Nursing)

BEYOND LIMITS: EXPLORING MOTIVATION AND GENDER BARRIERS IN ULTRAMARATHONING

Amy Harris (Department of Human Performance)

Cindra Kamphoff, Faculty Mentor (Department of Human Performance)

Suzannah Armentrout, Faculty Mentor (Department of Human Performance)

An ultramarathon extends beyond the traditional 26.2-mile marathon (Tharion, Strowman, & Rauch, 1988) and includes 50 kilometers (31 miles), 100 kilometers (62.1 miles) and 135 miles. Participants must train for substantial periods of time and oftentimes in rough off-road terrain while dealing with dramatic changes in elevation and weather. Despite these challenges, participation rates are increasing; yet, most of these participants are men. For instance, for every woman participant, five men participated in the Western States 100 (Western State Endurance Run, 2012). Very few researchers have examined the motives to participate in this unique sport or investigated the gender barriers of ultramarathons. This qualitative study was conducted to further explore and understand what motivates women to run ultramarathons and the gender barriers that may prevent or make it difficult for them to participate in ultramarathons. Telephone interviews were conducted with fifteen women who completed at least one ultramarathon. The interviews were recorded and transcribed verbatim. The transcripts were read in-depth and organized into common themes across all interviews using Creswell's (2000) framework. Gender barriers in ultramarathons were identified as: 1) child-care and household responsibilities, 2) job-related obstacles, 3) lack of support, 4) safety concerns and 5) biological barriers such as the menstrual cycle. To overcome gender barriers, these women commonly stated they used the following as motivation to continue ultramarathoning: 1) the ultra-running community, 2) the challenge of the ultra, 3) environmental factors, and 4) personal growth. Specific results and implications of our findings will be discussed in the presentation.

IMPORTANCE OF FAMILY CENTERED CARE FOR UNDERGRADUATE NURSING STUDENTS

Shamso Khandid (Department of Nursing)

Stacey VanGelderren, Faculty Mentor (Department of Nursing)

Norma Krumwiede, Faculty Mentor (Department of Nursing)

The purpose of this descriptive qualitative research study is to understand the perception of undergraduate nursing students on the importance of providing family centered care. Achieved data from a prior nursing simulation research study will be used to answer two research questions:

1. How important is it for the nurse to engage with families?
2. How important is it to include the family in nursing education for students?

The findings will inform nurse educators if the current method of teaching impacts the students' opinions on the importance of family centered care. Understanding the student's perception will assist in developing new methods of teaching a family approach in nursing practice. Knowing what students think of family centered care assists educators to better understand if simulation changes the students' view of the family approach in nursing practice.

Family centered care is beneficial for students when gathering useful information to better serve patients. Nurse educators believe that case-based nursing simulations are an effective teaching-learning strategy that promotes the learning for students on how to apply a family approach in their nursing practice. After experiencing two different simulations; one on family centered nursing practice and the other a lack of the family approach, students will be able to take a legitimate position on whether or not family centered care is important. The study would enrich both the students in coming to an informed decision of the importance of family and also aid educators in finding innovative methods of teaching family centered care.

**Automotive Engineering Technology, Biological Sciences, Chemistry and Geology,
Civil Engineering, Electrical Engineering, Geology, Integrated Engineering,
Manufacturing Engineering Technology, and Mechanical Engineering**

1. AERODYNAMIC OPTIMIZATION OF A FORMULA SAE BODY

Paul G. Kirchner (Department of Automotive Engineering Technology)
Jacob T. Varnum (Department of Automotive Engineering Technology)
Gary Mead, Faculty Mentor (Department of Automotive Engineering Technology)

2. SMART CAR HYBRID

John Albergo (Department of Automotive Engineering Technology)
Shane Heiden (Department of Automotive Engineering Technology)
Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)

3. ROSENBAUER COMMANDER 4X4

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

4. DIESEL METHANE RESEARCH GROUP

Chelsea Mann (Department of Automotive Engineering Technology)
Calvin Smith (Department of Automotive Engineering Technology)
Pvakash Shakya (Department of Automotive Engineering Technology)
Michael Nelson (Department of Automotive Engineering Technology)
Satish Nakarmi (Department of Automotive Engineering Technology)
Bruce Jones, Faculty Mentor (Department of Automotive Engineering Technology)

**5. DETERMINATION OF THE LOCALIZATION PATTERNS OF THE ALPHA 1 AND ALPHA 2
SUBUNITS OF ACTIN CAPPING PROTEIN**

Samantha Luer (Department of Biological Sciences)
Jessica Jurovich (Department of Biological Sciences)
Marilyn Hart, Faculty Mentor (Department of Biological Sciences)

6. MORPHOLOGICAL CHARACTERIZATION OF TRANSGENIC MICE HEARTS

Jennifer Heibel (Department of Biological Sciences)
Brandon Boeck (Department of Biological Sciences)
Ashley Overby (Department of Biological Sciences)
Marilyn Hart, Faculty Mentor (Department of Biological Sciences)
Michael Bentley, Faculty Mentor (Department of Biological Sciences)

7. A POSSIBLE SCREENING FOR THE DEVELOPMENT OF UTERINE CANCER IN OBESITY

Jennifer Lamoreux (Department of Biological Sciences)
Steven Mercurio, Faculty Mentor (Department of Biological Sciences)

**8. BIG WYOMING SAGEBRUSH SCREENS UV RADIATION MORE EFFECTIVELY AT
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Lina Wang (Department of Biological Sciences)

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Shannon Fisher (Department of Biological Sciences)

10. STRUCTURAL ANALYSIS OF HEART AND SKELETAL MUSCLE IN GENETICALLY ALTERED MICE

Kelsey Anderson (Department of Biological Sciences)

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Han Byul Lee (Department of Biological Sciences)

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Nathaniel Gonzales (Department of Biological Sciences)

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Moriamo Sulaiman-Ifelodun (Department of Biological Sciences)

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Jeremy Wolter (Department of Biological Sciences)

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Jessica Jurovich (Department of Chemistry and Geology)

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John Powers (Department of Chemistry and Geology)

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Clayton Wagner (Department of Chemistry and Geology)

Megan Maloney (Department of Chemistry and Geology)

Redeat Dadi (Department of Chemistry and Geology)

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Megan Geitz (Department of Chemistry and Geology)

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Kurtis Malecha (Department of Chemistry and Geology)

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John Thoemke, Faculty Mentor (Chemistry and Geology)

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Cameron Hovey (Department of Chemistry and Geology)

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Eva Serem (Department of Chemistry and Geology)

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Jiyeong Lee (Department of Chemistry and Geology)

James Rife, Faculty Mentor (Department of Chemistry and Geology)

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Young Hee Cho (Department of Chemistry and Geology)

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Yonghwa Kwon (Department of Chemistry and Geology)

Namyong Lee, Faculty Mentor (Department of Mathematics)

37. EFFECTS OF FLOCCULENT ON STORM WATER SEDIMENT DETENTION

Jerry Schimmel (Department of Civil Engineering)

Chase Radue (Department of Civil Engineering)

Nripendra Bastola (Department of Civil Engineering)

Hyunjung Lee (Department of Civil Engineering)

Akinola Asaolu (Department of Civil Engineering)

Stephen Druschel, Faculty Mentor (Department of Civil Engineering)

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Bradley Weist (Department of Mathematics)
John Grooms (Department of Mathematics)
Andrew Doran (Department of Mathematics)
Scott Paa (Department of Mathematics)
Namyong Lee, Faculty Mentor (Department of Mathematics)

39. PINE ISLAND MINNESOTA FLOOD IMPACT, PREVENTION, AND EVACUATION STUDY

Anthony Sellner (Department of Civil Engineering)
Joshua Stier (Department of Civil Engineering)
Cecilio Santana (Department of Civil Engineering)
Mitch Hatcher (Department of Civil Engineering)
Michael Reimers (Department of Civil Engineering)
Stephen Druschel, Faculty Mentor (Department of Civil Engineering)

40. LAKE WATER FILTRATION FOR EXCESS ALGAE REMOVAL

Sarah Green (Department of Civil Engineering)
Meghann Chiodo (Department of Civil Engineering)
Rebecca Welch (Department of Civil Engineering)
Yllka Patoku (Department of Civil Engineering)
Cassandra Orcutt (Department of Civil Engineering)
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Ryan Bechel (Department of Biological Sciences)
Beth Proctor, Faculty Mentor (Department of Biological Sciences)

42. DOES A CAPEWEED POPULATION FROM SAN FRANCISCO HAVE ALLELOPATHIC ABILITY?

Dustin Gruber (Department of Biological Sciences)
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43. PLEISTOCENE GLACIATION AND CLIMATE OF THE BOULDER MOUNTAINS, WESTERN MONTANA

Questor German (Department of Geology)
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44. A NEW INFINITE IMPULSE RESPONSE (IIR) MODEL FOR CANCEROUS AND NORMAL BREAST TISSUE

Eric Diep (Department of Integrated Engineering)
Nicholas Esler (Department of Integrated Engineering)
Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)

45. ROBOTIC WORKCELL DESIGN FOR PALLETIZING

Jeffrey Vang (Department of Manufacturing Engineering Technology)
Guanghsu Chang, Faculty Mentor (Department of Engineering Technology)

46. HEAT TRANSFER STUDY

Katherine Marking (Department of Integrated Engineering)

Grant Roy (Department of Integrated Engineering)

Emily Kilpatrick (Department of Integrated Engineering)

Emmy Stage (Department of Integrated Engineering)

Ronald Ulseth, Faculty Mentor (Department of Integrated Engineering)

47. ETHANOL PRODUCTION FROM FALL LEAVES

Korede Amusan (Department of Chemistry and Geology)

James Rife, Faculty Mentor (Department of Chemistry and Geology)

48. VASCULAR REGROWTH FOLLOWING PARTIAL HEPATECTOMY IN RAT

Courtney Frank (Department of Biological Sciences)

Kayla Anderson (Department of Biological Sciences)

Michael Bentley, Faculty Mentor (Department of Biological Sciences)

49. ATRAZINE INFLUENCE ON NORTHERN PIKE SPERM MOTILITY AND VIABILITY IN MINNESOTA

Andrew Stevens (Department of Environmental Science)

Paul Pallardy (Department of Environmental Science)

Shannon Fisher, Faculty Mentor (Water Resource Center)

50. PREPARATION OF SOME NEW ARYL DIETHYL PHOSPHATE AND THEIR USE IN METAL-CATALYZED REACTION.

Emmanuel Asamoah (Department of Chemistry and Geology)

Michael J. Lusch (Department of Chemistry and Geology)

AERODYNAMIC OPTIMIZATION OF A FORMULA SAE BODY

Paul G. Kirchner (Department of Automotive Engineering Technology)

Jacob T. Varnum (Department of Automotive Engineering Technology)

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

In an effort to increase cornering speeds, and cooling system reliability on MSU-Mankato's Formula SAE car, the sidepod, which houses the vehicles radiator, and an undertray, which mounts to the vehicles underbody, was optimized using computational fluid dynamics. An undertray featuring diffusers was utilized to increase downforce, in-turn increasing cornering speed. The diffusers inlet area, ramp angle, and length play an important role in force generation, all of which were altered and tested. Alternative sidepod designs were also created, focusing mainly on the effects of inlet size, length and shrouding. Each design was simulated in a 3-dimensional fluid domain using Star +CCM, a computational fluid dynamics software program. Once each design was simulated, the tests showed the optimum design to be one with a large enough inlet area to ensure maximum airflow, but shaped to allow superior air quality. The undertray geometry was altered with the maximum downforce evident when the diffuser angle is large enough to prevent flow separation, and while the diffusers throat was positioned at the vehicle center of gravity. Once the body was constructed, the simulations values were validated with full-scale flow rate, and instantaneous velocity measurement. An 1/8th scale model was created using fused deposition modeling, and was wind tunnel tested to validate the lift and drag forces calculated in the simulations.

SMART CAR HYBRID

John Albergo (Department of Automotive Engineering Technology)

Shane Heiden (Department of Automotive Engineering Technology)

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

With continually increasing gas prices and a demand for decreased emissions, this project explores the use of electric powered drivetrains within a hybrid vehicle. The thought process is to take a two wheel drive, internal combustion powered vehicle and implement an electric drive system on the other two wheels to create a through the road hybrid. This was a challenge because most production vehicles don't lend themselves well to a hybrid conversion. A custom front sub frame was designed and manufactured to allow the electric motor and transmission to be fitted to the vehicle to overcome this problem. An electric motor and drivetrain has been acquired and is being installed in the front of the 2005 Smart Car. The electric drivetrain would power the front wheels under light load, while the internal combustion would propel the rear wheels under needed circumstances. Research was conducted using the federal emissions testing procedures to select a proper final drive ratio and transmission. The range of the batteries was also simulated and examined using the federal test procedure. The results obtained were used to verify the motors and batteries selected for the vehicle.

ROSENBAUER COMMANDER 4X4

Daniel Boyer (Department of Automotive Engineering Technology)

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

Rosenbauer, an international fire equipment manufacturer recently developed a new chassis for the North and South American market. As an intern at Rosenbauer I was granted the opportunity to develop the four wheel drive system for the new chassis. Fires and emergencies happen in all sorts of weather, and trucks need to be able to respond during inclement winter conditions. The biggest challenge with converting a fire truck to four wheel drive is the overall height of the truck, so the requirement was set to develop a four wheel drive option that keeps the overall height of the truck under 10ft. This will allow ample clearance into older fire stations with shorter doors.

To develop the four wheel drive system, research was done on competitor's current options to establish what the team needed to do to create a competitive product. After the required specifications for components were identified, the team worked with application engineers at the component suppliers to identify parts that would work for our application. From this, bills of material and drawings were created to fully specify needed parts and costs for the four wheel drive option. The purpose of this project is to create the initial design, and a working prototype will not be built for at least a year.

The result of this project was a low-profile four wheel drive chassis with an overall height of under 10ft. This chassis will be ideal for smaller pumpers and rescue trucks, as there are weight limitations when using a front drive axle.

By completing this project, the team opened up Rosenbauer to a whole new line of customers that they could not previously serve without the option for 4-wheel drive.

DIESEL METHANE RESEARCH GROUP

Chelsea Mann (Department of Automotive Engineering Technology)

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Diesel and compressed natural gas, or methane gas, are two common fuels used every year in many industries and households. When these two fuels are utilized simultaneously in one unit, such as a Diesel engine, it is referred to as a Dual Fuel system. The benefits of such a system include major cost cuts, lower harmful emissions, and higher engine efficiencies.

The compressed natural gas (CNG) used in our research was provided to us by Environmental Technologies, Inc. Their focus is a unique process for digesting manure from farms, which collects and cleans the methane gas provided from the waste. This creates a clean CNG product usable for our diesel engine.

To perform our research we utilized a computerized CNG injection system which converts CNG from high to low pressure, while injecting it in precise amounts in the engine.

The data that we have collected includes exhaust emissions and efficiency readings from the engine while running on just Diesel, and then while running the Dual Fuel system. We were able to take this data and analyze it to prove that the Dual Fuel combination provides benefits. The standard operating procedures used in the research process were developed based on standards set by the Code of Federal Regulations and similar published research.

Creating an optimum balance of the two fuels during use will allow for the highest capital return, while allowing companies and operations that have a CNG source to translate its energy opportunity to a readily available transportation fuel.

DETERMINATION OF THE LOCALIZATION PATTERNS OF THE ALPHA 1 AND ALPHA 2 SUBUNITS OF ACTIN CAPPING PROTEIN

Samantha Luer (Department of Biological Sciences)

Jessica Jurovich (Department of Biological Sciences)

Marilyn Hart, Faculty Mentor (Department of Biological Sciences)

Actin is an abundant protein of eukaryotic cells that contributes to a variety of cellular processes including cell division, maintaining cell structure, mobility and muscle contraction. Monomeric actin can polymerize and depolymerize to form long filaments and branched structures. Actin dynamics are largely regulated by accessory proteins, including actin Capping Protein (CP). Capping Protein is a heterodimer composed of an alpha (α) and a beta (β) subunit. In higher organisms, there are three alpha isoforms ($\alpha 1$, $\alpha 2$, $\alpha 3$) and three beta isoforms ($\beta 1$, $\beta 2$, $\beta 3$). In vertebrates, the $\alpha 1$ and $\alpha 2$ proteins are highly conserved, differing by approximately 20 amino acids. In previous Western Blot analysis using an antibody that recognizes α subunits equally, both $\alpha 1$ and $\alpha 2$ proteins accumulated in all mouse tissues examined; however, the relative amounts of the proteins varied among different tissues. The presence of multiple isoforms of the subunits of CP and their different expression levels in tissues raises the possibility of isoform specific functions. We have recently generated $\alpha 1$ and $\alpha 2$ polyclonal antibodies and confirmed their specificity. We are using the antibodies to define similarities and differences in the protein patterns of α isoforms using immunofluorescence studies. Both $\alpha 1$ and $\alpha 2$ had similar localization patterns in murine skeletal muscle, localizing to the Z-line. We are analyzing other tissues including spleen, liver, kidney, lung, and myocardium to determine if the α isoforms have distinct localization patterns.

MORPHOLOGICAL CHARACTERIZATION OF TRANSGENIC MICE HEARTS

Jennifer Heibel (Department of Biological Sciences)

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Marilyn Hart, Faculty Mentor (Department of Biological Sciences)

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The heart is a specialized muscle found in all animals with a circulatory system that is responsible for pumping blood throughout blood vessels by rhythmic contractions. The vertebrate heart is composed of myofibrils which maintain a precise alignment of two major components, actin and myosin. The ends of actin filaments are attached to a structural anchor, the Z line that maintains the alignment of the thin filament. Biochemical and cell biological studies suggest that actin capping (CP) attaches one end of the actin filament to the Z line. In previous studies, mice with reduced expression of CP displayed major structural defects in muscle unit organization, leading to an enlarged heart and ensuing lethality. To determine the basis of the myofibril defect, we examined the hearts of transgenic and wildtype mice using scanning electron microscopy. The myocardium of both transgenic and wildtype mice were treated with 1% elastase/1% collagenase and fixed in 2.5% glutaraldehyde. The prepared tissue was freeze dried, sputter coated with gold, and visualized using a JEOL JSM 6510LV/LGS scanning electron microscope. Digital images were captured and analyzed for alterations in myofibril organization. In general, the genetically altered myocardium displayed filament disarray relative to their wild type counterparts.

A POSSIBLE SCREENING FOR THE DEVELOPMENT OF UTERINE CANCER IN OBESITY

Jennifer Lamoreux (Department of Biological Sciences)

Steven Mercurio, Faculty Mentor (Department of Biological Sciences)

Constant growth and shedding of the uterine lining in women has made them prone to mutations and cancer, especially in obesity. Obese women and animals have also shown increased sensitivity of estrogen receptors. To test the hypothesis that obese female mice challenged with estrogen would have increased cancer gene expression and reduced risk in the presence of a treatment that reduced blood vessel formation, female mice were fed a normal diet compared to others fed a high fat diet for 15 weeks, given the anti-VEGF antibody for mice (B20 4.1.1) for the first 10 days, and challenged with estrogen 6 hours prior to sampling. The uterus of each mouse was examined and frozen under liquid nitrogen. It was already noticed the whole mouse and uterine weights of anti-VEGF antibody for mice (B20 4.1.1) treated mice were lower than their untreated controls, whether high or low fat. Some uteri appeared necrotic. Using these uterus samples, I looked for development of the c-MYC gene to find the effect of obesity versus anti-VEGF antibody for mice (B20 4.1.1). Mice were analyzed by a gene kit using a real-time PCR machine. A kit was used to examine m-RNA sequences indicating c-MYC expression. Their development was seen by fluorescence labeling of the new gene transcripts. It already appeared that the treatment had profound effects, especially on non-obese animals and that pretreatment for cancer was unwarranted. However, development of this gene assay may have proven to be a good marker for developing reproductive cancer in women.

BIG WYOMING SAGEBRUSH SCREENS UV RADIATION MORE EFFECTIVELY AT HIGHER ALTITUDES

Michael Dyslin (Department of Biological Sciences)

Christopher Ruhland, Faculty Mentor (Department of Biological Sciences)

John Krenz, Faculty Mentor (Department of Biological Sciences)

The flux of biologically-effective ultraviolet radiation (UV; 280-400nm) reaching the Earth's surface diminishes at lower elevations which may cause physiological and morphological phenotypic differences within plant populations. We examined epidermal UV-screening effectiveness in *Artemisia tridentata* ssp. *wyomingensis* (Big Wyoming Sagebrush) along an 800 m elevation gradient in central Wyoming with a pulse amplitude modulated UV fluorometer. Epidermal transmittance of UV increased at lower elevations; adaxial UV-transmittance values ranged from 10.2% (low elevation) to 2.3% (high elevation). To provide a proximate explanation for this relationship, we collected plants from across the gradient and estimated the concentration of bulk-soluble UV-absorbing compounds (spectrophotometry; $\lambda=300$ and 365 nm) and the density of adaxial leaf hairs (epifluorescence microscopy). Concentrations of UV-absorbing compounds increased with elevation and ranged from 0.64 to 2.25 A₃₀₀ cm⁻² and 0.43 to 1.35 A₃₆₅ cm⁻². Trichome density also increased from a mean of 14,400 cm⁻² at low elevation to a mean of 22,500 cm⁻² at high elevation. Because the distance along the elevation gradient was only 18 km, gene flow likely prevents ecotypic differentiation; the ultimate cause of the cline in screening effectiveness is likely the evolution of phenotypic plasticity in both biochemical and anatomical properties of leaves in response to UV stimuli.

THE EFFECT OF BISPHENOL-A (BPA) ON THE FEMINIZATION OF DANIO RERIO

Lina Wang (Department of Biological Sciences)

Theresa Salerno, Faculty Mentor (Department of Chemistry and Geology)

Shannon Fisher, Faculty Mentor (Department of Biological Sciences)

In lakes and rivers all across the world, there has been an increase in the feminization of male fish due to the presence of endocrine disrupters (Rhee et al., 2010). It has been found that pollutants such as Bisphenol-A (BPA), farm runoff, and soil contaminants from municipal wastewater treatment plants can increase the amount of endocrine disrupters in water systems (Kidd et al., 2006). The project focused on BPA and its effect on adult and juvenile fish.

Danio rerio were exposed to BPA concentrations of 0.0, 0.2 parts per billion (ppb), 2.0 ppb, and 20.0 ppb for one week. During this week, D. rerio spawned and the eggs were collected. The fish fry were exposed to the same concentrations as the parent generation until they reached adulthood.

Through the use of statistical analysis it was found that there was a significant difference in the percent fertilized for 0.0 ppb vs 2.0 ppb ($p=0.001$) and 0.2ppb vs 20.0 ppb ($p=0.003$). There was no significant difference in percent survived or percent hatched for all concentrations ($p>0.05$). The young were visually observed to have a larger ratio of females to males in all concentrations.

It is possible that these results are caused by something other than the BPA, such as stress, nutrients available, or randomness of fish health. More testing should be done to pinpoint the exact cause of difference in higher BPA concentrations. At this point, it seems that BPA does have a role in the ratio of females in D. rerio.

STRUCTURAL ANALYSIS OF HEART AND SKELETAL MUSCLE IN GENETICALLY ALTERED MICE

Kelsey Anderson (Department of Biological Sciences)

Kelli Wilson (Department of Biological Sciences)

Marilyn Hart, Faculty Mentor (Department of Biological Sciences)

Striated muscle, including heart and skeletal, is characterized by the precise alignment of the two prevalent muscle proteins, actin and myosin. Actin capping protein (CP) plays a significant role in the assembly of muscle fibers and contributes to maintaining the organization of the filaments. CP is a heterodimer composed of an alpha and beta subunit. In higher organisms, there are 3 isoforms of the alpha (α_1 , α_2 , α_3) and 3 isoforms of the beta subunit (β_1 , β_2 , β_3). The β_1 is the predominate isoform of muscle tissue; β_2 is the predominate isoform of non-muscle tissue. Dr. Marilyn Hart, Department of Biological Sciences, produced transgenic mice with a reduced amount of CP β_1 . The hearts of the genetically altered mice had disorganized filaments and enlarged chamber walls. In this study, both skeletal and heart muscle of genetically altered and wildtype mice were compared to evaluate morphological differences. The skeletal and heart tissues of six month old mice were collected and fixed in formalin, dehydrated using a graded series of alcohol, exchanged with xylene, and imbedded with paraffin using an automated Leica Tissue Processor, TP1020. Sections (7-8 microns) were prepared using a microtome, collected on gelatin coated slides and stained with a biological differential stain, hemotoxilyn and eosin. We found that the skeletal and heart muscle were disorganized with altered periodicity and alignment of the filaments in the genetically altered mice relative to the wildtype.

PURIFICATION OF ACTIN CAPPING PROTEIN ANTIBODIES USING AFFINITY CHROMATOGRAPHY

Sixxy Sivongxay (Department of Biological Sciences)

Marilyn Hart, Faculty Mentor (Department of Biological Sciences)

Antibodies are an effective tool used in many biological applications. In previous studies in the laboratory of Dr. Marilyn Hart, an antibody was generated to be used as a marker for actin capping protein in cells and tissues. Actin capping protein modulates the activity of actin monomers and filaments. The generated antibodies are a complex mixture of specific and nonspecific antibodies. Therefore, we used affinity chromatography to purify our antibody of interest from a heterogeneous group of molecules. The initial antibody mixture was passed through an affinity column to allow binding, a wash buffer was applied to remove unbound nonspecific antibodies and the elution buffer subsequently applied to release the specific antibodies. Fractions were collected and their protein concentrations determined. A fraction with an increased concentration was identified suggesting that the antibodies were purified.

CHARACTERIZATION OF THE NOVEL POLYGLUTAMINE PROTEIN FAM171B

Han Byul Lee (Department of Biological Sciences)

Geoffrey Goellner, Faculty Mentor (Department of Biological Sciences)

FAM171B is a completely uncharacterized protein (identified via the human genome sequencing project) that contains a polyglutamine (polyQ) stretch within its primary amino acid sequence. PolyQ tract proteins are particularly interesting, as expansion mutations within them have been shown to underlie a growing number of severe neurodegenerative disorders such as Huntingtons Disease and Spinocerebellar Ataxia. Using a bioinformatics approach, we find that FAM171B not only contains a polyQ region near its amino-terminus, but also is likely expressed in the nervous system and contains both a putative signal sequence and a single transmembrane domain. These data suggest that FAM171B normally functions within the endomembrane system of neurons- and mutations within the polyQ tract may underlie an as yet molecularly uncharacterized neurodegenerative disease. In this study, we set out to not only shed light on the normal cellular function of FAM171B (by identifying its intracellular localization), but also to assay the degree of polymorphism within its polyQ tract (an indication of expansion mutation propensity). Using immunofluorescence assays, we find that FAM171B displays a punctate vesicular-like staining pattern within the cytoplasm of HELA and HEK cells- consistent with bioinformatics predictions. In addition, using DNA genotyping assays, we find that the polyQ tract within FAM171B is quite stable within the human population (96.5% homogeneity)- suggesting FAM171B should not be considered a strong candidate gene for neurodegenerative disease. The preliminary outcomes, from the combined studies of localization and polymorphism, characterize FAM171B as a stable cytoplasmic protein localizing to vesicular organelles- such as, mitochondria or endosomes.

ISOLATING BRAIN RNA TO DETERMINE GENES INVOLVED IN HYGIENIC BEHAVIOR IN THE HONEY BEE, APIS MELLIFERA

Laura Chopp (Department of Biological Sciences)

Daniel Toma, Faculty Mentor (Department of Biological Sciences)

Honeybees are an integral part of the agricultural industry, especially in the Midwestern United States. Honeybees serve as pollinators of crops, an invaluable job of honeybees, as well as producers of honey. Diseases that kill members of the colony threaten honeybee colonies, typically only partially treatable with pesticides. Hygienic behavior, meaning the bees clean out diseased brood from the hive, confers a natural resistance to three diseases of bees: American foulbrood, chalkbrood, and varroa mite. However, it is not found in all colonies and only a certain number of honeybees contain this behavior in a given colony. This desirable behavior can be traced to genetics—meaning hygienic honeybees exhibit this behavior partly due to information they carry in their DNA (genetic material). We are undertaking a large genetic screen in cooperation with Dr. Marla Spivak of the Entomology department at the University of Minnesota. To isolate specific genes, we will look for differences between genes used in brains from hygienic honeybees vs. non-hygienic honeybees. The brains must be dissected and the appropriate genetic material (RNA) isolated for comparison. This comparison between the RNA of hygienic and non-hygienic bees will be done at the genomics facility at the University of Illinois.

MICROVASCULATURE OF TRANSGENIC MOUSE HEARTS LACKING ACTIN CAPPING PROTEIN

Leah Michaels (Department of Biological Sciences)

Kyle Sonnabend (Department of Biological Sciences)

Michael Bentley, Faculty Mentor (Department of Biological Sciences)

Transgenic mice bred to be deficient in actin capping protein have inefficient, abnormally formed muscle groups. The hearts of these transgenic mice are a potential model for the study of heart disease in humans. Because the structure of the cardiac muscle groups in transgenic mice is fundamentally different from normal mice, the structure of the microvasculature supplying those muscle groups may also be measurably different. In order to measure this difference in structure, casts were made of the coronary microvasculature in both transgenic and wild type mice (normal/control). After Forane (Isoflurane) anesthesia the heart was then exposed and a catheter was placed into the apex extending 1 mm into the left ventricle. A saline-heparin mixture (0.1 mL heparin to 10 mL 0.9% saline) of 60 mL was infused at a flow rate of 0.1 mL per minute. The infusion was continued with a Mercor casting polymer. After roughly 20 minutes infusion was stopped and the Mercor was allowed to polymerize; forming a solid cast of the coronary microvasculature. The hearts were placed in deionized water for 24 hours and then placed in a 15% weight by volume potassium hydroxide solution to digest the tissues away from the vascular cast. Upon completion of digestion the casts were freeze dried to preserve their structure and then analyzed using scanning electron microscopy. The procedure has been modified from the previous year in which polyurethane resin was used. Using Mercor resin in place of polyurethane has greatly improved the results of our experiment.

ULTRASTRUCTURE OF *SPHAERIDIOTREMA GLOBULUS* FOUND IN WATERBIRDS ON THE UPPER MISSISSIPPI RIVER

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Over 30,000 migrating waterbirds (especially lesser scaup and American coot) have died as a result of trematode parasitism in Minnesota and Wisconsin since 2004. The leading cause of these deaths has been 2 parasites, *Sphaeridiotrema globulus* and *Cyathocotyle bushiensis*. A study done by Gagnon (1990) found that *C. bushiensis* caused damage to the bird's cecae. However, *S. globulus* only showed damage to the mucosa of the small intestine and displayed no distortion of the cecae. In birds infected with both *S. globulus* and *C. bushiensis*, the cecum appeared to be infected and distorted. Gagnon's (1990) work relied upon histological examination using stereomicroscopy. I used scanning electron microscopy (SEM) to determine the external features of *S. globulus* and overall development of the parasite through intestinal segment of birds in Minnesota. Tissue samples were collected from waterbirds that died as a result of infection. These tissues were prepared for scanning electron microscopy (SEM) and examined at a variety of levels of magnification to view the ultrastructure characteristics of these worms. Particular attention was paid to examining the presence or absence of structures the worms may use when attaching to host tissues. With the availability of worms from different regions of the intestines of these birds, we also measured the size of worms and various ultrastructural features to see if there were differences between worms from regions of the intestine. These findings help us to better understand the interaction that occurs between the waterbird host and the parasitic worm.

SURVIVABILITY OF POTENTIAL PATHOGENS IN WATER

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Non-municipal water may be capable of providing a suitable environment for pathogenic microorganisms and serve as a reservoir for disease. The purpose of this research project was to investigate the survivability of pathogenic microorganisms in several water sources. *Staphylococcus aureus*, *Enterococcus faecalis*, and *Escherichia coli* were used as representative pathogenic organisms. Water samples were collected from four sources: reverse osmosis (r/o), tap, creek, and gray water. Sterilized samples were inoculated with a single organism. All water samples were incubated at room temperature. Samples were assayed weekly for quantification of surviving bacteria using plate counts on non-selective media. All three organisms survived at least three weeks in r/o water. *E. coli* was the most sensitive to tap water. Survival in Seven Mile Creek water varied greatly with *S. aureus* being the most sensitive. Some results with gray water are still pending and will be presented. Seven mile creek water and gray water were capable of supporting growth of *E. coli* and *E. faecalis* which means nutrients for growth were present. The results demonstrate that using one organism as a safety indicator for all pathogens is unreliable because each organism's behavior varies. The results also indicate that potable water treatment with disinfection agents, like chlorine, is important.

BIOASSAY OPTIMIZATION IN IDENTIFICATION OF TRANSGENIC MICE

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Transgenic mice play a critical role in biology by providing a tool to investigate gene structure, function, and expression. Because of their genetic homology with humans, studying the interactions of proteins in heart cells of transgenic mice can provide insight into potential applications to treat cardiovascular disease. In this study, a PCR assay was refined and optimized to genotype a line of mice carrying a transgene mutation for Actin Capping Protein (CP). DNA was collected by tail snips, digested overnight, and then extracted by standard techniques. Optimization of the PCR reaction was carried out through a series of buffer combinations that varied salt concentration and pH, with β -Actin primers being used. Preliminary results indicated that a buffer containing 2.5mM Mg²⁺ at pH 9 worked best to amplify the β -Actin control product. Further modifications such as annealing temperature and concentration of template DNA may be investigated to further optimize the assay. The development of a dependable, repeatable assay will be important for maintaining the integrity of the transgenic mouse line.

EXCISING PHOA FROM E. COLI TO STUDY TOPOLOGIES OF POSSIBLE MEMBRANE PROTEINS

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One way to study the topology, or shape, of a protein in a cell membrane is to fuse the gene encoding the protein of interest with another gene encoding a protein that has the ability to indicate the shape of the protein of interest in the membrane. The alkaline phosphatase protein, encoded by the phoA gene, has this ability and is therefore useful in studying membrane protein topologies in E. coli. However, E. coli contain the phoA gene in their genome, making it possible for the phoA gene in the fusion construct to recombine into the genome and render the fusion construct useless. To circumvent this issue, we intend to excise the phoA gene from the genome of a strain of E. coli. Thus far, we have generated a short segment of DNA that has ends similar to the ends of the phoA gene in E. coli's genome. This segment is currently being used to displace the phoA gene from E. coli's genome. Following this process the segment will be removed from the genome, leaving a strain of E. coli lacking the phoA gene. We intend to utilize this strain and a phoA fusion construct to study the topology of the mammalian cell entry protein of Mycobacterium avium subspecies paratuberculosis, which is thought to help initiate a damaging gastrointestinal disease in cattle. In addition, generating this strain of E. coli will provide investigators at Minnesota State University, Mankato with the ability to study the topologies of other important membrane proteins.

EFFECTS OF STRONTIUM IN THE BONE DENSITY OF MICE

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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 4 groups of male mice (5 in each group): Group 1, low calcium chow and strontium chloride in the drinking water; Group 2, low calcium chow and distilled drinking water; Group 3, low calcium chow and calcium chloride in the drinking water; Group 4, normal calcium chow and strontium chloride in the drinking water. 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 that are on the strontium chloride water regimen. We do not anticipate finding any increase of bone density in the mice that are on the calcium chloride water regimen.

GROWTH CHARACTERISTICS OF BIOFILMS IN GREYWATER

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As the demand for water continues to be an issue, methods to improve the efficiency of water consumption are of interest. Use of greywater systems can be a low cost way to recycle water, reducing the overall water demand. One major problem related to greywater is the formation of biofilms, which can quickly compromise a system by increasing the bacterial load and clogging pipes. Washing machine water during the wash cycle was used as a greywater and microbe source for these experiments which determined various biofilm size factors including; storage material, incubation time, and cell density. Additionally biofilm removal by sonication was examined. Samples were stained with crystal violet, eluted in ethanol, and measured with spectroscopy to determine relative biofilm size. It was found that biofilms grew better on hydrophilic surfaces, younger samples grew faster, higher cell densities lead to larger biofilms, and sonication decreased the biofilm size. These findings support the original concern of biofilms forming in greywater, and provided a possible solution to the biofilm formation.

ANTI-PREDATOR RESPONSES OF FATHEAD MINNOWS TO THE PRESENCE OF ALARM PHEROMONE

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In some fish, alarm pheromones are released from skin cells when they are bitten by a predator, signaling nearby fish in danger. Such anti-predator defenses have been studied in the fathead minnow (*Pimephales promelas*), and some have suggested that the response to the pheromone is not instinctual, but rather fish must learn to associate it with a predation cue such as motion. The purpose of this study is to separate fatheads into two groups, one conditioned to associate movement with the presence of the pheromone and one with no conditioning. Observations will then be made on their responses to the pheromone stimulus alone and with the motion stimulus. If the minnow has learned to associate the alarm substance with motion (predation threat), then the minnow should exhibit a greater anti-predator response to the alarm substance, than the fish without the learning experience.

THE EFFECTS OF MEDIUM-CHAIN TRIACYLGLYCEROLS AND CARBOHYDRATES ON EXERCISE PERFORMANCE

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Marilyn Hart, Faculty Mentor (Department of Biological Sciences)

Several studies have examined whether medium-chain triacylglycerols (MCT) are beneficial for increasing exercise time to exhaustion. The following, a systemic review, summarizes the research conducted and conclusions of nine of those studies, evaluating exercise performance (endurance, speed), rate of perceived exertion (RPE), respiratory exchange ratios (RER), blood lactate and glucose concentration. Some evidence suggests that consuming MCT prior to or during exercise can contribute as much as 7-13% of total energy expenditure during exercise. The PubMed search engine was used where studies that were reviewed included clinical trials, each identified as involving human subjects, using the keywords “medium chain triglycerides and exercise performance”. The articles reviewed included crossover, double or single blind, randomized controlled trials. Three out of eight studies found that MCT increases cycling time to exhaustion, and another study concluded that CHO ingestion enhanced cycling time trial performance. One study that did not show improved time to exhaustion found that the prescribed exercise was too intense for MCT to be effective. Four of the studies determined that MCT ingestion did not contribute to the cycling performance yet RPE and RER were reduced. However, in all four of these studies the participants reported gastrointestinal (GI) symptoms such as nausea, vomiting, stomach-cramps, diarrhea and others. In one of the studies analyzed, MCT consumption after an overnight fast led to increased RPE and RER. Although the results of research were inconclusive and indicated that consumption of MCT combined with CHO increases exercise performance and endurance via fat oxidation. Nevertheless, additional studies are needed to determine the effects of MCT on various exercise types, intensities and GI discomforts.

EFFECTS OF AN ANTICANCER AGENT ON BRAIN VESSEL DEVELOPMENT OF MICE ON REGULAR AND HIGH FAT DIETS.

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Obesity may lead to cancer as well as heart disease in young people. Mice were used to test the effect of an anticancer agent to stem the obesity caused by a high fat diet (11% fat) compared with control (4% fat) mice. The anti-VEGF antibody B20 4.1.1, a murine surrogate for AVASTIN® , works by preventing new blood vessel formation (antibody to vascular endothelial growth factor). The concern in developing animals and humans is that brain development may be compromised. Results supported this hypothesis indicating that the anti-VEGF antibody B20-4.1.1, a murine surrogate for AVASTIN®, decreased brain weights more than it decreased weight gain in either low or high fat diet. Other brain region development also appeared affected similarly. To continue with these results, the brain vessel development showed that there was a significant decrease in size leading to a decrease in brain functionality

LOCALIZATION OF NOVEL PROTEIN FAM157A IN HELA AND HEK CELLS

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We are interested in the FAM157A protein for a couple reasons. First, it is a novel protein that has recently been translated from our genome. This means that there is no information available as far as how this protein is involved in our cellular function. Secondly, the protein contains a region known as a polyQ region. Some of the proteins that contain a region such as this are associated with neurodegenerative diseases; like Huntington's. This polyQ region can become expanded beyond normal lengths leading to the disease state. So FAM157A could be associated with a neurodegenerative disease, but we have no information on the cellular presence of the protein. In order to localize the protein in the cell, we decided to use immunofluorescent microscopy. This involves using an anti-body that will specifically bind our protein of interest, which we can then photograph. Our most promising results so far is that photographs not using our specific anti-body have almost negligible staining compared to ones using our anti-body. With these results, we know that FAM157A must be expressed in our cells and can move onto further localizing it to an organelle and function, ultimately leading to knowing how this protein affects our life.

DEVELOPING A QPCR GENOTYPING METHOD TO SCREEN FOR APOLIPOPROTEIN E VARIANTS

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A less time-intensive, real-time polymerase chain reaction (qPCR) genotyping method to screen for apolipoprotein E variants was developed. Certain apolipoprotein E variants have been associated with increased risk of Alzheimer's disease and hypolipoproteinemia. Using the DNA sequences for each variant found on the National Center for Biological Information website, the sites of variation were determined, and primers and probes that can discriminate between the E2, E3 and E4 alleles of apolipoprotein E were developed. The probes were fluorescently labeled and designed to selectively bind to specific DNA variants. Buccal samples from several volunteers were obtained. DNA was isolated from these samples using a QIAamp DNA mini Kit from QIAGEN. A Step One Plus real-time PCR system from Applied Biosystems was then used to determine the genotypes by monitoring which probes were used more rapidly for each sample. This procedure will be used as an experiment in future CHEM 360 labs.

AQUAPORIN-2 EXPRESSION IN RAT KIDNEY

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Aquaporin-2 (AQP2) is a water channel protein isoform that helps to regulate the amount of water in mammalian kidneys. AQP2 accomplishes this by inserting itself into kidney cell membranes which then allows water to be reabsorbed back into the body. When more water is reabsorbed into the body, plasma levels in the blood increase which can induce hypertension. The hormone aldosterone is known to regulate AQP2 expression by reducing AQP2 gene transcription while at the same time increasing AQP2 mRNA translation. The purpose of this research is to determine if there is a correlation between aldosterone levels and AQP2 expression in rat kidney. Comparisons were made using kidneys from both spontaneously hypertensive rats (SHR) and normotensive rats. RNA was extracted from rat kidneys using the RNeasy Mini Kit (Qiagen) and the quality and quantity of total RNA were measured using a spectrophotometer. Copy DNA (cDNA) was synthesized from the purified total RNA using a high capacity cDNA reverse transcription kit (Applied Biosystems). A primer/probe set that was specific for the amplification of rat AQP2 was successfully designed using Primer Express software (Applied Biosystems). The method showed good efficiency when tested with varying levels of rat kidney cDNA. This method was then applied to study AQP2 expression in rats with different plasma aldosterone levels. Initial studies have shown no statistical correlation between aldosterone levels and AQP2 expression in male SHR kidney tissue.

ISOMORPHOUS SUBSTITUTION OF CALCIUM BY PRASEODYMIUM (III) IN SYNTHETIC CALCIUM VANADATE APATITE

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Compounds with the apatite structure have the general composition $M_5(EO_4)_3X$, where M are univalent to trivalent cations (Ca⁺², Sr⁺², La⁺³, Pr⁺³, Na⁺, K⁺ etc); E are tetravalent to hexavalent elements (P⁺⁵, V⁺⁵, As⁺⁵, Si⁺⁴, Ge⁺⁴, Cr⁺⁶ etc); and X represents anions OH⁻, F⁻, Cl⁻, O⁻². An important property of apatite compounds is their ability to undergo isomorphic substitutions: different elements can substitute for the major constituents in their crystal structures without change the crystal structure overall. Modified compounds (solid solutions) resulting from these substitutions have changed and often improved physical properties. Therefore, isomorphic substitutions are widely studied and used for synthesis of different functional materials (catalysts, sorbents, and luminophores). Solid solutions based on calcium hydroxyapatite $Ca_5(PO_4)_3OH$ play very important role in many physiological processes occurring in a human body and considered to be the most biologically compatible. However, little has been studied on isomorphic substitutions in hydroxovanadate $Ca_5(VO_4)_3OH$ with apatite structure substituted by Rare-Earth elements. These compounds can be used as luminescent, laser material, and catalysts. In this work we studied isomorphic substitutions of praseodymium (Pr⁺³) for calcium (Ca⁺²) in calcium hydroxovanadate under the scheme:

$Ca^{2+} + OH^- \rightarrow Pr^{3+} + O^{2-}$. Using X-ray diffractational analysis the solubility limits in the system $Ca_{5-x}Pr_x(VO_4)_3(OH)(1-x)O_x$ were established in the range $0 \leq x \leq 0.60$. Each sample of the solid solution was prepared from nitric-tartaric aqueous solution and calcined for 18 hours at the temperature of 750°C. The apatite solid solutions coexist with unknown X phase in heterogeneous regions of the system.

VERIFYING THE SPECIATION OF MOLYBDENUM IN SULFIDIC AND POLYSULFIDIC NATURAL WATERS USING ION CHROMATOGRAPHY WITH SUPPRESSED CONDUCTIVITY DETECTION

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Within sulfidic waters, Mo speciation is characterized by the formation of thiomolybdates ($\text{MoO}_n\text{S}_{4-n}^{2-n}$, $n=1-4$). Using thermodynamic constants, Mo speciation in sulfidic basins has been calculated. However, actual speciation in natural waters has not been verified because a suitable analytical method remains elusive. Zero-valent sulfur has been shown to influence Mo speciation and sequestration by pyrite via formation of anionic Mo-polysulfido complex(es). Unfortunately, optical means were not able to identify the complex(es) definitively. We have demonstrated that ion chromatography with suppressed conductivity detection gives linear response down to at least 10^{-8} M MoO_4^{2-} . IC methods are developed to quantify contrived mixtures of MoO_4^{2-} and thiomolybdates at $\Sigma\text{Mo}=10^{-7}$ in simulated seawater. IC-MS is used to identify and quantify Mo-polysulfido complex(es) formed in polysulfidic test solutions; kinetic and equilibrium constants will be calculated. This research will better define Mo speciation and its relation to Mo fixation in anoxic waters.

ANALYSIS OF BENZALDEHYDE INTERACTIONS WITH NUCLEOSIDES

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Benzaldehyde is present in many commonly consumed foods (ex: coffee, cherries, almonds, and apricots). In addition to its low toxicity, benzaldehyde has been reported to demonstrate anticancer activity. Therefore, there's interest in determining the mechanisms by which this anticancer activity occurs. Due to the reactivity of other aldehydes, it is proposed that benzaldehyde may form DNA adducts. Calf thymus-DNA was treated with benzaldehyde in the presence of arginine. After enzymatic digestion, it was determined by HPLC that benzaldehyde preferentially reacted with 2'-deoxyguanosine (dG) to form adducts. This selective reactivity of benzaldehyde was also confirmed using ^1H NMR. Reaction mixtures of benzaldehyde and arginine with dG and 2'-deoxyadenosine (dA) in $[\text{D}_6]\text{DMSO}$ were prepared. Analysis of the benzaldehyde/dG reaction mixture indicated that there was complete loss of the CHO proton of benzaldehyde and the NH-1 proton of dG.

CORRELATION OF DISSOLVED ORGANIC MATTER FLUORESCENCE PROPERTIES AND PHOTOPRODUCTION OF REACTIVE OXYGEN SPECIES

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Dissolved Organic Matter (DOM) is prevalent in natural waters and is the byproduct of natural decay processes. Prior work shows that DOM properties depend on the sources, and in many cases, two main types of DOM exist, which are microbial and terrestrial. The former comes from biological activity of microscopic organisms in the water, while the latter is from decayed terrestrial plant material. When DOM absorbs sunlight, it has the capability to produce Reactive Oxygen Species (ROS). Several types of ROS exist, but the types studied for this project are molecular singlet oxygen and the triplet state of DOM. Each of these ROS potentially provides a “pathway” for the decomposition of pollutants, which can be beneficial and/or harmful due to the possibility of oxidizing pollutants into less or more harmful substances. Prior evidence suggests a correlation between the DOM source properties and the relative amounts of the different ROS produced. Knowledge of the specific ROS that will be produced in a natural water sample will allow more accurate predictions about this pollutant decomposition. For this project, correlations between optical characterization of the DOM (using UV-Visible and fluorescence spectroscopy with PARAFAC analysis) and the relative amounts of ROS that are produced by a DOM sample were performed. Preliminary results suggest that the probe molecules (furfuryl alcohol and methylated phenols) react with the photogenerated reactive species and provide a measure of the differences within DOM samples.

FLUORESCENCE SPECTROSCOPY AND PARAFAC ANALYSIS TO QUANTIFY INTERACTIONS BETWEEN METAL IONS AND DISSOLVED ORGANIC MATTER IN NATURAL WATERS

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The dissolved organic matter (DOM) in natural waters is composed of a variety of organic compounds and has a number of ecological and geochemical functions, including metal binding and buffering capacity. Metal ions potentially interact with DOM to form complexes, and this interaction influences the transport, bioavailability and potential toxicity of those metal ions, which can play a significant role in environmental and ecological processes.⁶

This project is intended to quantify the interaction between DOM and metal ions, using UV-spectroscopy and fluorescence spectroscopy coupled with PARAFAC (Parallel Factor) analysis. Natural surface water samples will be obtained and filtered. Then they will be titrated with metal ion solutions, and spectroscopically analyzed. By assessing the magnitude and nature of the spectroscopic changes induced by the addition of metal ions, detailed information about the metal-DOM interaction can be obtained. The metal ions we are initially interested in are copper (Cu²⁺), iron (Fe³⁺), aluminum (Al³⁺), zinc (Zn²⁺), vanadium (V²⁺) and nickel (Ni²⁺).

IDENTIFICATION OF METABOLIC ADDUCTS FORMED BETWEEN THE COMMON FOOD CONTAMINANT, HMF, AND DNA

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5-Sulfoxymethylfurfural (SMF) is a metabolite of the common heat-related food contaminant, 5-hydroxymethylfurfural (HMF). Investigations of HMF in vitro showed no mutagenic activity, but HMF was found to be mildly carcinogenic in female mice. HMF is thought to be converted in vivo by sulfotransferase enzymes into SMF, which is a stronger carcinogen. Until recently, SMF had not been detected as a metabolite of HMF in humans or rodents, but the conversion of HMF to SMF in mice following administration of HMF has now been confirmed and quantified. No literature yet exists that investigates the structure or prevalence of SMF adducts with DNA. In this study, we examined SMF and its reactions with DNA in order to elucidate the structure of any such adducts. After synthesizing SMF, reaction standards were made by allowing SMF to react with nucleosides of DNA under physiological conditions (pH 7.2, 37° C). SMF was then combined with Calf Thymus DNA (CT DNA) under the same conditions. Nuclear Magnetic Resonance (NMR) spectroscopy and High-Performance Liquid Chromatography with UV detection (HPLV-UV) were used to investigate the products of these reactions.

TIME COURSE OF THE WOUNDING EFFECT ON LIPOXYGENASE EXPRESSION IN SOYBEAN LEAVES

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Lipoxygenases (LOXs) are enzymes that catalyze the addition of molecular oxygen to unsaturated fatty acids to form hydroperoxide products. Soybean plants have several LOX isoenzymes or different proteins that catalyze the same reaction. Soybean seeds contain at least three LOX isoenzymes while at least six different isoenzymes are in the vegetative tissue. Expression of some LOX isoenzymes increases after mechanical wounding in soybean plants. The objective of this project was to explore the time course of the effect of wounding on the expression of Lox mRNAs. Plants were wounded at the bifoliate stage; one leaf was wounded while the other was used as a systemic leaf. Both leaves were harvested separately at 3½, 6 and 24 hours after wounding. Leaves were also harvested from control plants, which were not wounded. RNA was isolated from the samples using the RNeasy Plant Minikit from Qiagen. RNA quantities and quality were assessed by measuring sample absorbancies at 260 and 280nm. cDNAs were prepared using a High-Capacity cDNA Reverse Transcription Kit from Applied Biosystems. The Quantitative Polymerase Chain Reaction experiment was done on a Step One Plus Real-Time PCR system from Applied Biosystems using SYBR Green as the fluorescent indicator. Wounded leaves showed a significant increase in the expression of Lox 7 mRNA 3½ hours after wounding. This level was maintained 6 hours after wounding, but significantly increased again 24 hours after wounding. Systemic leaves did not show a significant increase in Lox 7 expression until 24 hours after wounding.

RESPONSE OF LIPOXYGENASE EXPRESSION TO WOUNDING AND METHYL JASMONATE IN SOYBEAN LEAVES

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Lipoxygenases (LOXs) are enzymes which catalyze the peroxidation of polyunsaturated fatty acids. They function in development, growth and response to pathogenic attack including mechanical wounding. There are multiple isozymes of LOX in soybean. It has been reported that each isozyme has a distinct function in different stages of growth. Studies have shown that the expression of some isoforms of LOX is enhanced after wounding or treatment with jasmonic acid (JA) or methyl jasmonate (MJ), a mediator of plant defense mechanism. This project investigated the relationship between wounding, MJ treatment and expression of LOX isoenzymes including LOX10 using Quantitative Polymerase Chain Reaction. Soybean plants were raised in a growth chamber. When the plants reached the bifoliate stage, two sets of experimental plants were used. One set was wounded by crimping the leaves with a clamp. The other set was not wounded. Both sets of experimental plants were sealed in an aquarium containing MJ vapor. Control plants were sealed in an aquarium with no MJ. Leaves were harvested at 0, 3, 6, and 24 hours after treatment. RNA was isolated from the samples using an RNeasy Plant Minikit from Qiagen. RNA quantities were estimated from the absorbance at 260nm. A High-Capacity cDNA Reverse Transcription kit from Applied Biosystems was used to make cDNA copies of the mRNAs. Relative quantities of the LOX mRNA were measured by qPCR on a Plus One Real-Time PCR System from Applied Biosystems. SYBR green was used to detect the PCR products.

EFFECTS OF MECHANICAL WOUNDING AND METHYL JASMONATE TREATMENT ON PEA LIPOXYGENASE ISOFORMS

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Lipoxygenases (LOXs) are important enzymes for development, senescence, and responses to various stresses. In a plant wound defense mechanism, increased expressions of pea LOXs were identified along with the release of signal molecules like methyl jasmonate (MeJA). The effects of mechanical wounding and MeJA treatment on the quantitative expression levels of different LOX isoenzymes have not been well studied. Recent research has shown wound-induced elevations of LOX-g and LOX-N3 mRNA levels in pea leaves. The first phase of this research studied another pea isoenzyme LOX 1: PS 7 along with LOX-g and LOX-N3. Gene specific primers and probes were designed by the Primer Express Software (Applied Biosystems) and used to amplify LOX 1: PS 7 by Real-Time quantitative polymerase chain reaction (qPCR). Its expression also increased after mechanical wounding. In the second phase, the effect of MeJA treatment on LOX-g, LOX-N3, and LOX 1: PS 7 isoform expression was investigated. MeJA-treated pea leaves and their controls were frozen in liquid nitrogen after 3, 6, 12, and 24 hours of treatment. Their RNAs were isolated using RNeasy Plant Mini Kit (Qiagen), and a spectrophotometer was used to measure amounts and purity. The reverse transcription (RT) technique was used to convert RNA samples to the corresponding cDNA molecules. The qPCR results were normalized using endogenous EF1 α , and RQ (relative quantities) of three different LOX isoforms were obtained relative to untreated controls. MeJA also increased expression of LOX 1: PS 7.

MATHEMATICAL MODELING OF GLYCOLYSIS METABOLIC PATHWAY AFFECTED BY A PYRUVATE KINASE DEFICIENCY

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Glycolysis is a pathway in all cells that metabolizes glucose to pyruvate and it produces limited amounts of usable energy as ATPs. The different enzymes involved in glycolysis act as kinases, mutases, and dehydrogenases, cleaving enzymes, isomerases or enolases. A pyruvate kinase is the last enzymatic reaction in glycolysis and yields one molecular of pyruvate and one molecular of ATP. When the pyruvate kinase is deficient in the red blood cell, it prevents the cell from producing sufficient amounts of ATP for cell survival.

Mathematical model of glycolysis in human proposed the influence of the key enzymes on the glycolysis energy metabolism. In particular, flux rate and metabolism concentration for both normal functions of the pyruvate kinase enzyme and defective of the pyruvate kinase enzyme were analyzed through the mathematical model.

The steady-state of concentration of the some glycolytic metabolism and glycolytic flux rate depended on the rate constant ATP consuming reaction for normal control and the deficiency and it was calculated through mathematical model.

The mathematical model of the pyruvate kinase deficiency led to understand glycolysis metabolic regulation cause by enzymatic activity.

EFFECTS OF FLOCCULENT ON STORM WATER SEDIMENT DETENTION

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Akinola Asaolu (Department of Civil Engineering)
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Pollutants slowly build up on the surface of the earth either through direct human action, or natural processes. Our main concern in this research is where the pollutants go after a significant rain event. Much of the time they are washed to a creek or a stream where they remain in suspended solution until the solution runs into a detention pond. Here, they are supposed to be filtered out of the water column before flowing into the major bodies of water we rely on for drinking water and recreation. During heavy rain fall, the detention ponds do not work as they should, and the water has no time to let gravity alone work effectively against the pollutants. We suggest during peak rain events, injecting a flocculent into the water before the detention pond to effectively settle out pollutants. This could essentially be used to improve the clarity and quality of the source water we use for drinking and recreation, and reduce the cost of treatment; at the same time improving the ecology of the water, enhancing the enjoyment of fishing, swimming, canoeing, etc. Our method will involve collecting soil samples from all over Minnesota, getting as diverse of samples as possible. In 1000mL graduated cylinders, we will mix the sample well with water, and allow only gravity to settle it out of the control. We will then test different concentrations of multiple commercially available flocculants in two more graduated cylinders, one of them having had the pH balanced before treatment. If implemented correctly under real world conditions, we expect flocculent to be very useful in settling out suspended pollutants in storm water run-off. Our research could be used as a jumping off point for individuals concerned with pollutants in run-off water, to help with implementation and correct dosage of storm water.

SPATIAL DYNAMICS OF INVASIVE SPECIES UNDER DIFFERENT TREATMENTS

Bradley Wiest (Department of Mathematics)
John Grooms (Department of Mathematics)
Andrew Doran (Department of Mathematics)
Scott Paa (Department of Mathematics)
Namyong Lee, Faculty Mentor (Department of Mathematics)

The Asian carp are an invasive species that was originally introduced to the United States in the 1970's to help aquaculture and wastewater treatment facilities keep retention ponds clean. Flooding caused these fish to be washed into the Missouri and Illinois river systems and migrate throughout the Mississippi River. These fish can grow between 80 and 100 pounds and consume up to 40% of their body weight everyday in plankton. Specific treatment methods are being used to limit the expansion of the Asian carp population. A barrier that limits the fish from passing through to the Great Lakes has been implemented, as well as an electric barrier to prevent the fish from passing through.

Mathematical modeling and simulation of the spatial dynamics of this invasive species were used to better understand the rate at which this particular group of carp is expanding and to see the success of techniques used to slow their expansion. Through this mathematical modeling process, we experimented to predict the invasive species populations before they are introduced to new areas as well as after they have been introduced. We also mathematically analyzed this spatial dynamics model of the Asian carp fish population and the effectiveness of the treatments on slowing their growth.

PINE ISLAND MINNESOTA FLOOD IMPACT, PREVENTION, AND EVACUATION STUDY

Anthony Sellner (Department of Civil Engineering)
Joshua Stier (Department of Civil Engineering)
Cecilio Santana (Department of Civil Engineering)
Mitch Hatcher (Department of Civil Engineering)
Michael Reimers (Department of Civil Engineering)
Stephen Druschel, Faculty Mentor (Department of Civil Engineering)

Pine Island Minnesota and the surrounding Zumbro Watershed incurred over 64 million dollars in flood damage during the September, 2010 flooding. Over ten inches of rain fell within 24 hours in some parts of the watershed. This combined with pre-saturated soils and well drained, karst geology resulted in multiple rivers flooding past bank full and damaging rural and urban communities. An area of focus and damage was Pine Island.

Rain and groundwater from the 250,000 acre watershed of Pine Island is transported to the community from the Middle Fork and North Branch Rivers. These rivers and their corresponding watershed were then isolated as the problem source and solution for controlling flooding. Resident protection could not be achieved through farmland tile management, as few tile lines exist in this part of the state due to steep geography and karst terrain. Levees were not considered a viable option either for protection due to a resultant increase in flow downstream. In order to protect residents and slow the flow of large surges of water to the community during large storm events a soil berm and controlled release outlet structure was designed upstream of Pine Island on the Middle Fork.

The river, flow, and berm implementation was modeled using ArcMap10.0, HEC-RAS 4.1, and AutoCAD. Lidar data was attained to model the ground, USGS regression flow information was attained to represent the flow, and geometric bridge data was used to calibrate the model.

LAKE WATER FILTRATION FOR EXCESS ALGAE REMOVAL

Sarah Green (Department of Civil Engineering)

Meghann Chiodo (Department of Civil Engineering)

Rebecca Welch (Department of Civil Engineering)

Yllka Patoku (Department of Civil Engineering)

Cassandra Orcutt (Department of Civil Engineering)

Stephen Druschel, Faculty Mentor (Department of Civil Engineering)

Last summer, many fresh water lakes began their mornings with the stench of hundreds of dead fish. The cause was an overgrowth of algae in lakes. Bacteria ate the algae and when this happened, oxygen was taken out of the water. When there was too much algae, there was not enough oxygen for the fish, and they died, in large quantities. Unnaturally large amounts of algae in lakes have become a common problem in America. The goal of our project was to create a device that can remove algae quickly and easily, and do so without disturbing each lake's fragile ecological system, to save our lakes and our fish. Using natural water collected from a pond, we created an environment ideal for algae growth. We used special cloth filters normally used in landscaping, and sent samples of our pond water through a variety of filter types and sizes. We tested each filter to determine which one was most efficient in removing algae. The filters we used were created to be environmentally friendly, so we know the best results of our project will also be the best for protecting the wildlife in our lakes.

ALLELOPATHIC CAPABILITIES OF ARCTOTHECA PROSTRATA

Ryan Bechel (Department of Biological Sciences)

Beth Proctor, Faculty Mentor (Department of Biological Sciences)

Capeweed (*Arctotheca prostrata*) is an invasive species in California. It was first introduced into the United States from South Africa for use by landscapers. Greenhouse plants from a Capeweed population collected south of Point Arena, California (130 miles North of San Francisco) were grown and used for this experiment. The purpose of this research was to determine if water extracts of leaves, runners, and roots of this population reduced the germination and or growth of lettuce seeds (*Latuca sativa*). The roots, leaves, and runners were crushed (ball grinder), different wet weights (.5 – 4 grams) were extracted with water, centrifuged, and then added to petri dishes with 10 lettuce seeds each (N=3). These were incubated at 26°C (10 hrs/14 hrs dark) for 72 hours. When compared with controls, there was no significant difference in the number of seeds that germinated at the end of 72 hours. However, there were appreciable differences in growth of the lettuce as measured by root length. Water soluble chemicals leaching from the plant or from the decomposition of these plants may release chemicals that provide a competitive edge for this plant. More research is needed.

DOES A CAPEWEED POPULATION FROM SAN FRANCISCO HAVE ALLELOPATHIC ABILITY?

Dustin Gruber (Department of Biological Sciences)

Beth Proctor, Faculty Mentor (Department of Biological Sciences)

Originally from South Africa, Capeweed (*Arctotheca prostrata*) was introduced into the United States as ornamental plant. Capeweed is an invasive species and has the potential to invade large parts of California. Greenhouse plants from a Capeweed population collected in San Francisco (Tennessee Valley) were grown and used for this experiment. The purpose of this research was to determine if water extracts of leaves, and roots of this population reduced the germination and or growth of lettuce seeds (*Lactuca sativa*). Roots and leaves were separated and ground with a ball pestle grinder. Then HPLC water was added to different wet weights of the roots or leaves, mixed using a vortex mixer for 5 minutes, centrifuged and then 10 mls of the extract was added to individual Petri dishes containing 10 lettuce seeds. The Petri dishes were incubated at 26°C (10 hrs/14 hrs dark) for 72 hours. When compared with controls, there was no significant difference in the number of seeds that germinated. The water extract of the 2.5 grams of leaf had a germination rate lower than the controls. There were appreciable differences in growth of the lettuce as measured by root length for all weight of leaves and 4 gram wet weight of roots. There were no runners on this population. Water soluble chemicals leaching from the plant or from the decomposition of these plants may release chemicals that provide a competitive edge for this plant . More research is needed.

PLEISTOCENE GLACIATION AND CLIMATE OF THE BOULDER MOUNTAINS, WESTERN MONTANA

Questor German (Department of Geology)

Chad Wittkop, Faculty Mentor (Department of Geology)

An area of transition between mountain and continental glaciation in the western United States lies near the Boulder Mountains of Montana. A relatively low altitude ice mass called the Boulder Mountain ice cap, or BMIC, developed in the Boulder Mountains during the last glacial maximum, or LGM, in the Pleistocene Epoch about 17,000 year ago. The development of the BMIC has not been studied in this area since initial descriptions by Ruppel (1962), and limited new mapping by my mentor.

Using Geographic Information Systems, or GIS, I have digitized Ruppel's maps and portions of other maps. The digitized data were updated by field checking the pre-existing data and new mapping in areas of incomplete data. Mapping was carried out in the difficult terrain with the use of GPS units, topographic maps, and digitized versions of Ruppel's map. In several areas ice boundaries were checked by identifying presence of glacial features including glacial sediment and debris at ice boundaries and striations on bedrock indicating ice movement. Upon returning from the field, the data underwent GIS analysis and spreadsheet modeling in collaboration with Ryan Bleess. These results helped determine a more accurate area and thickness of the BMIC.

Results were then used to compute the equilibrium line altitudes, or ELAs, of the BMIC. Above the ELA the glacier is resistant to melting in all seasons. Our study determined lower ELA's than those previously calculated in the area around the BMIC, suggesting a colder climate in this area during the LGM.

A NEW INFINITE IMPULSE RESPONSE (IIR) MODEL FOR CANCEROUS AND NORMAL BREAST TISSUE

Eric Diep, Department of Integrated Engineering

Nicholas Esler, Department of Integrated Engineering

Mohammad Habibi, Faculty Mentor (Department of Integrated Engineering)

Electrical properties (permittivity and conductivity) have been used to characterize different materials, especially human tissue. There is strong evidence that different types of human tissues have varying electrical properties, however quantitatively interpreting the electrical data has been a challenge. Although several empirical functions, e.g. Debye, Cole-Cole, have been employed to express the data, the explanation of the parameters has been vague. In this work, we present a novel method which includes describing the data using an analog filter. We used the electrical property data which were collected from a number of patients in the radio and microwave frequency and has been recently published. The published data represent the frequency response of human breast tissue. This data also approves that human tissue acts like an analog filter. In this paper, we first converted the data into a transfer function and then realized it as an IIR filter by using filter realization techniques, such as direct and canonic forms. We obtained two different models for normal and cancerous human breast tissue. We concluded that various filter parameters such as degree, and the location of poles and zeros can be used to differentiate between cancerous and normal tissue and to justify the properties of each.

ROBOTIC WORKCELL DESIGN FOR PALLETIZING

Jeffrey Vang (Department of Manufacturing Engineering Technology)

Guanghsu Chang, Faculty Mentor (Department of Engineering Technology)

Denso Robot is a leader in manufacturing automation since the 1960s. Many modern industry uses robot for its high speed, precision, and accuracy which are useful in many applications such as assembly, inspection, painting and palletizing. Robot can be program, teach and learn to load and unload materials and parts on/off a pallet for easier transportation and storage at a constant rate, doing job in harsh environment which are usually unsafe for humans. It has revolutionized the manufacturing industry and has the potential to change the economy, health and standard of living.

HEAT TRANSFER STUDY

Katherine Marking (Department of Integrated Engineering)

Emily Kilpatrick (Department of Integrated Engineering)

Grant Roy (Department of Integrated Engineering)

Emmy Stage (Department of Integrated Engineering)

Ronald Ulseth, Faculty Mentor (Department of Integrated Engineering)

The team is modeling the heat transfer out of a building to understand the amount of energy needed to heat the building as well as the affects of different types of insulations. Modeling of the heat transfer will be done experimentally, mathematically, and with a computer simulator so the team can accurately understand what is happening.

By using pre-determined heat transfer coefficients for the materials of the building, relative wind speeds, as well as the design temperatures and building specifications, the team can mathematically model how much energy is needed to heat the building.

To experimentally model the rate of heat transfer, a scaled building must be built and the team must measure how much energy it takes to keep the building at a set temperature. The experiment will be conducted by setting a control and then have multiple trials while changing variables so the driving factors of heat transfer can be determined. By collecting various temperatures, an accurate model of the heat transfer and heat load can be found.

Modeling heat transfer with a computer simulator will use a combination of these techniques. The team will build a virtual building and put values for heat transfer coefficients into the computer. The computer will then do the calculations and give values of how much energy is needed to heat the building.

By doing this experiment, the team will become aware of the important aspects of building design, as well as gain the technical knowledge needed to do these calculations.

ETHANOL PRODUCTION FROM FALL LEAVES

Korede Amusan (Department of Chemistry and Geology)

James Rife, Faculty Mentor (Department of Chemistry and Geology)

The rate at which the world population has been consuming energy has been an alarming issue. Conventional sources of energy such as coal, oil, and gas are non-renewable and eventually will be depleted. Furthermore, these sources of energy have been major contributors of greenhouse gases. Therefore, alternatives to these energy sources must be developed. Cellulose, the major component of plant cells, is the most abundant organic compound in the world making it a serious alternative to non-renewable resources. Cellulosic ethanol is a biofuel that can be produced from plant feedstock such as leaves, wood, and grass. While cellulosic ethanol can be produced from an array of biomass, this project has focused on using fall leaves to produce cellulosic ethanol. The objective of this project was to test conditions for improving the yield of glucose and ethanol from leaf biomass. The cellulosic content of leaves from the fall 2011 harvest was found to equal $14.8 \pm 2.2\%$. The enzyme load needed to convert that cellulose to the fermentable sugar glucose was tested. It was found that the cellulase previously used was contaminated with significant amounts of glucose and lost activity after 24 hours of hydrolysis. A beta-glucanase from *Trichoderma longibrachiatum* introduced much less contaminating glucose and was stable for 144 hours of digestion. 250 mg of this enzyme per gram of leaf biomass efficiently converted the leaf cellulose to glucose. Preliminary fermentation studies produced approximately 66% of the theoretically expected yield of ethanol from leaf biomass.

VASCULAR REGROWTH FOLLOWING PARTIAL HEPATECTOMY IN RAT

Courtney Frank (Department of Biological Sciences)

Kayla Anderson (Department of Biological Sciences)

Michael Bentley, Faculty Mentor (Department of Biological Sciences)

The purpose of this study is to examine the growth and regeneration of the vasculature of the liver following a partial hepatectomy. The regeneration of the hepatocytes of the liver has been studied extensively, but little attention has been directed towards the regeneration of the supportive vasculature. The vasculature of the liver is highly complex. The liver receives blood from hepatic arteries as well as the hepatic portal vein; therefore, the blood supply in the capillaries (hepatic sinusoids) is a mixture of arterial and portal blood. It is currently unknown how this complex circulation is reestablished in relationship to the regeneration of hepatocytes. In order to perform this study, a group of rats were assigned to one of two groups. The first group was composed of rats that were given the experimental surgery and the other group was given the sham surgery. The vasculature was prepared for viewing two days after the hepatectomy. The vasculature was then viewed under the scanning electron microscope. After viewing the vasculature, it appears that there is fenestration of the sinusoids in the experimental rat, but no fenestration occurs in the control group. However, further investigation is underway. In conclusion, it seems the vasculature in the livers of the experimental group are compensating for the portion of the liver that was removed.

ATRAZINE INFLUENCE ON NORTHERN PIKE SPERM MOTILITY AND VIABILITY IN MINNESOTA

Andrew Stevens (Department of Environmental Science)

Paul Pallardy (Department of Environmental Science)

Shannon Fisher, Faculty Mentor (Water Resource Center)

Northern pike *Esox lucius* populations in southern Minnesota have been found to produce hatchability rates that are significantly lower than populations within northern Minnesota. Hatching reductions have been suggested as a contributing factor in the decline of pike in southern Minnesota. Northern pike are an important game species and declines in population density are a concern to anglers. In addition, the species provides predatory balance to many lake ecosystems. In the areas where hatching success has come into question, watersheds are highly disturbed and substantial agricultural runoff occurs. Research has shown that atrazine, a commonly used agricultural herbicide can impact gamete health. Our objective is to assess differences in sperm motility and density between atrazine-exposed and atrazine-free pike populations. Staff from the Minnesota Department of Natural Resources will assist in capturing breeding-age pike. We will collect and assess milt samples at Minnesota State University, Mankato using established methodology from the literature for other fish species. Water samples from the lakes where milt will be collected will be screened for atrazine content. Sperm motility and density are critical attributes to fish reproduction; therefore reductions in these attributes could certainly be linked to reductions in fertility, hatchability, and larval production rates. Significantly different results between the treatment groups would serve as a foundation for future studies to assess declining pike populations.

PREPARATION OF SOME NEW ARYL DIETHYL PHOSPHATE AND THEIR USE IN METAL-CATALYZED REACTION

Emmanuel Asamoah (Department of Chemistry and Geology)

Michael J. Lusch (Department of Chemistry and Geology)

The Characterization of this compound was carried out by proton (1H) and Carbon -13 NMR (Nuclear magnetic Resonance Spectroscopy), Infrared Spectroscopy, and mass spectroscopy. The overall research experiment was to make a compound that had not been made in the MSU organic Chemistry and Geology Department. This experiment was carried out by following the procedure of Kenner and Williams (H.W Kenner & N.R Williams, J. Chem. Soc 1955, PG 522-525.) This procedure instiu preparation of Chloro-diethyl-phosphate reacting with phenol under basic conditions to make corresponding aryl-diethyl-phosphate. The compound was purified by using flash chromatography. Its structure was confirmed by NMRIR mass spectrometry. Once prepared these compound were subjected to middle catalyzed reaction.

FROM RUNWAY TO MUSEUM: CREATING SUCCESSFUL EXHIBITIONS SHOWING THE INTERRELATIONSHIP BETWEEN FASHION AND ART

Erica Kroening, Department of Art

Curt Germundson, Faculty Mentor (Department of Art)

BALKAN ELEGY: ANALYSIS OF THE PERFORMANCE ARTIST MARINA ABRAMOVIĆ

Jelena Bulajic (Department of Art)

Alisa Eimen, Faculty Mentor (Department of Art)

THE HIERARCHY OF ROCOCO WOMEN SEEN THROUGH FASHION IN PAINTINGS

Sanda Brighidin (Department of Art)

Curt Germundson, Faculty Mentor (Department of Art)

PORTRAIT OF AGING

Jelena Bulajic (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

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Erica Kroening, Department of Art

Curt Germundson, Faculty Mentor (Department of Art)

Historically, high-end fashion has been reduced to ideas of materialism and functionality by the average person. What has commonly been overlooked on the runways of New York, Paris, and Milan was the idea of fashion as an object of art. Some designers, artists, and art historians have always given fashion the warranted classification as art, but this concept is not yet accepted by the regular museum visitor.

This paper focuses on three fashion exhibitions that show when a designer's inspiration and vision is successfully translated into a museum setting, it encourages the visitor to see the interrelationship between fashion and art. I visited the following exhibitions for research: "Scaasi: American Couturier" at the Museum of Fine Arts in Boston, "Roberto Capucci: Art into Fashion" at the Philadelphia Museum of Art in Philadelphia, and "Alexander McQueen: Savage Beauty" at The Metropolitan Museum of Art in New York City.

These exhibitions deal with designer-artists who transcend the conventional line between fashion and art. Exhibiting fashion is relatively contemporary, and there are challenges involved with translating the designer's pieces. After thorough research, I have concluded that displaying these fashion pieces in a museum is difficult, for they rely so heavily on movement, contours of the body, and the designer's inspiration from the workroom to the runway. It is a challenge that when overcome by remaining true to the context of the designer's vision, from the initial design to the runway show, encourages the museum visitor to expand his/her definition of art to include fashion.

BALKAN ELEGY: ANALYSIS OF THE PERFORMANCE ARTIST MARINA ABRAMOVIĆ

Jelena Bulajic (Department of Art)

Alisa Eimen, Faculty Mentor (Department of Art)

My research project revolves around performance artist Marina Abramović and works she has created in the last two decades, with a particular focus placed upon the autobiographical video and performance works produced between 1997 and 2005. These works form a period of the nostalgic evocation of her native country (Serbia) or region (the Balkans), and simultaneously delve into her family's background, Abramović, a child of Yugoslav military officials, chooses the moment after the culmination of the Yugoslav wars to commence these works, at the time when she herself was distanced from the war-riven region: a wanderer equipped with rationale eager to balance fact and fiction, memento mori and humor, death and life. The period of her art production I will be analyzing, rich with ritual imagery, is framed with its beginning - the major work performed at the XLVII Venice Biennale in 1997, *Balkan Baroque*, and its ending - *Balkan Erotic Epic*, video, Belgrade, 2005. These works are conceived as thesis and antithesis: tragedy and satire. My primary area of interest in this research paper is the formulation of these antipodes within a synthesis which could be named "Balkan elegy", through Abramović's usage of Balkans' history, modern Serbian history stained with bloodshed and genocide, political and social evolution, and, most importantly, tradition or Serbian folklore, imagined as primitive and pagan, and ambiguously represented as innocent and scandalous, and even pornographically offensive.

THE HIERARCHY OF ROCOCO WOMEN SEEN THROUGH FASHION IN PAINTINGS

Sanda Brighidin (Department of Art)

Curt Germundson, Faculty Mentor (Department of Art)

The style of Rococo evokes a variety of feminine attributions; women were usually depicted in works of art in a decorative manner. Many of the interpretations of these paintings focus on the luxurious clothes and lavish backgrounds. Artists like Jean-Antoine Watteau and Francois Boucher were responsible for perpetuating a very elegant view of Rococo women within the public's eyes. But there were also depictions of non-aristocratic women that were geared more to the middle class (bourgeois). After reading a number of articles and books on Jean-Baptiste-Simeon Chardin, and visiting the Louvre in Paris, I became aware that his works were usually of women engaged in the activities of daily life and household work. I want to argue that a detailed study of fashion within paintings can tell a lot about the different social classes and hierarchies of 18th century France. I had the opportunity to explore the differences between the social classes by also visiting the palace of Versailles, which allowed me to experience the luxurious side of the life of aristocratic women of the Rococo. As a result of my research I became aware of not just Chardin's representations of bourgeois life, but also of other artists who were engaged in depicting a side of 18th century life different from that shown by artists such as Watteau and Boucher. The visit to the museums and the books I have read demonstrated the role played by Chardin's work as an alternative to the luxurious Rococo style.

PORTRAIT OF AGING

Jelena Bulajic (Department of Art)

Brian Frink, Faculty Mentor (Department of Art)

Gina Wenger, Faculty Mentor (Department of Art)

My creative project raises attention to elderly people as a marginalized group by displaying the faces of individuals in a public space; they are people who are highly unlikely to ever leave the place at which they are situated. My grand scale drawings are aimed to extract the elderly from their residences and bring them into the gallery or a public space where their existence would be perceptible and noted, and where it could, in a sense, communicate with the audience. The people whom I portrayed in my drawings are the residents of nursing homes in Mankato: tenants of Laurels Edge and Laurels Peak. I created three 106.3 x 78.7" drawings, realistic in their execution, while working on them in the Nelson Hall painting studio. My project, apart from resulting in a presentation at the Undergraduate Research Symposium and exhibition by students of MSU in the CSU Gallery, will further progress upon the completion of my studies at MNSU: I will depart to my home country where I will be exhibiting works created at MSU at 2012 Academy of Arts Annual Exhibition at the Museum of Contemporary Art in Novi Sad, Serbia. Finally, I have the intention of exhibiting these works at the solo exhibition which I will have in the Royal Capital of Montenegro, Cetinje, in the summer of 2012.

Psychology, Social Work, and Communication Studies

HOW DO PEOPLE THINK ABOUT THEIR DECISIONS: UNDERSTANDING HOW SCENARIO DOMAIN INFLUENCES THE FRAMING EFFECT

Anthony Christian (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

IS IT ALL THE MIND? PREDICTING THE PERFORMANCE OF MARATHON RUNNING

John Bygrave (Department of Psychology)

Cindra Kamphoff, Faculty Mentor (Department of Human Performance)

Karla Lassonde, Faculty Mentor (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

EFFECTS OF AN INCREASE IN NUTRITIONAL KNOWLEDGE AND DIET IN INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

Dylan Sobota (Department of Social Work)

Laura Strunk, Faculty Mentor (Department of Social Work)

KOREAN ADOPTEES' EXPERIENCES AND THEIR CONNECTION TO RACIAL AND ETHNIC IDENTITY

Max Forbord (Department of Communication Studies)

Sachi Sekimoto, Faculty Mentor (Department of Communication Studies)

HOW DO PEOPLE THINK ABOUT THEIR DECISIONS: UNDERSTANDING HOW SCENARIO DOMAIN INFLUENCES THE FRAMING EFFECT

Anthony Christian (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

The framing effect research of Tversky and Kahneman (1981) has shown that people prefer certain options when they are worded as gains, but that people prefer riskier options when those options focus on potential losses. Also, this framing effect is both more likely and stronger when participants respond to scenarios about potential loss of human life, compared to scenarios about property loss. However, we do not know why people respond differently to human life compared to property scenarios. In the current study, researchers use a novel open-ended thought listing procedure to further understand the why behind the framing effect. After reading human life and property decision scenarios with gain and loss framed options, 137 participants listed their thoughts or feelings regarding their decision, and then chose one of the options. Their thought listings were coded into categories focusing on mention of emotion, concern about risk, or logical considerations. The current research findings were consistent with previous research regarding the influence of the framing of the scenarios; there was a significant framing effect for the human life scenarios, but not for the property scenarios. The current research also found significant differences between the human life and the property scenarios in the coding of emotion responses ($p < .0001$, more emotion mentioned for human life scenarios), but no difference for logic-related responses ($p < .336$). This research represents one of the first studies to examine how participants think about decisions in different domains, and further fills in the gaps in why the framing effect occurs.

IS IT ALL THE MIND? PREDICTING THE PERFORMANCE OF MARATHON RUNNING

John Bygrave (Department of Psychology)

Cindra Kamphoff, Faculty Mentor (Department of Human Performance)

Karla Lassonde, Faculty Mentor (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

Marathon and participation has grown significantly in popularity over the past 10 years (Gerweck, 2010; Lamppa, 2011). Limited research exists to understand the percentage of performance that is physical compared to mental, especially in the marathon where runners must overcome both mental and physical barriers in order to be successful (Kamphoff, Harris, Armentrout, & Long, 2011). The research question guiding this study was: What variables predict marathon performance? We had 40 runners answer a surveyed before and after they ran a marathon or half marathon. The survey addressed several questions about their physical training for the event (the highest weekly mileage, their longest run, etc.) and several psychological variables including positivity, confidence, and mindset. We hypothesized that mental variables would play a larger role in predicting runner's performance than physical variables; however, we found that none of our mental variables significantly predicted final marathon time or perceptions of a successful race. We did however find distinct differences in training between full and half marathoners. Results indicated that the half and full-marathoners differed in their training patterns where marathoners trained on average 6 more weeks and ran about double the number of miles per week compared to half marathoners ($t = 3.77$, $p = .001$). Yet despite less training, half-marathoners felt more mentally prepared ($t = 2.23$, $p = .050$) and marginally more confident ($t = -2.10$, $p = .056$) than marathoners. Though we did not find predictors of marathon performance, there were interesting differences between the characteristics of marathoners compared to half marathoners.

EFFECTS OF AN INCREASE IN NUTRITIONAL KNOWLEDGE AND DIET IN INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

Dylan Sobota (Department of Social Work)

Laura Strunk, Faculty Mentor (Department of Social Work)

Little is known about the effect of a healthy diet and an increase of nutritional knowledge as it pertains to individuals with developmental disabilities. Often times, the developmentally disabled population displays decreased levels of self-esteem, increased levels of depressive disorders, and overall rates of obesity. Data will be gathered from a target population of at least two individuals with developmental disabilities that are participants in an educational curriculum called "You Are What You Eat", operated out of SMILES Center for Independent Living in Mankato, MN. Data gathered during this study will consist of qualitative and quantitative methodologies through the use of observation, questionnaires, a pre-test/post-test, interviews, and participant self-reporting. Baseline data will be collected consisting of each participant's disability, their basic health regarding nutrition, their starting body weights, and their beginning results of a Patient Health Questionnaire (PHQ-9) that measures any possible existing depressive disorders. These same methodologies will be administered at the culmination of the study as well. Research data backing up the fact that a healthier diet and nutritional knowledge for developmentally disabled individuals can greatly improve their overall lifestyles can be provided to places like group homes, DT&H (Day Training & Habilitation) facilities and social service agencies to instill awareness to those places, as well as to the general public that this issue is often unnoticed, unaddressed, and is becoming increasingly problematic for the health of this demographic.

KOREAN ADOPTEES' EXPERIENCES AND THEIR CONNECTION TO RACIAL AND ETHNIC IDENTITY

Max Forbord (Department of Communication Studies)

Sachi Sekimoto, Faculty Mentor (Department of Communication Studies)

Agathon (2011) states that in 2010, more than one million adoptees had been involved in international adoption, and approximately 200,000 of them came from South Korea. There are a growing number of international adoptions from South Korea ever since the end of Korean War in 1953. However, there is very little research about Korean adoptees' experiences and how those experiences form their racial and ethnic identity. The purpose of research is to explore the significant life experiences of Korean adoptees and examine how their experiences have shaped their racial and ethnic identity. For this research, racial identity is defined as a sense of group identity based on one's perception that he/she shares with a particular racial group, and ethnic identity is defined as a social identity based on the culture of one's national group. I will conduct case studies of 3-5 Korean adoptees through in-depth face-to-face interviews. Some of the themes I hope to address from the case studies include: 1.) How Korean culture has influenced the adoptees, 2.) How mainstream American culture has influenced the adoptees, 3.) How Korean adoptees experience stereotypes and racism in the United States, and 4.) How Korean adoptees identify themselves as a member of their racial and ethnic group. I hope to gain a better understanding of Korean adoptees and their exploration of racial and ethnic identity in order to help further the research on interracial and international adoption.

COMMERCIALIZATION OF MEDICINAL PLANTS IN THE PERUVIAN AMAZON

Jose Barriga (Department of Biological Sciences)

Timothy Secott, Faculty Mentor (Department of Biological Sciences)

THE EFFECT OF LAND DEVELOPMENT ON THE COMPOSITION OF INSECTIVOROUS BIRD SPECIES IN SUB-BOREAL PEATLANDS OF THE MIDWESTERN UNITED STATES

Zachary Olson (Department of Biological Sciences)

Lucas Wandrie, Graduate Student Mentor (Department of Biological Sciences)

John Krenz, Faculty Mentor (Department of Biological Sciences)

REGULATION OF EXPRESSION OF THE LIP1 GENE IN THE BACTERIUM PHOTORHABDUS TEMPERATA

Bryan Reddick (Department of Biological Sciences)

Christopher Conlin, Faculty Mentor (Department of Biological Sciences)

CONCERNING THE ETHICAL TREATMENT OF HUMAN SUBJECTS IN PHARMACEUTICAL CLINICAL TRIALS IN THE DEVELOPING WORLD

Anna Stanek (Department of Open Studies)

Brandon Cooke, Faculty Mentor (Department of Philosophy)

COMMERCIALIZATION OF MEDICINAL PLANTS IN THE PERUVIAN AMAZON

Jose Barriga (Department of Biological Sciences)

Timothy Secott, Faculty Mentor (Department of Biological Sciences)

The Peruvian city of Iquitos is found in the western portion of the Amazon basin, where the majority of people rely on forest products for their health needs. People of and around the city of Iquitos have been involved in the global trade of medicinal plants long before the rubber boom that started in the late 1800s. As a result of the high worldwide demand for rubber (during the late 1800s and early 1900s), thousands of immigrants from around the globe were attracted to Iquitos. This led to a blending of beliefs and ways of living, both strongly tied to nature. The present project analyzes the current commercialization process of medicinal natural products, including the profitability, knowledge and quality of the products in the socioeconomic context of Iquitos. In that means, the results were compared to the contexts of Cuzco (Peru) and La Paz (Bolivia), where the products from Iquitos are commercialized as well. To accomplish this, semi-structured interviews were conducted between December 2011 and January 2012. Results suggest that there is a lack of balance of profitability between people who harvest the products and people who sell the products to the public. Additionally, the farther the products get from Iquitos, the lesser the quality and purity of the products and the higher the costs.

THE EFFECT OF LAND DEVELOPMENT ON THE COMPOSITION OF INSECTIVOROUS BIRD SPECIES IN SUB-BOREAL PEATLANDS OF THE MIDWESTERN UNITED STATES

Zachary Olson (Department of Biological Sciences)

Lucas Wandrie, Graduate Student Mentor (Department of Biological Sciences)

John Krenz, Faculty Mentor (Department of Biological Sciences)

The effect of adjacent land development on the species composition of insectivorous birds was assessed in 20 peatlands throughout east central Minnesota and north western Wisconsin. Insectivorous bird species consume primarily insects and other invertebrates. The composition of the adjacent land (or buffer) within 500-m of the site was measured using remote sensing data. We measured the proportion land that included impervious surfaces (roads and cities) and the proportion of cropland. The proportion of altered buffer can be an important consideration in the management of an area for wildlife. A highly altered buffer causes more frequent human-wildlife interactions and a higher chance of a lack of nesting and feeding habitats, and a lack of vegetative and biological diversity.

REGULATION OF EXPRESSION OF THE LIP1 GENE IN THE BACTERIUM PHOTORHABDUS TEMPERATA

Bryan Reddick (Department of Biological Sciences)

Christopher Conlin, Faculty Mentor (Department of Biological Sciences)

The lip1 gene found in the bacterium Photorhabdus temperata, an insect pathogen, is a member of a family of closely related esterase's found in many gram negative bacteria including apeE from Salmonella typhimurium. Their function is largely unknown. However, we do know apeE is regulated by phosphate starvation. We have begun to study the regulation of gene expression in the lip1 gene. By inserting the lip1 gene into chromosomal DNA of Salmonella we were able to test its regulation. Results indicate that unlike apeE, lip1 is not regulated by limiting phosphate levels. Furthermore, during growth phase there was a thirty fold increase from exponential phase to stationary phase indicating the lip1 gene is expressed during stationary phase. The rpoS gene is an alternative sigma factor known to regulate a number of genes whose expression increases in stationary phase. The results from Salmonella with the rpoS mutation displayed a six fold reduction of expression when compared to the wild type in stationary phase indicating regulation by rpoS. To confirm these results in Photorhabdus temperata, we are moving the reporter system into the original host and assaying at different times during growth phase.

CONCERNING THE ETHICAL TREATMENT OF HUMAN SUBJECTS IN PHARMACEUTICAL CLINICAL TRIALS IN THE DEVELOPING WORLD

Anna Stanek (Department of Open Studies)

Brandon Cooke, Faculty Mentor (Department of Philosophy)

As an Open Studies major, I have taken courses in biology, philosophy, and international relations, which is a challenging combination that allows me to study medical ethics on an international scale. I am completing a capstone project that focuses on the care and treatment of human test subjects in drug trials, especially those sponsored by American pharmaceutical companies that take place in international settings. To assist with this, I have read the book White Coat, Black Hat: Adventures on the Dark Side of Medicine by Dr. Carl Elliott and studied different ethical theories, in particular, Immanuel Kant's categorical imperative, which is a moral theory that requires respect for the autonomy of persons. Pharmaceutical companies that sponsor the studies are concerned with the speed at which a drug can be pushed through the development process at low cost, and it is because of this that ethical treatment of test subjects tends to fall by the wayside, even if the study boasts that the trial helps those that might not otherwise receive medical care. This is arguably a violation of the categorical imperative, and it puts those of us who benefit from such trials in league with the sponsors. I will present cases of recent overseas clinical trials to offer specific ethical and practical recommendations for pharmaceutical companies, and for patients who accept treatments developed through the exploitation of other persons.

ECOTEC EFFICIENCY: INVESTIGATION OF POTENTIAL THERMAL EFFICIENCY IMPROVEMENTS OF ETHANOL BLENDED FUELS

Jonathan Olmstead (Department of Automotive Engineering Technology)

Christopher Reek, Faculty Mentor (Department of Automotive Engineering Technology)

FORMULA SAE DATA ACQUISITION INTERFACE

Christopher Langlois (Department of Automotive Engineering Technology)

Devin Moyer (Department of Automotive Engineering Technology)

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

SMALL ENGINES TEAM

Ryan Olson (Department of Automotive Engineering Technology)

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

FORMULA SAE FUEL INJECTION PLACEMENT

David Mengelkoch (Department of Automotive Engineering Technology)

Bryce Tillman (Department of Automotive Engineering Technology)

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

ECOTEC EFFICIENCY: INVESTIGATION OF POTENTIAL THERMAL EFFICIENCY IMPROVEMENTS OF ETHANOL BLENDED FUELS

Jonathan Olmstead (Department of Automotive Engineering Technology)

Christopher Reek, Faculty Mentor (Department of Automotive Engineering Technology)

The project attempts to identify if there are any efficiency benefits that can be gained through engine modification and the use of different ethanol blends than currently available. Ethanol is a renewable fuel source that is made from biomass and emits fewer pollutants than standard gasoline when used in internal combustion engines. However, ethanol has a lower energy density which results in lower miles per gallon fuel economy. This study will attempt to identify a blend of ethanol and gasoline that better balances the advantages and disadvantages of the fuels.

The testing utilized a four cylinder gasoline engine made by General Motors. The engine was set up on an engine dynamometer and connected to computer software that recorded data and monitored engine parameters. The test engine has many technologically advanced features that make it ideal for the testing that was done. These features include a directly injected fuel system, dual variable camshaft timing, and a turbocharger. The first step in the process was to do baseline fuel efficiency testing on the engine. Next, the engine was modified and optimized to run on specific blends of fuel with varying ethanol content. Then the original testing was repeated to compare the efficiency of the engine on the various ethanol blends to the baseline efficiency.

Although testing has not been completed, preliminary results show that the fuel consumption of the test engine on E85 could be reduced by increasing the static compression of the engine and optimizing the engine calibration.

FORMULA SAE DATA ACQUISITION INTERFACE

Christopher Langlois (Department of Automotive Engineering Technology)

Devin Moyer (Department of Automotive Engineering Technology)

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

Necessary for vehicle development, data acquisition systems are utilized for viewing dynamic effects on the entire vehicle. These systems will monitor acceleration, cornering, braking, surface, and driver effects. Virtually every manufactured vehicle utilizes many different sensors to maintain engine operation commonly known as engine management. The Formula SAE vehicle maintains separate engine management and data acquisition systems, utilizing separate software for logging data. Interfacing the engine management and data acquisition system is of immense value, harnessing the ability to gather data from every portion of the vehicle with one system. The Interface functions on simple principles, the data management system outputs data through a transmit line, sending all engine specific sensor output values. The data acquisition system interprets the information through a receive line. The interface option purchased did not function as described. It was programmed for higher functioning engine management systems, different from the current system. The data acquisition system received data at a different rate than what the engine management sends. The electrical engineering students built an AVR microprocessor to convert the data rates that the engine management system was sending so the data acquisition unit could read and interpret the data. The team successfully accomplished the communication link between the two systems and worked on mapping out the correct channel identification codes and values. The team can now utilize all information through a single-wire, using one system allowing for superior testing, and diagnostic capabilities.

SMALL ENGINES TEAM

Ryan Olson (Department of Automotive Engineering Technology)

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

In August 2013 all Minnesota gas pumps will be required to have gasoline containing 20% ethanol, compared to 10% at the moment. This research study focused on the effect of mid-level ethanol blends on small non-road engines. Currently, almost all non-road engines are rated only for 10% ethanol, or E10 fuel. The study will aid manufacturers and the EPA in predicting the effects of mid-level ethanol blends in small engines. This change could result in small engines having shorter life spans and diminished performance.

This study tested leaf blowers and weed whackers. They were tested in E0, E10, E15 and E20 (% Ethanol content). There were two engines using the same fuel, four fuels, thus 8 engines per test. The engines had tests performed on them to determine the position they will be able to run, such as upside down, pointed up, etc. Each engine was aged 125 hours as per the manufacturer's specifications with tests conducted at the two hour break in, 62.5 hour half life, and 125 hour marks. The engines were operated at an interval of 2:20 minutes wide open throttle, and 0:20 minutes idle. The engines were loaded with the attachments they were intended to be used with. Temperature measurements at six different points of the engine were monitored to ensure accurate representations of the effects each fuel has on the engines. The data collected was instrumental in the future of small non-road engines and how they perform with E20, as well as natural resource sustainment.

FORMULA SAE FUEL INJECTION PLACEMENT

David Mengelkoch (Department of Automotive Engineering Technology)

Bryce Tillman (Department of Automotive Engineering Technology)

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

Fuel injector placement contributes to engine performance, emission-output, and fuel efficiency. There are two methods of fuel injection. Direct fuel injection sprays fuel directly into the cylinder, and port injection sprays fuel into the air stream before it enters the cylinder. Although many manufacturers are starting to introduce direct fuel injection, port injection is still a viable means of fuel distribution within internal combustion engines. Just recently port injection has been implemented into small engine construction. Before port injection most small engines were carbureted. Port injection is better than carburetion because fuel can be more accurately controlled as well as delivered much closer to the cylinder than a carburetor. Extensive research is necessary to gain a full understanding of fuel delivery capabilities for these types of applications. The overall goal of this project was to determine whether a single fuel injector should be located such that the spray pattern opposes or coincides with intake airflow in order to obtain better engine performance. Both methods were designed and constructed to be tested on a turbocharged single cylinder KTM 525 engine using a blend of 85% ethanol and 15% pump gasoline. Computer models were constructed prior to prototype development. Engine performance was tested and evaluated using the SuperFlow engine dynamometer. Using the parameters of horsepower output, intake temperature reduction, and stable air/fuel ratio to evaluate performance, it is predicted that the co-flow injector placement will be superior.

Art, Business, Communication Disorders, Dental Hygiene, Economics, Family and Consumer Sciences, Gender and Women's Studies, Geography, Human Performance, Humanities, Mass Communications, Mathematics, Nursing, Political Science, and Psychology

1. QUALITATIVE RESEARCH: SELECTED LANGUAGE SKILLS OF A CHILD WITH HEARING LOSS

Jessica Malepsy (Department of Communication Disorders)
Bonnie Lund, Faculty Mentor (Department of Communication Disorders)

2. SELECTED LANGUAGE SKILLS OF A CHILD WITH MOEBIUS SYNDROME

Kim Churness (Department of Communication Disorders)
Bonnie Lund, Faculty Mentor (Department of Communication Disorders)

3. SELECTED LANGUAGE SKILLS OF A CHILD WITH ASPERGERS SYNDROME

Jennifer Duley (College of Allied Health and Nursing, Communication Disorders)
Bonnie Lund, Faculty Mentor (College of Allied Health and Nursing, Communication Disorders)

4. IMPLEMENTATION OF TINNITUS RETRAINING THERAPY (TRT) PROGRAM WITHIN A UNIVERSITY AUDIOLOGY CLINIC

Tara Brink (Department of Communication Disorders)
Renee Shellum, Faculty Mentor (Department of Communication Disorders)

5. AWARENESS OF XYLITOL

Linda Froehlich (Department of Dental Hygiene)
Krystal Bode (Department of Dental Hygiene)
Angela Monson (Department of Dental Hygiene)
Angela Monon, Graduate Student Mentor (Department of Dental Hygiene)
Krystal Bode, Faculty Mentor (Department of Dental Hygiene)

6. DOES THE PRESENCE OF INFORMATION ASYMMETRY CAUSE MANAGEMENT TO PREFER DEBT FINANCING? AN EMPIRICAL TEST OF THE PECKING ORDER THEORY OF CAPITAL STRUCTURE

Benjamin Guthmiller (Department of Economics)
Ihsuan Li (Department of Economics)

7. LAND USE IN REMOTE INDIGENOUS COMMUNITIES OF ECUADOR: SOCIAL, POLITICAL, AND ECONOMIC ISSUES

William Manning (Department of Economics)
Kimberly Contag, Faculty Mentor (World Language & Cultures)

8. SENSORY EVALUATION OF BEEF JERKY

Mari Moffitt (Department of Family and Consumer Science)
Abbey Winkels (Department of Family and Consumer Science)
Joye Bond, Faculty Mentor (Department of Family and Consumer Science)

9. RAISING RELATIVES CHILDREN: THE RELATIONSHIPS, STRESSORS AND METHODS OF COPING

Danielle Jones (Department of Family and Consumer Science)
Heather Von Bank, Faculty Mentor (Department of Family and Consumer Science)

10. COMMERCIALS AND COLLEGE: THE NEGATIVE EFFECTS ON BODY IMAGE

Madeline Greene (Department of Gender and Women's Studies)

Megan Peters, Graduate Student Mentor (Department of Gender and Women's Studies)

Maria Bevacqua, Faculty Mentor (Department of Gender and Women's Studies)

11. IN THE NAME OF HONOR

Sabaina Khurram (Department of Gender and Women's Studies)

Maria Bevacqua, Faculty Mentor (Department of Gender and Women's Studies)

12. EROSION CONTROL ALONG THE MNSU FITNESS TRAIL

Matthew Lassonde (Department of Geography)

James McKay (Department of Geography)

Katherine Dettmann (Department of Geography)

Forrest Wilkerson, Faculty Mentor (Department of Geography)

13. NATIVE PRAIRIE PLANT DISPLAY ON CAMPUS

Brandon Bohks (Department of Biological Sciences)

Jaydon Rueckert (Department of Geography)

Jeffrey Rosamond (Department of Geography)

Stacey Allen (Department of Geography)

Philipp Nagel, Graduate Student Mentor (Department of Geography)

Forrest Wilkerson, Faculty Mentor (Department of Geography)

14. AN ANALYSIS OF ALBEDO AND ABSORPTION OF SOLAR RADIATION IN REGARDS TO THE URBAN HEAT ISLAND EFFECT, VEGETATION, AND POTENTIAL ENERGY USE

Elixus Couvertier (Department of Biological Sciences)

Andrew Meyer (Department of Geography)

Lisa Edman (Department of Geography)

William Mekeel, Graduate Student Mentor (Department of Geography)

Forrest Wilkerson, Faculty Mentor (Department of Geography)

15. MINNESOTA NATIVE PLANT GARDEN ABSTRACT

Michael Schulte (Department of Geology)

Matthew Schmidt (Department of Geography)

Scott Hoffman (Department of Geography)

Forrest Wilkerson, Faculty Mentor (Department of Geography)

16. EFFECT OF DYNAMIC WARM UP AFTER AN ACUTE BOUT OF STATIC STRETCHING ON KNEE FLEXION ISOKINETIC TORQUE PRODUCTION

Zachary Martens (Department of Human Performance)

Robert Pettitt, Faculty Mentor (Department of Human Performance)

17. EFFICACY OF AN INTERVAL PROGRAM TO SELECTIVELY DEVELOP CRITICAL VELOCITY OR ANAEROBIC CAPACITY

Brianne West (Department of Human Performance)

Ida Clark, Graduate Student Mentor (Department of Human Performance)

Robert Pettitt, Faculty Mentor (Department of Human Performance)

18. “ JUST PLAIN INACCURATE” : ENSURING THE ACCURACY AND DEPENDABILITY OF THE BIOELECTRICAL IMPEDANCE ANALYSIS (BIA) DEVICE IN THE HEALTH FITNESS INDUSTRY

Jacob Mehrhoff (Department of Human Performance)

Stacy Ebner, Graduate Student Mentor (Department of Human Performance)

Robert Pettitt, Faculty Mentor (Department of Human Performance)

Rachel Wentz, Faculty Mentor (Department of Human Performance)

19. THE CULTURAL SURVIVAL OF DAKOTA PEOPLE

Tiffany Ranweiler (Department of English)

Gwen Westerman-Wasicuna, Faculty Mentor (Department of English)

20. COLLEGE STUDENT’S ELECTRONIC REPLACEMENT PROPENSITY: THE WHEN, HOW AND WHY

Lindsay Bertolino (Department of Marketing)

Kristin Scott, Faculty Mentor (Department of Marketing)

21. LOOKING BACK TO LOOK FORWARD: DEVELOPING AN INNOVATIVE TYPEFACE

Ian Roberts (Department of Art)

Matthew Willemsen, Faculty Mentor (Department of Art)

22. THE RELATIONSHIP BETWEEN SOCIAL MEDIA USE AND CONSUMER BRAND ENGAGEMENT

Joshua Stein (Department of Marketing)

Kristin Scott, Faculty Mentor (Department of Marketing)

23. HOW DO SOCIAL MEDIA AFFECT NEWS GATHERING?

Grace Webb (Department of Mass Communication)

Amy Lauters, Faculty Mentor (Department of Mass Communication)

24. HAVE YOU WASHED YOUR HANDS?: A STUDY OF HANDWASHING PRACTICES AMONG NURSES WORKING IN THE NEONATAL INTENSIVE CARE UNIT

Nicole LaFontsee (Department of Nursing)

Stacy Novak (Department of Nursing)

Emily Cox (Department of Nursing)

Sarah Bagshaw (Department of Nursing)

Kelly Scott (Department of Nursing)

Marcia Stevens, Faculty Mentor (Department of Nursing)

25. THE EFFECT OF SIMULATION EXPERIENCES ON THEORY COURSE GRADE IN OBSTETRICAL NURSING

Yemesrach Mengesha (Department of Nursing)

Angela Christian, Faculty Mentor (Department of Nursing)

26. WHAT FACTORS INFLUENCE BACK PAIN IN NURSES

Brittany Frank (Department of Nursing)

Casey Lynch (Department of Nursing)

Christine Henke (Department of Nursing)

Lyndsay Sadler (Department of Nursing)

Clifford Rippel (Department of Nursing)

Colleen Royle, Faculty Mentor (Department of Nursing)

27. USING NURSE LED YOGA MEDITATION TO QUIET THE MIND: AN INTEGRATIVE THERAPY TO REDUCE HOSPITAL READMISSION RATES IN PATIENTS WITH A DIAGNOSIS OF SCHIZOPHRENIA

Sara Pepel (Department of Nursing)
Fawn VanEps (Department of Nursing)
Laurel Chapman (Department of Nursing)
Casey Windsperger (Department of Nursing)
Karissa Scharmer (Department of Nursing)
Hans Peter De Ruiter, Faculty Mentor (Department of Nursing)

28. ARE NURSES THE KEY FACTOR IN SAVING PATIENTS FROM A CRISIS?

Emily Fisher (Department of Nursing)
Kortney Schmitz (Department of Nursing)
Michelle Brunn (Department of Nursing)
Jill Smith (Department of Nursing)
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29. HEALTH CARE PROVIDERS INFLUENCES ON WHETHER OR NOT THEY USE PERSONAL PROTECTIVE EQUIPMENT

Amy Hiltner (Department of Nursing)
Emily Cameron (Department of Nursing)
Alyssa Tranby (Department of Nursing)
Hans Peter De Ruiter (Department of Nursing)

30. PATIENT SLEEP PATTERNS: UNDERSTANDING PATIENTS' PERCEPTIONS OF NURSING ASSESSMENT TIMES AND INTERVENTIONS DURING SLEEPING HOURS

Leslie Walters (Department of Nursing)
Emily Grundhoffer (Department of Nursing)
Jessica Neumann (Department of Nursing)
Lindsey Frandrup (Department of Nursing)
Amber Ralls (Department of Nursing)
Hans Peter De Ruiter, Faculty Mentor (Department of Nursing)

31. NURSING BURNOUT AND HOW IT AFFECTS THE QUALITY OF PATIENT CARE AND PATIENT SATISFACTION

Ashley Larson (Department of Nursing)
Jean Gorter (Department of Nursing)
Christine Cullen (Department of Nursing)
Ashley Leahy (Department of Nursing)
Diane Witt, Faculty Mentor (Department of Nursing)

32. THE PERCEPTION OF AFRICAN AMERICANS TOWARDS HIV/AIDS AND ITS TRANSMISSION

Karishma Manandhar (Department of Nursing)
Yemesrach Mengesha (Department of Nursing)
Victoria Afolayan (Department of Nursing)
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Anwar Mohamed (Department of Nursing)
Hans Peter De Ruiter, Faculty Mentor (Department of Nursing)

33. WATER CRISIS OF SUB-SAHARAN AFRICA AND ITS EFFECTS ON WOMEN

Mellisa Xiong (Department of Political Science)

Abdalla Battah, Faculty Mentor (Department of Government)

34. PERSPECTIVES OF PRE-SERVICE AND IN-SERVICE SPECIAL EDUCATION TEACHERS ABOUT HOMEWORK INTERVENTIONS

Brenda Walker (Department of Psychology)

MaryBeth Armstrong (Department of Psychology)

Alexandra Panahon, Faculty Mentor (Department of Special Education)

Carlos Panahon, Faculty Mentor (Department of Psychology)

Marcia Sytsma, Graduate Student Mentor (Department of Psychology)

35. INTUITION OVERRULES LOGIC WHEN DETECTING DECEPTION

Colette Baudoin (Department of Psychology)

Chelsea Schmillen (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

36. PSYCHIATRIC PROFESSIONAL BELIEFS REGARDING DISSOCIATIVE IDENTITY DISORDER

Nicole Draheim (Department of Psychology)

Amber Schramm (Department of Psychology)

Daniel Houlihan, Faculty Mentor (Department of Psychology)

Carlos Panahon, Faculty Mentor (Department of Psychology)

Liesa Klein, Graduate Student Mentor (Department of Psychology)

37. SURVEYING COLLEGE STUDENTS WITH DISABILITIES ABOUT THEIR PERCEPTIONS OF TEST ACCOMMODATIONS

Melissa Stewart (Department of Psychology)

Grace Cimino (Department of Psychology)

Carlos Panahon, Faculty Mentor (Department of Psychology)

38. PRE-SERVICE TEACHERS' KNOWLEDGE OF SELECTIVE MUTISM

Daniel Spencer (Department of Psychology)

Carlos Panahon, Faculty Mentor (Department of Psychology)

Nicole Enfield, Graduate Student Mentor (Department of Psychology)

39. HOW SUPERSTITIONS AFFECT CRITICAL THINKING IN COLLEGE STUDENTS

Daniel Spencer (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

40. EXAMINING COLLEGE STUDENTS' LEVEL OF EROTOPHOBIA AND EROTOPHILIA

Allison Campbell (Department of Psychology)

Miranda Bretz (Department of Psychology)

Keegan McPherson (Department of Psychology)

Matthew Schumann (Department of Psychology)

Eric Sprankle, Faculty Mentor (Department of Psychology)

41. DO TEACHER'S PERCEPTIONS ABOUT STUDENTS WITH EBD BEGIN DURING THEIR COLLEGE EDUCATION?

Amber Schramm (Department of Psychology)
Grace Cimino (Department of Psychology)
Carlos Panahon, Faculty Mentor (Department of Psychology)
Dana Shea, Graduate Student Mentor (Department of Psychology)

42. AN OBSERVATION OF COMMAND USAGE AMONG INTERACTIONS BETWEEN POLICE OFFICER AND CIVILLIAN

Kelsey Martin (Department of Psychology)
Sarah Marsh (Department of Psychology)
Britta Fiksdal, Graduate Student Mentor (Department of Psychology)
Daniel Houlihan, Faculty Mentor (Department of Psychology)

43. IN ONE EAR AND OUT THE OTHER: THE CORRECTION OF PSYCHOLOGY MISCONCEPTIONS AND OUR MINDS RESISTANCE TO IT.

Samuel Erickson (Department of Psychology)
Samantha Bergmann (Department of Psychology)
Sarah Lewer (Department of Psychology)
Karla Lassonde, Faculty Mentor (Department of Psychology)

44. COLLEGE STUDENTS' PERCEPTIONS AND MISCONCEPTIONS ABOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER

Ashley Germscheid (Department of Psychology)
Carlos J. Panahon, Faculty Mentor (Department of Psychology)

45. LAPTOPS IN THE CLASSROOM: EVALUATING THE POTENTIAL BENEFITS OF TECHNOLOGY AGAINST DISTRACTIONS

Britten Block (Department of Psychology)
Ryan Meyer (Department of Psychology)
Maria Almoite (Department of Psychology)
Kayla Scott (Department of Psychology)
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46. DETECTING DECEPTION: STUDYING THE CUES PEOPLE USE TO DISTINGUISH BETWEEN TRUTH-TELLERS AND LIARS

Amber Schramm (Department of Psychology)
Emily Stark, Faculty Mentor (Department of Psychology)

47. INVESTIGATING RACIAL STEREOTYPES FOR AFRICAN AMERICANS WITH A NEW IMPLICIT MEASURE OF READING COMPREHENSION

Carrie Claussen (Department of Psychology)
Megan Selberg (Department of Psychology)
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48. PHYSICAL ACTIVITY PATTERNS OF DEAF ADULTS

Kenisha Butler (Department of Human Performance)
Suzannah Armentrout, Faculty Mentor (Department of Human Performance)

49. DANCING FOR EVERYONE

Samantha Gerber (Department of Community Health and Dance)
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Amy Hedman, Faculty Mentor (Department of Health Science)

50. BACK TO REALITY: EFFICACY OF REALITY ORIENTATION ACTIVITIES MINIMIZING POSTOPERATIVE DELIRIUM

Yu (Janet) Wu (Department of Nursing)
Stephanie Kruse (Department of Nursing)
Andrew Thomas (Department of Nursing)
Christine Haas (Department of Nursing)
Catherine Conniff (Department of Nursing)
Hans-Peter de Ruiter, Faculty Mentor (Department of Nursing)

51. IMPACT AND RESULTS OF CUTS IN TRAINING AND DEVELOPMENT BUDGETS ON SMALL LOCAL BUSINESS

Emily Haag (Department of Management)
Queen Booker, Faculty Mentor (Department of Management)

52. CAREER COUNSELING: RIGHT NURSE, RIGHT POSITION

Erin Eccles (Department of Nursing)
Hans Peter De Ruiter, Faculty Mentor (Department of Nursing)

53. GENDER BIAS IS HERE TO STAY? INVESTIGATING HOW SUBTLE CHANGES IN LANGUAGE CAN INFLUENCE GENDER STEREOTYPED OCCUPATIONS

Emily Coon (Department of Psychology)
Natalie Lloyd (Department of Psychology)
Karla Lassonde, Faculty Mentor (Department of Psychology)

54. THE PERCEPTION OF RESOURCES AVAILABLE TO VICTIMS OF DOMESTIC VIOLENCE IN MNSU

Abel D. Gebretkle (Departments of Biological Sciences and Health Science)
Mark Windschitl, Faculty Mentor (Department of Health Science)

55. A RETROSPECTIVE ANALYSIS OF THE PERCEIVED BENEFITS OF PARTICIPATING IN A STUDY ABROAD PROGRAM

Emma Grumke (Department of French)
Evan Bibbee, Faculty Mentor (Department of French)

56. ANOREXIA NERVOSA AND OTHER EATING DISORDERS

Kennyeh Momoh (Department of Health Science)
Amy Hedman, Faculty Mentor (Department of Health Science)

QUALITATIVE RESEARCH: SELECTED LANGUAGE SKILLS OF A CHILD WITH HEARING LOSS

Jessica Malepsy (Department of Communication Disorders)

Bonnie Lund, Faculty Mentor (Department of Communication Disorders)

The purpose of this research was to learn about the qualitative research process and the selective language skills of an individual with hearing loss. After IRB approval, two audio-taped interviews were conducted, one with the individual and another with her mother. With this data, I was able to look at factors that affected the individual's language skills such as family involvement, self-esteem/advocacy, and therapy received. Codes and subcodes were used to organize the information obtained in the interview and from these, four main patterns were extracted. These patterns and the data analysis allowed for an assertion to be made regarding the individual's experience growing up with hearing loss.

SELECTED LANGUAGE SKILLS OF A CHILD WITH MOEBIUS SYNDROME

Kim Churness (Department of Communication Disorders)

Bonnie Lund, Faculty Mentor (Department of Communication Disorders)

The purpose of this research was to understand the selective language development of individuals with Moebius syndrome and learn how to complete qualitative research. I gained knowledge about an individual's experience growing up with Moebius syndrome and compared it to existing literature. After IRB approval and signed consent, I conducted an interview and recorded it using audiotape. I then wrote down the interview verbatim to collect data. I used this data to create codes and sub codes where five patterns emerged. Analyzing these patterns allowed for the following assertion to be created regarding an individual's experience growing up with Moebius syndrome: In addition to obtaining appropriate intervention for speech and language development, implementing early awareness, and creating relationships with individuals with similar disabilities are important aspects of building and maintaining high self-esteem.

SELECTED LANGUAGE SKILLS OF A CHILD WITH ASPERGERS SYNDROME

Jennifer Duley (Department of Communication Disorders)

Bonnie Lund, Faculty Mentor (Department of Communication Disorders)

A qualitative research study was conducted to gain an understanding of Asperger's Syndrome (AS.) The researcher informed the reader about a specific case of a boy with AS. A review of the literature allowed comparisons to be made between existing research and the case study. Information was gathered through an interview of the boy's mother. The interview sample was transcribed and coded using qualitative research methods. From the triangulation of the data, three patterns emerged. The following assertion was also discussed: The family involvement resulted in more effective outcomes for the subject with AS.

IMPLEMENTATION OF TINNITUS RETRAINING THERAPY (TRT) PROGRAM WITHIN A UNIVERSITY AUDIOLOGY CLINIC

Tara Brink (Department of Communication Disorders)

Renee Shellum, Faculty Mentor (Department of Communication Disorders)

Tinnitus is defined as a subjective sensation of noise within the human ear. Approximately 50 million Americans, 15% of the population, experience tinnitus to the extent that it significantly affects their daily lives, interfering with sleep, concentration, work and social interaction. It is estimated that about 5% of the general population (about 13 million Americans), suffer from moderate to severe prolonged spontaneous tinnitus.

The purpose of this study is to organize and develop a Tinnitus Retraining Therapy (TRT) protocol for use within a University clinical setting. TRT consists of informational therapy and a habituation process that incorporates auditory therapy and directive counseling to initiate and facilitate habituation of the perception of the tinnitus. Auditory therapy consists of wearing devices much like hearing aids and that emit a soft broadband noise; this sound is meant to distract the brain and "mask" out the perception of the tinnitus. Extensive counseling and education are integral to the therapy, with the goal of retraining the brain to de-emphasize the importance of the tinnitus. The direct outcome of this research is to structure a TRT therapy program for use within a University Audiology Clinic site.

Education on TRT was gained throughout conference seminars, as well as Tinnitus Practitioner's Association (TPA) certification by Principal Investigator in December of 2011. Instructional presentation slides, as well as, all necessary patient forms were obtained through TPA certification. All material was re-addressed and organized into areas of tinnitus assessment and management. TRT protocol is arranged for implementation subsequently following concluding research.

AWARENESS OF XYLITOL

Linda Froehlich (Department of Dental Hygiene)

Krystal Bode (Department of Dental Hygiene)

Angela Monon, Graduate Student Mentor (Department of Dental Hygiene)

Krystal Bode, Faculty Mentor (Department of Dental Hygiene)

Purpose. Tooth decay continues to be a significant problem in the population. This study examined dental patients' knowledge of xylitol and explored any correlations between knowledge and age, education level, ethnic background, and income.

Methods. Surveys were distributed to a convenience sample of dental patients (N=50) at the MSU Dental clinic and Trail Creek Dental Clinic. Of those surveyed, 82% of participants were Caucasian with 85.1% between the ages of 25 and 54.

Results. The average knowledge score regarding xylitol was 5 out of 10 true/false items. Most participants were aware that xylitol is not readily available (70.2%) and that xylitol can reverse the initial stages of decay (68.1%). Most participants (61.7%) were unaware that xylitol can help regulate blood glucose levels for diabetics. Results revealed that there were no significant correlations between the knowledge score and participants' age, ethnicity, education, or income. There was a significant correlation between participants' value of oral health and the knowledge score ($r=.36$). Despite the lack of knowledge, 79.6% of participants were willing to administer and monitor the use of xylitol for their children to reduce the chance of tooth decay.

Conclusion. The findings in this study suggest that dental patients are unaware of xylitol and its potential benefits, regardless of age, education level, ethnic background or income level. Further research should be conducted with a larger random sample to validate these findings. Increased knowledge among dental patients is needed to encourage the use of xylitol to prevent dental decay.

DOES THE PRESENCE OF INFORMATION ASYMMETRY CAUSE MANAGEMENT TO PREFER DEBT FINANCING? AN EMPIRICAL TEST OF THE PECKING ORDER THEORY OF CAPITAL STRUCTURE

Benjamin Guthmiller (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

The first widely accepted study of the effect of capital structure on the value of a firm was published in 1958 by Franco Modigliani and Merton Miller. The conclusion of their research was that capital structure was irrelevant to the value of a firm. However if management is rational and acting on behalf of rational shareholders, why do firms continually adjust their capital structure? In 1984 Stewart C. Myers developed a new theory that looked at the problem in a different way. He proposed that management's more precise knowledge, relative to external shareholders, about the value of the firm created informational costs associated with the issuance of debt or equity to finance a proposed investment project. His major conclusion was that the preferred order of financing was: retained earnings, debt, and finally equity. Empirical tests of the theory have been performed and often reject his theory. The most recent study performed to test the theory was done using data ending in 1998. My research will contribute to the existing body of literature by adding a fresh look with more recent data. I test Pecking Order Theory on a broad cross-section of publicly traded American firms from 1998-2011 using OLS regressions. I expect the large firms will exhibit some aspects of pecking order behavior and firm's financing deficit is less important in explaining net debt issues overtime for all firm sizes. I expect that Pecking Order Theory while intuitively appealing will not be supported empirically.

LAND USE IN REMOTE INDIGENOUS COMMUNITIES OF ECUADOR: SOCIAL, POLITICAL, AND ECONOMIC ISSUES

William Manning (Department of Economics)

Kimberly Contag, Faculty Mentor (Department of World Language & Cultures)

Globalization has had a profound effect on the people of Ecuador, especially the nation's indigenous population in remote areas. Not only has contact with western capitalism affected the land on which the people live, it has changed a culture that has been handed down for centuries. Western companies such as Texaco and Perenco have spearheaded the west's push into indigenous territories through their pursuit of resources and the profits they bring. They have shown little regard for the rights or well being of the indigenous population causing a wide range of social, psychological, and physical consequences. My research focuses on how specific indigenous communities like the Huaorani and Sarayaku have struggled with these consequences. The purpose of the project is to describe the issues that affect land use and to draw some conclusions about how the political, economic and social issues affect decisions for these remote areas of Ecuador. Remote communities like these do not always have access to the Spanish-speaking political and economic system in spite of recent changes to the Ecuadorian constitution meant to protect land use in these remote areas.

SENSORY EVALUATION OF BEEF JERKY

Mari Moffitt (Department of Family and Consumer Science)

Abbey Winkels (Department of Family and Consumer Science)

Joye Bond, Faculty Mentor (Department of Family and Consumer Science)

Sensory evaluation is a scientific method that objectively and subjectively analyzes consumer products. The food industry uses sensory evaluation to develop or improve food products. Once a product is approved from development to production, it is the job of those in quality assurance and quality control to maintain the integrity of the product. The purpose of this research was to use sensory evaluation to determine if consumers could discern a difference between two beef jerky products made with the same ingredients, but processed differently. The four flavors tested were Original, Teriyaki, Jalapeño, and Sweet and Spicy. A 9-point hedonic scale (where 1=dislike extremely and 9=like extremely) was used to determine the degree of liking of the color, flavor, and texture of both the test and control samples. Approximately 75 testers, recruited from MSU faculty, staff, and students, tasted each of the four flavors. Results of the paired t-test indicated there was no significant ($p > .05$) difference in preference between the control and test samples for Original, Jalapeño, and Sweet and Spicy jerky. However, testers significantly ($p < .05$) favored the Teriyaki jerky test sample over the control for flavor, color texture, and overall appeal. The research provided valuable information to the producing company about how changes instituted in processing affected the flavor, color, and texture of four of their beef jerky products.

RAISING RELATIVES CHILDREN: THE RELATIONSHIPS, STRESSORS AND METHODS OF COPING

Danielle Jones (Department of Family and Consumer Science)

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

In today's society, it has become common for individuals to assume the primary caregiving of their family member's children. But to commit to raising a relative's child can cause great stress and leave one feeling overwhelmed and unprepared to meet new and unexpected financial and emotional challenges. This qualitative study investigated the stresses and coping mechanisms that individuals used to handle these difficult situations. Data was collected through semi-structured focus group interviews with participants who attended a "Raising Relative's Children" support group at locations across the Minneapolis and Southern Minnesota region. Participants responded to questions about the relationship they have with the child, their relationship with the parents of the child, and their coping skills. Our findings show that while the respondents expressed great levels of stress and frustration, they also focused on the positive outcomes that resulted in their decision to raise the children. Caregivers voiced their experience of raising their grandchildren, nieces or nephews, or great-grandchildren, by countering every "negative with a positive" in describing their relationship with the children. Often the participants' relationship with their own children was strained and left them feeling confused, disappointed and angry. To cope with stressors, the caregivers turned to the support group, religion, and family members. This study merely scratches the surface and reveals the experiences of a growing section of the older-adult population. It also highlights a need for more support for individuals who decide to raise their relatives' children.

COMMERCIALS AND COLLEGE: THE NEGATIVE EFFECTS ON BODY IMAGE

Madeline Greene (Department of Gender and Women's Studies)

Megan Peters, Graduate Student Mentor (Department of Gender and Women's Studies)

Maria Bevacqua, Faculty Mentor (Department of Gender and Women's Studies)

It seems as if people can never escape the media and the images it produces. This is shown in relation to college students and their ability to be connected to the media, in some way or another, at all points of their every day life. Although the media has had positive effects on society such as serving as a source of news and educating the public nevertheless this study provides information demonstrating that the media, specifically the six commercials used in this study, have a negative effect on the body image of college aged women because it gives women an unobtainable and unhealthy image of how they should feel and what their bodies should look like. Through content analysis, interviews, and surveys, this study takes a deeper look at commercials and their direct correlation to the demise of college women's body image. While many campaigns aim to combat this epidemic, this study illustrates that college women are still subject to the negative effect of these ads and will continue to strive for an unrealistic body image. Throughout my research, I have found that it is not impossible to separate the images in the commercials from the thoughts of body image but in today's world, college aged women are less likely to do so. Despite the positive attributes the media has in regards to society, I argue that the negative effects the media has on women's body image, specifically college aged women, is too large an issue to ignore.

IN THE NAME OF HONOR

Sabaina Khurram (Department of Gender and Women's Studies)

Maria Bevacqua, Faculty Mentor (Department of Gender and Women's Studies)

Although honor killing is part of the culture in Pakistan and Turkey, it is a serious injustice against women. I will be watching a documentary about it and an actual film. I will use content analysis, looking for whether certain aspects of those cultures creates motives for honor killings, and if so, what these are. I expect reasons for these killings to come from how patriarchy dominates in these societies to the point that women are treated as second class citizens in their homelands. I also expect to find that they are treated more as the property of a man or family than a human being. While culture is an important motive, I also expect to find another motive- one that relates to bias in punishment for "honor crime". I will search for gender bias- men and women not being given equal punishment for the same crime. Also, I will see if fake honor killings are occurring as revenge for self-satisfaction. Culture can have a great impact on people. Because of this, I will see how these countries' cultures might affect their societies, creating ideals such as bringing honor, proving masculinity, and social pressures. All of these can lead to honor killing. I seek to gain a lot of knowledge of a sensitive topic, and lead to more research to fight against a "hidden" crime. We need to address this issue, because if culture is shown to influence motives that lead to honor killing, then many women can be given justice and punishment for the perpetrators.

EROSION CONTROL ALONG THE MNSU FITNESS TRAIL

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Katherine Dettmann (Department of Geography)

Forrest Wilkerson, Faculty Mentor (Department of Geography)

A \$7 million outdoor sports complex was constructed by Minnesota State University, Mankato in 2010. A new fitness trail occupies the perimeter of the complex. Through field observation, we noticed several areas where erosion threatens the integrity of the trail as it borders the edge of a ravine. Human land use changes induce gully formation and the erosion patterns present in gullies can be diminished with water retention obtained through bushes and trees. It is the goal of this project to employ such vegetative ground cover of indigenous, deep rooted, plants that will reduce water flow thus promoting slope stability and protecting the soil from erosion. Plants were chosen based on aesthetics and function such as abilities to mature quickly, spread easily, and thrive in shady conditions while requiring low maintenance. The Blue Star Juniper, with its weather tolerance and easy adaptation to well drained soils, provides a great example. Employment of a small, degradable, wooden grid may also be necessary for early soil fortification. In addition, more soil and mulch will aid in slope stability achievement that is necessary for the overall protection of the trail. We anticipate that this project will suppress gully forming soil erosion while adding beauty and protection to the trail as it was a significant investment for the University.

NATIVE PRAIRIE PLANT DISPLAY ON CAMPUS

Brandon Bohks (Department of Biological Sciences)

Jaydon Rueckert (Department of Geography)

Jeffrey Rosamond (Department of Geography)

Stacey Allen (Department of Geography)

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Forrest Wilkerson, Faculty Mentor (Department of Geography)

Using native plant species in landscaping projects has become a very popular approach in private, commercial, as well as public spaces. We are introducing four prairie plant species native to Minnesota which include little bluestem, purple prairie clover, prairie dropseed, and leadplant; to a designated site located behind gage towers along the walking path on campus. Our primary focus is to create an outdoor space that will have important environmental as well as aesthetic benefit, and to provide a learning opportunity for community members and students. Long and short term monitoring and evaluation of this project will be assessed by future biogeography students; to ensure the ecology of the site is stable. Sufficient data will be provided to help develop future landscaping plans that can then be implemented in other areas on and off of campus.

AN ANALYSIS OF ALBEDO AND ABSORPTION OF SOLAR RADIATION IN REGARDS TO THE URBAN HEAT ISLAND EFFECT, VEGETATION, AND POTENTIAL ENERGY USE

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Forrest Wilkerson, Faculty Mentor (Department of Geography)

Texas' heat wave during the summer broke many all-time highs, including 70 plus days of temperatures above 100 degrees. Most of the problems that occurred were exacerbated by the urban heat island effect and the decline of vegetation. An Urban Heat Island has many different aspects which include trapped long wave radiation, the albedo of the surface features (darker surfaces absorb more energy), and evapotranspiration of vegetation. Research has been conducted on the Urban Heat Island effect as early as 1833 (Howard, 1833). Due to these pressing issues we have decided to research cost effective solutions to the urban heat island effect. We chose the city of Dallas as our project site because it resembles many cities in the United States and around the world; given the population size and diversity. Using geographic information science (GIS) and remote sensing, we will give reasons to modify roof/surface color and increase vegetation to reduce overall temperature and increase reflectivity. Our goal is to give a solution that is cost effective, improve overall health, and helps the environment. The final results will be presented at the Symposium.

MINNESOTA NATIVE PLANT GARDEN ABSTRACT

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The development of urban areas is an ongoing process resulting in the displacement native plants and landscapes. Landscaping projects in these areas often use non-native plants, the introduced plant species can cause unforeseen damage to the ecosystem and might not be well suited to the extreme weather of Minnesota. Our project is a small decorative garden on campus that will assess the landscaping qualities of various native Minnesotan plant species. Plants used were chosen for their aesthetics, ease of maintenance, and native distribution. Future Biogeography classes at MNSU will monitor the results of the project as well as perform necessary upkeep.

EFFECT OF DYNAMIC WARM UP AFTER AN ACUTE BOUT OF STATIC STRETCHING ON KNEE FLEXION ISOKINETIC TORQUE PRODUCTION

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Static stretching prior to physical activity purportedly increases muscle compliance decreases elasticity resulting in reduced power performance. Prior investigators have used a change optimum angle of torque production (Θ_{opt}) as a surrogate measure for change in muscle compliance. The purpose of this study was to peak torque and Θ_{opt} of the hamstrings (i.e., knee flexion) in response to static and dynamic stretching. Subsequent to a familiarization trial, 14 collegiate football players performed a 5 minute, cycle ergometer warm up and a pretesting isokinetic bout of each knee at 60 deg/s for a total of 5 repetitions. In counterbalanced order, subjects performed either a static or dynamic stretching protocol (4 X 30 seconds). After a 3 minute rest, the subjects completed a posttesting isokinetic bout. Data (every 10 msec) were exported to tab-delimited text files and evaluated manually to determine peak torque and Θ_{opt} . No differences in peak torque from pretesting (147 ± 28 Nm) to posttesting (151 ± 24 Nm) were observed between dynamic and static stretching ($F=3.07$, $p=0.90$). Similarly, no differences in Θ_{opt} (~ 34 to 36°) were observed between dynamic and static stretching ($F=0.23$, $p=0.88$). Similar typical errors between repetitions, at pretesting and posttesting, were observed (~ 5 to 9° , 17 to 27%). Our results demonstrate that static stretching does not alter peak torque production. Moreover, the similarity of the Θ_{opt} data refutes the hypothesis that static stretching adversely affects muscle compliance and elasticity, a result that is contrary to the dogma that static stretching reduces power.

EFFICACY OF AN INTERVAL PROGRAM TO SELECTIVELY DEVELOP CRITICAL VELOCITY OR ANAEROBIC CAPACITY

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The critical velocity (CV) model identifies an athlete's CV, analogous to their maximal aerobic steady state, and their anaerobic work capacity (D'). The CV concept is a technique for establishing the velocity-time (V-t) relationship of the severe exercise domain, where the D' represents the finite capacity for work $>CV$. The 3-min all-out exercise test (3 MT) has emerged as a technique for estimating CV and D' . In soccer, there is a need for both an aerobic base (i.e., CV) along with an ability to sprint repetitively (i.e., D'). We have recently devised a 3 MT that readily identifies CV and D' with GPS and can be used to prescribe interval training. We sought to adapt this test for indoor running using digitized video on 20 female, collegiate soccer players. We divided the team into two groups identified to improve deficiencies in either CV or D' , respectively. Each group completed seven interval training sessions over a four week period at identical percentages of depletions of D' but at different V-t limit durations. For example, the group working to improve their D' ran shorter intervals at higher velocities. Telemetry heart rate (HR) was recorded and downloaded from all athletes, and for each workout. The HR data from each workout achieved progressively higher values after each interval completed, a characteristic of individuals exercising above CV. Post assessment of the all-out test will be evaluated to determine the efficacy of the program.

“JUST PLAIN INACCURATE”: ENSURING THE ACCURACY AND DEPENDABILITY OF THE BIOELECTRICAL IMPEDANCE ANALYSIS (BIA) DEVICE IN THE HEALTH FITNESS INDUSTRY

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Despite years of research by health practitioners, much of the understanding and testing equipment has not been done on newer models of equipment. Since the development of assessing the body, and its composition; health professionals try to make their assessments as accurate as possible. These numbers have been so commonly accepted that most never stop to question their accuracy and validity. Most individuals don't understand the processes that were used in making the equipment, therefore making it difficult to understand the devices and their assessments rationally. As a health professional, I personally have administered hundreds of body composition tests with a plethora of individuals from all body types. This led to my hypothesis that one of the most commonly used devices on the market today (BIA \$50.00 retail value) can be incredibly inaccurate because of how it's used. The research done was performed on 66 individuals with the BIA, and 13 of these individuals were also measured using the BOD POD (Air Displacement \$50,000.00 retail value). Comparing the results has confirmed my hypothesis that the current method of administering the BIA should be modified to increase accuracy. Using the BIA, some individuals tested up to a 37% difference in fat mass simply by changing their way of holding the device. For many people, this difference easily stratifies them from healthy categories, to dangerous categories of body fat. This can play a destructive role in their lives, and not the helpful role that the assessment is intended for.

THE CULTURAL SURVIVAL OF DAKOTA PEOPLE

Tiffany Ranweiler (Department of English)

Gwen Westerman-Wasicuna, Faculty Mentor (Department of Gpi rkuj)

As a citizen of Minnesota one should be able to take pride in it's past and present state. The Dakota inhabitants were mistreated for a portion of our history, which has led to a cultural trauma that has gone understudied throughout the years resulting in ignorance, disrespect and mistreatment of one of Minnesota's unique cultures today, the Dakota people. I intend to shed light on what the Dakota people struggle with today and the events that led to such struggles.

I researched the topic using a variety of media such as books, historical newspapers, scholarly articles, memorandums and the Internet to find to support my research. I also conducted multiple interviews with Dakota people of different ages to grasp how Dakota people perceive their cultural situation today.

I have found that through cultural removal, misrepresentation, lack of education and manipulation Dakota people have been formed into subhuman beings that are foreign even to fellow Minnesotans, which has led to a feeling of cultural trauma and a disconnect within our state.

The repercussion of such treatment has led to a lack of communication and therefore understanding. We need to start communicating with each other; Dakota people are willing to talk to those that are interested. Dakota people exist outside of history books, they are here today and they are just people, another unique culture that makes up Minnesota, the only way to break the stereotypes is to become informed and we can do it together.

COLLEGE STUDENT'S ELECTRONIC REPLACEMENT PROPENSITY: THE WHEN, HOW AND WHY

Lindsay Bertolino (Department of Marketing)

Kristin Scott, Faculty Mentor (Department of Marketing)

With technology advancing rapidly, electronic usage and disposal are increasing at alarming rates. Due to toxins located within electronic devices, disposal of such devices could create a damaging impact on the environment. Because of this potential negative consequence, it would be beneficial to encourage consumers to keep their products as long as possible before disposal and then dispose of them in a sustainable manner. To accomplish this, researchers must understand what influences the life-span and disposal of electronic products. This study aims to investigate this question by measuring electronic replacement propensity and the factors that influence it. Specifically, the study aims to answer the questions: How long do students expect their electronic products to last? What influences them to dispose of them? And how do they dispose of their electronic products? To examine these questions, an on-line survey was developed and administered through Survey Monkey to 80 MNSU students. Survey questions included both open-ended and Likert scale to measure replacement propensity, frugality, product life-span expectations, and demographics. Results show that the median product life span expectations are as follows: cell phones- 2 years, televisions- 8 years, MP3 Players-5 years, and computers-5 years. The data collected also shows a negative correlation between a student's frugality and their replacement propensity in addition to a negative correlation between a student's stewardship and their replacement propensity. These results will help researchers better understand college student's motives for replacing their electronic devices and how often they do so.

LOOKING BACK TO LOOK FORWARD: DEVELOPING AN INNOVATIVE TYPEFACE

Ian Roberts (Department of Art)

Matthew Willemsen, Faculty Mentor (Department of Art)

From research of historic typefaces and over 1000 primary documents at the Klingspor Museum, including sketches, notes, books, and posters found at the archive, I developed a typeface that doesn't start from the ground up as New Typography did but instead uses elements connected with craft while not completely denying the machine or modernity. This project has impacted my views of design by furthering my understanding of typography, design movements, and the interchange between the two. I feel as though my knowledge will be a benefit to myself, the MNSU campus and to the professional graphic designers I have made connections with. The innovative typeface developed from this experience and research is a testament to the craft of typography and machine aesthetics of design.

THE RELATIONSHIP BETWEEN SOCIAL MEDIA USE AND CONSUMER BRAND ENGAGEMENT

Joshua Stein (Department of Marketing)

Kristin Scott, Faculty Mentor (Department of Marketing)

The use of social media by businesses as a communication tool has grown rapidly in recent years. Despite this rapid adoption, little is known about the use of social media among consumers and its effect on brand behavior. This research study aims to fill this gap by investigating the relationship between social media use and consumer brand engagement. To conduct this research, an on-line survey was administered through Survey Monkey to 60 undergraduates ranging in age from 18-24 through a snowball method. Survey questions included; extent of social media use, willingness to engage with brands, views on online vs. offline retailers, and demographic questions. Results showed that 73.3% of respondents interacted with a type of social media on a daily basis and that the primary social media used was “to keep in touch with friends”. Respondents indicated that they were more likely to engage with a brand using social media when they were extrinsically rewarded (coupon, gift card, etc.) by a company. Also, there was no significant difference in views of online vs. offline retailers. Results of this study will help businesses use social media more effectively and increase participation by consumers. Despite the wide use of social media among college students, future research should extend this demographic to older populations and include comparisons among the different generations. Future research could also include more specific real world examples, to give less active social media users a feel for the benefits and/or complications of using social media to engage with brands.

HOW DO SOCIAL MEDIA AFFECT NEWS GATHERING?

Grace Webb (Department of Mass Communication)

Amy Lauters, Faculty Mentor (Department of Mass Communication)

In this age of ubiquitous technology, the traditional practices of journalism are changing. News gathering isn't done entirely in person anymore; journalists make use of the internet and other technology to supplement their stories. My research project focuses on (1) how social media affect news gathering compared to traditional news gathering and (2) how journalists can learn to use social media to gather information more effectively. I realize journalism has changed greatly throughout the years. Reporters no longer interview sources in person, scribbling down notes on notepads. Now, journalists sometime conduct lengthy interviews entirely through e-mail, without ever seeing their sources. I want to see how this can be taken even further through social network sites such as Facebook.

I plan to interview professional journalists who've been in the field for several years and ask them questions about how social media have changed the way they gather news. I will ask them how they started gathering news and interviewing sources and then ask them how their journalism practices have changes in light of new technology. In addition, I want to ask them how they would suggest younger journalists make use of these new technological outlets to gather news and information more effectively. My hope is to find ways for journalists to become more effective in their field. I will present my findings to the public at the MSU Undergraduate Research Conference and also publish an article in a journalism journal.

HAVE YOU WASHED YOUR HANDS?: A STUDY OF HANDWASHING PRACTICES AMONG NURSES WORKING IN THE NEONATAL INTENSIVE CARE UNIT

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Emily Cox (Department of Nursing)

Sarah Bagshaw (Department of Nursing)

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Marcia Stevens, Faculty Mentor (Department of Nursing)

Neonates are extremely vulnerable when exposed to pathogens due to their immature immune systems. Newby (2008) recognized that infection rates in NICU's vary from 6% to greater than 40%. Previous studies also suggest there is a correlation between poor hand hygiene practices and increased rate of infection in Neonatal Intensive Care Units. This leads to poor health outcomes and increased length of stay as well as increased healthcare costs.

Study Purpose: The purpose of this study will be to examine what barriers nurses working in a neonatal ICU encounter when washing their hands. In addition handwashing practices will be examined.

Design: This study will use a focus group design. Participants will be asked semi-structured interview questions

Setting: 3 Neonatal Intensive Care Units in the Midwest.

Sample Size: Approximately sixty nurses.

Method: Data will be collected during 4 focus groups.

Data analysis: The researchers will independently code and categorize the manuscript data. The researchers will meet to arrive at a final consensus of the independently categorized data to arrive at comprehensive conceptual themes.

THE EFFECT OF SIMULATION EXPERIENCES ON THEORY COURSE GRADE IN OBSTETRICAL NURSING

Yemesrach Mengesha (Department of Nursing)

Angela Christian, Faculty Mentor (Department of Nursing)

Background: Although making an error is common to the human behavior, when these errors affect patient care, it can be detrimental. Every year in America, at least 1.5 million individuals are injured due to medication errors (John Hopkins University (JHU), 2012). The estimated cost of these errors is \$3 billion dollars annually and there are as many as 7,000 people who die from medication errors, annually (JHU, 2012). One of the top reasons listed on what contributes to medication errors is: new graduate nurses (Journal of Clinical Nursing, 2007). Multiple studies have revealed that simulation may enhance the competency levels of new nurses which ultimately could reduce medication errors. This purpose of this study was to explore simulation experiences and the impact on the theory course grade of students in obstetrical nursing.

Methods: Nursing students (N=40) were randomly assigned into two groups: intervention and control group based on the clinical instructor they had previously selected. The control group was taught using conventional clinical teaching methods, while the intervention group used conventional clinical teaching adjunct with simulation experiences and interactive modules. The theory course grades of both groups were compared.

Results/Conclusions: The theory course grade of the intervention group was significantly higher than the control group. This study concurs with previous studies that revealed the effectiveness of simulation experiences on new nurses. This study supports the use of simulation as an effective teaching approach which could eventually reduce medication errors made by new graduate nurses

WHAT FACTORS INFLUENCE BACK PAIN IN NURSES

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The purpose of this study is to determine the incidence and factors that influence back pain within the nursing profession. Back pain decreases work productivity and quality of life. Many factors influence back pain including: age, gender, smoking, poor body mechanics, stress, education level, nursing department, and long periods of standing.

The design of the study is a quantitative correlational study. Sample size will be 500 nurses recruited from the Minnesota Nurses Association (MNA). The study method will be a two-part survey. Part one focuses on demographics and part two is a Likert Scale assessing perception of back pain. Data analysis will be performed using a statistical function within Microsoft Excel.

USING NURSE LED YOGA MEDITATION TO QUIET THE MIND: AN INTEGRATIVE THERAPY TO REDUCE HOSPITAL READMISSION RATES IN PATIENTS WITH A DIAGNOSIS OF SCHIZOPHRENIA

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Purpose

Approximately 2.2 million people in the US have schizophrenia. It is considered one of the most disabling psychiatric disorders; its treatment utilizes an unbalanced share of mental health services. This study examines a non-pharmacological approach to helping patients with this condition.

Significance

Traumatic and stressful events commonly trigger the onset or worsening of psychotic symptoms in individuals with schizophrenia; interventions that improve an individual's ability to cope and decrease anxiety have been useful in managing these symptoms. The practice of yoga works in three ways to influence perception: it heightens perceptual sensitivity, it works to selectively exclude undesirable stimuli, and it changes distorted ideas or understanding, which often occurs in schizophrenia. Demonstrating the effectiveness of an additional intervention of nurse led yoga-meditation to traditional group-home therapy for individuals with a diagnosis of Schizophrenia.

Study Question

Can the addition of an alternative therapy to conventional treatment reduce readmission rates for individuals with a diagnosis of Schizophrenia?

Design

This study will be a quasi-experimental quantitative study that will have 300 randomized participants who currently live in group homes and have a diagnosis of Schizophrenia. All of the participants will currently be participating in conventional therapy, including skill building and medication management. 150 participants will be assigned to the experimental group and will participate in yoga-meditation in addition to their conventional therapy. At monthly intervals, the group home staff will be sent a survey, through Survey Monkey, focusing on psychosis-related hospital readmissions of the participant(s) in their residence.

ARE NURSES THE KEY FACTOR IN SAVING PATIENTS FROM A CRISIS?

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Kortney Schmitz (Department of Nursing)
Michelle Brunn (Department of Nursing)
Jill Smith (Department of Nursing)
Diane Witt, Faculty Mentor (Department of Nursing)

Purpose: The study purpose is to examine the benefits when an RN takes the vital signs which leads to an earlier recognition and interpretation of the patient's condition, rather than delegating the task to a PCA (James et. al., 2010).

Background: PCAs are trained to take vital signs, but not to assess and interpret the data gathered (James et. al., 2010). There is evidence that shows that undetected patient deterioration can lead to a worsening condition.

Method: Two medical surgical floors at the same hospital will be used to study the difference between RNs and PCAs taking vital signs.

Data Collection/Analysis: Information gathered will be processed through a computer database, including close-ended questions to focus the research.

Hypothesis: When RNs take vital signs themselves, rather than delegating the task, there will be accelerated interpretation of the patient's change in condition leading to better patient outcome.

HEALTH CARE PROVIDERS INFLUENCES ON WHETHER OR NOT THEY USE PERSONAL PROTECTIVE EQUIPMENT

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Background: Personal protective equipment (PPE) is any type of face mask, glove, or clothing that acts as a barrier between infectious materials and the skin, mouth, nose, or eyes (mucous membranes). Infection rates can be directly incorporated with non adherence and disobedience to the use of PPE. The lack of compliance and use of PPE can result in great danger to patients, hospital staff and community members.

Purpose: Examine the correlation between job title and experience with the use of PPE during the care of patients in a hospital setting and outside of the hospital.

Method: This qualitative study has interviews and will be completed at 5 rural hospitals and 5 urban hospitals in Minnesota. Data will be collected on multiple specialties. Study will focus on how the professional position and educational level of the staff impacted the use of PPE during patient care.

Analysis of data: Interviews will be recorded and transcribed. Transcripts will be analyzed by the individual team members after which consensus will be achieved on codes and themes.

PATIENT SLEEP PATTERNS: UNDERSTANDING PATIENTS' PERCEPTIONS OF NURSING ASSESSMENT TIMES AND INTERVENTIONS DURING SLEEPING HOURS

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Abstract: Purpose: to determine if changing the nursing assessment times would decrease disturbances in the patients' sleep cycles and therefore promote sound sleep in patients. Background: currently nurses perform mandatory routine assessments and frequent nursing interventions that may disturb the rehabilitation patients' sleep cycles. Rehabilitation patients in long term care facility may suffer from sleep deprivation as a result of these assessments and their recovery time may be extended. Sleep preserves energy and promotes restoration and is important for recovery and rehabilitation time. Method: this study will use a mixed method. Over a three month time period 6 rehabilitation patients and their family members will be interviewed; additionally structured surveys will be conducted.

Analysis: Interviews will be analyzed by determining themes in addition to statistical analysis of surveys.

NURSING BURNOUT AND HOW IT AFFECTS THE QUALITY OF PATIENT CARE AND PATIENT SATISFACTION

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Christine Cullen (Department of Nursing)
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This study will be investigating the affects of nursing burn out on the quality of patient care and patient satisfaction. Recent studies have indicated the nursing profession as a highly demanding job with high expectations. More than one in five nurses say they plan to leave their current job within one year. (Vahey, Aiken, Sloane, Clarke & Vargas, 2004)Nursing burn out is significant in that it often leads to increased employee tardiness, absences, decreased performance and high rates of turnover. As a result patient satisfaction is reduced and patient outcomes are poorer. In order for patient status to improve, they must achieve a trusting relationship with their care team. The goal of this study is to prove that nursing burn out has a direct negative effect on the quality of patient care. We plan to prove this through direct observation of nurse-patient interaction and by surveying patients about their level of satisfaction with their nurse.

THE PERCEPTION OF AFRICAN AMERICANS TOWARDS HIV/AIDS AND ITS TRANSMISSION

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According to the Center for Disease Control and Prevention (CDC), even though African Americans make up about 12% of the population, they accounted for 44% of all new HIV infections in 2009 (CDC, 2009). The devastating and infectious nature of HIV/AIDS among African Americans makes it an important public health issue. The purpose of this study is to gain insight into the perception of this population towards HIV/AIDS and its transmission. This will serve as a first step towards future studies that will focus on why there is a disproportionately higher rate of HIV/AIDS within the African American population and if the perception of HIV/AIDS in this population will in any way contribute to the disproportionately higher rate of this disease.

Data Collection: Data will be obtained using series of four focus groups interviewed, over an hour and half time period per group, until saturation is achieved. The focus groups will consist of two groups of men and two groups of women in different age categories – 16 to 30 and 31 to 60. Participants that meet these requirements will be recruited within the African-American community. Each group will consist of eight participants; confidentiality of participants will be maintained by assigning fictitious names.

Analysis: Responses will be recorded and transcribed after each focus group. Three individuals will be coding the responses and a consensus will be reached afterwards. The codes attained will then be put into different categories and themes for further analysis and result.

WATER CRISIS OF SUB-SAHARAN AFRICA AND ITS EFFECTS ON WOMEN

Mellisa Xiong (Department of Political Science)

Abdalla Battah, Faculty Mentor (Department of Government)

By 2030 almost half of the world's population will be living in water stressed areas and to no one's surprise sub-Saharan Africa holds the largest number of water stressed countries compared to any other region today. This research concentrates on three types of water crisis issues of sub-Saharan Africa: polluted water, access to safe drinking water and water scarcity. Since women are natural providers for their families they will be emphasized more with an overview of how water scarcity affects women and their livelihoods. A significant finding is that sometimes it takes women the whole day to find drinkable water as they travel on feet walking miles away from their village. Although water is running short for some countries, it does not imply that water is not there. The means of obtaining it can be costly since certain tools are required like when fixing a village well. Finding a solution to accessing drinkable water could mean that women will have more time seeking other objectives such as jobs and education. Unsanitary water also poses an issue as it leads to health diseases and poor hygiene. I have found this research to be a continuous effort made in hope that others could use it to fulfill some of their studies, and even though water is scarce it is possible for people living in sub-Saharan Africa to collect drinkable water with the assistance of funds coming from humanitarian organizations. Methods of sources used were mainly academic journals, official websites of organizations familiar with woman and water scarcity, and scholarly publications from non-governmental organizations.

PERSPECTIVES OF PRE-SERVICE AND IN-SERVICE SPECIAL EDUCATION TEACHERS ABOUT HOMEWORK INTERVENTIONS

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This purpose of this study was to integrate the research on empirically supported strategies for improving homework with the perspectives and attitudes of teachers who are expected to implement such strategies. Primary focus was on gathering and summarizing descriptive statistics of the types of interventions used for specific student populations throughout K-12 education. Data were obtained from graduate students enrolled in the Special Education program at Minnesota State University. Participants were asked to specify the types of homework support strategies they have implemented and indicate those students they think will benefit most from the particular strategies. Finally, participants were asked about their willingness to implement different strategies and their estimates of both the feasibility and barriers to implementation. It is hypothesized that only a subset of empirically supported strategies will be considered for use by in-service teachers. Also, it is expected that different strategies will be judged to be applicable to different grade levels of students requiring accommodations (e.g., kindergarten through fifth grade versus sixth through eighth grade versus high school students). Providing a list of commonly implemented strategies for homework problems will help teachers and other educational professionals incorporate standard practice concepts with best practice.

INTUITION OVERRULES LOGIC WHEN DETECTING DECEPTION

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Chelsea Schmillen (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

When listening to a story that may be a lie or a truth, it seems we should use logic to detect the lie. However, previous studies show that relying on your intuition may be a better practice when distinguishing between a lie or a true story (Albrechtsen, Meissner, & Susa, 2009). The purpose of this current study is to find if participants are able to implicitly and/or explicitly distinguish between truths and lies. Seventy-one students volunteered to participate in this study. These participants watched sixteen short video clips that featured a person telling either a true story or a lie. The participants rated whether the story was true or not, and also rated the individual on how likeable and trustworthy he or she was as well as their willingness to work on a project with that individual. Our results showed that participants did no better than chance at overtly distinguishing between lies and truths; however, the participants were intuitively rating the truth tellers significantly more likeable and more trustworthy than the liars, and they were more willing to work with the truth-tellers (all $ps < .05$). Many people may try to use logic and common sense when detecting a lie, rather than relying solely on their gut feelings. However, our findings suggest that if you use your intuition, you may be better at detecting deception. These findings may be beneficial to many professions including crime investigators and social workers as well as in jury deliberations and every-day social situations.

PSYCHIATRIC PROFESSIONAL BELIEFS REGARDING DISSOCIATIVE IDENTITY DISORDER

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Dissociative Identity Disorder (DID), previously known as Multiple Personality Disorder, continues to be a highly controversial diagnosis. Controversy may arise due to differing opinions, perceptions, and observations of DID symptomology. The current study sought to examine the skepticism of the DID diagnosis in psychiatrists for a 10-year re-evaluation of the prevalence of skepticism, prevalence of psychiatrists' beliefs about DID as sociocognitive or posttraumatic in origin, and the relationship between skepticism and origin model. Nine hundred licensed psychiatrists were contacted for participation with 120 responders. Results indicated that almost half of respondents indicated some level of skepticism regarding the clinical diagnosis of DID, though the majority endorsed the posttraumatic model of symptoms. Further, those endorsing the sociocognitive model of DID reported significantly more skepticism regarding the disorder.

SURVEYING COLLEGE STUDENTS WITH DISABILITIES ABOUT THEIR PERCEPTIONS OF TEST ACCOMMODATIONS

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Test accommodations are commonly defined as a change in testing materials or procedures that enables students with disabilities to participate in assessments in ways that reflect their skills and abilities. The purpose of test accommodations is to change the way the test is administered to correct the disadvantage for a higher score caused by a disability. Accommodations are commonly utilized by college students who have a documented disability. However, little research has focused on the perceptions of college students regarding test accommodations. Sanz (2011) reported college students perceived test accommodations to be somewhat unfair. Unfortunately, very few students with disabilities participated in the previous study. Therefore, the purpose of this study was to learn more about college students with disabilities and their perceptions of test accommodations. Students eligible to receive test accommodations through the Office of Disability Services at Minnesota State University, Mankato were recruited. Participants completed an online survey asking questions about their perceptions of test accommodations for various types of assessments. Results of this study will be compared with the results from Sanz (2011). Similarities and differences between the two studies will be discussed. Findings will provide a better understanding of the perceptions of students with disabilities regarding test accommodations. Modifications can be made to preexisting accommodations to provide an increased benefit for students with disabilities.

PRE-SERVICE TEACHERS' KNOWLEDGE OF SELECTIVE MUTISM

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Selective mutism is characterized by refusal to speak in specific social situations in which there is an expectation for speech (American Psychiatric Association, 2000). The aim of this project was to ascertain pre-service teachers' knowledge about selective mutism. It was hypothesized that teachers know very little about this topic because the current prevalence rate is under 1%. This reported statistic is thought to be lower than the actual prevalence rate because individuals working within the school setting are unfamiliar with this childhood disorder. Therefore, it is important to raise awareness on this subject so that students with selective mutism may be identified and referred for treatment by their teachers. Selective mutism has been reported to be easily treatable. Undergraduate students enrolled in the College of Education at Minnesota State University, Mankato completed an online survey pertaining to selective mutism, including characteristics that children with the disorder may exhibit, warning signs or symptoms, effective treatments, and its prevalence rate. Descriptive analyses were conducted on the pre-service teachers' responses. Implications and areas for future research will be discussed.

HOW SUPERSTITIONS AFFECT CRITICAL THINKING IN COLLEGE STUDENTS

Daniel Spencer (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

It would be difficult to find an individual who doesn't value critical thinking; colleges across the country aim to teach students how to use it in everyday life. One of the merits of critical thinking is that it can measure the validity of claims made by various groups. Researchers (McLean & Miller, 2010) have examined how critical thinking abilities relate to beliefs about the paranormal, but we need to know more about how superstitions and paranormal beliefs influence how students think. Critical thinking may be high in some areas while never being applied to others. For instance, do people who have superstitious beliefs avoid analyzing them because they are "off limits" or do they simply lack critical thinking ability? Superstitious beliefs may also relate to GPA, study habits, and beliefs about intelligence. In the current study, forty-five participants completed a survey with questions about their attitudes toward school and studying, GPA, and levels of superstition. All participants also completed two critical thinking tests, one focused on psychology, and one assessing general critical thinking abilities. Critical thinking abilities negatively related to levels of superstition ($p < .05$), meaning that highly superstitious participants scored lower on the critical thinking tests. This poster will present complete results of how superstition and critical thinking abilities relate to other attitudes and beliefs about school and learning. This study is important because it reveals the strength of superstitions, how they relate to age and participants' beliefs, and whether they interfere with academic learning.

EXAMINING COLLEGE STUDENTS' LEVEL OF EROTOPHOBIA AND EROTOPHILIA

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This study aimed to examine general sexual attitudes of college students by assessing the participants' level of erotophilia and erotophobia. The purpose of collecting the data was to assist in data analyses of a primary study on perceptions of sexually explicit instructional therapy videos that will be conducted at a later date. By having data reflecting general sexual attitudes of the campus population, potential floor or ceiling effects found in the future perceptions study will be better understood and taken into consideration when discussing the findings. Undergraduate student participants ($N=363$) completed the Sexual Opinion Survey through an online data collection system. The results indicated a normal distribution of scores on the erotophilia-erotophobia spectrum, which suggests diversity of sexual attitudes among participants. However, within a normal distribution there was a significant gender difference with female participants reported higher levels of erotophilia than male participants. The results counter previous research on college students' sexual attitudes, where a higher level of erotophilia among men is consistently reported.

DO TEACHER'S PERCEPTIONS ABOUT STUDENTS WITH EBD BEGIN DURING THEIR COLLEGE EDUCATION?

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Previous research indicates three factors that demonstrate the presence of an emotional behavior disorder (EBD) according to Huessey (1992): lack of self-control, emotional hypersensitivity, and impulsivity. Educators play an important role in the development of children with EBD. Unfortunately, over 50% of teachers surveyed, who worked with students with EBD, planned to leave their positions within the next five years (Adera & Bullock, 2010). For this reason, it is important to examine teachers' perceptions regarding children with EBD in order to promote teacher satisfaction and lower stress and burnout. The current study surveyed pre-service teachers attending Minnesota State University, Mankato. Surveying this population is ideal because their future career aspirations will likely include contact with students with EBD. Participants completed a survey containing questions about the participant's current perceptions of students with EBD. Means, standard deviations, and frequency distributions will be calculated and compared to previous research. These results will contribute to the current research pertaining to educators' perceptions of students with EBD. This study will reveal current perceptions in the pre-service teacher population, and contribute to identifying where and when the perceptions arise. Results can be used to determine how to improve teachers understanding of students with EBD and encourage better work environments for teachers who work with these students.

AN OBSERVATION OF COMMAND USAGE AMONG INTERACTIONS BETWEEN POLICE OFFICER AND CIVILLIAN

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Interactions between police officers and civilians can quickly become dangerous for both themselves and bystanders, particularly when communication is not clear. Therefore, it is imperative that research determine the most effective communication styles to increase compliance and reduce or possibly prevent encounters from becoming dangerous. One way language can be modified is when giving commands. They should be clear (alpha commands) instead of vague (beta commands). Research has shown the types of commands given impacts the rate of compliance for children in home and school settings, in stressful police situations, and with elders diagnosed with dementia living in assisted living facilities. Previous research has shown that in general, beta commands are associated with a higher instance of physical aggression, emotional distress, and non-compliance. The purpose of the current study was to see if staff used more beta commands when the situation began to escalate as was found in previous research on police interactions. The study was completed by observing archival videos of interactions between police officers and civilians in St. Louis, Missouri. The data has been collected and is currently being analyzed to determine if command types had an effect on compliance in these highly stressful situations.

IN ONE EAR AND OUT THE OTHER: THE CORRECTION OF PSYCHOLOGY MISCONCEPTIONS AND OUR MINDS RESISTANCE TO IT.

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Samantha Bergmann (Department of Psychology)

Sarah Lewer (Department of Psychology)

Karla Lassonde, Faculty Mentor (Department of Psychology)

We are constantly being overwhelmed with information through media. While this has heralded a new era of research and advancement, the information we learn isn't always correct. Knowledge permeates the general population, and students often apply learned general misconceptions to their field of study. In previous studies, we assessed psychology students' knowledge of 50 misconceptions. Students with more experience in the major correctly identified misconceptions as "false" compared to introductory psychology students, but still held many to be true. The goal of the current study was to evaluate the effectiveness of a method of knowledge revision for misconceptions. Misconceptions were elaborated upon in a series of 24 texts and in each text a misconception was either directly stated as incorrect or not. The time it took participants to read outcome sentences containing refutation information, or only description information and no refutation, was recorded. Participants took longer to read outcome sentences following passages that didn't contain a refutation compared to those that did. Thus, the refutation texts served to compete with prior knowledge about the misconception in memory and readers had less trouble processing the outcome sentence when it was contradictory to the misconception. Additionally, participants took a pre-test assessing their knowledge for the misconceptions before reading and a post-test after reading the passages. When the assessments were compared, the average difference in score was 10.57, suggesting a positive influence of the refutation texts on knowledge. These findings can be applied and used to inform learning in the classroom.

COLLEGE STUDENTS' PERCEPTIONS AND MISCONCEPTIONS ABOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER

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Between 3 and 7 percent of children have been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) (American Psychiatric Association, 2000), with even higher estimates of those children continuing to have symptoms into adolescence and adulthood. As this diagnosis becomes more prevalent it is affecting a greater number of college-age students; therefore, this study aimed to discover the perceptions and misconceptions college students have about ADHD. In addition, this study examined the perceptions and misconceptions of the legal and illegal usage of ADHD medications. College students with and without ADHD completed similar questionnaires regarding their views on this topic. Results have been analyzed to determine if any statistical significance has been found regarding the students' perceptions and misconceptions of ADHD. Results from this study have also been compared to the results from a previous study involving middle and high-school students. Implications and future directions will be discussed.

LAPTOPS IN THE CLASSROOM: EVALUATING THE POTENTIAL BENEFITS OF TECHNOLOGY AGAINST DISTRACTIONS

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Maria Almoite (Department of Psychology)

Kayla Scott (Department of Psychology)

Karla Lassonde, Faculty Mentor (Department of Psychology)

Students in college face a decision of bringing a notebook with them to a lecture or to use a laptop for taking notes. Many students opt to bring their laptop with them to class lectures, but there are teachers that oppose laptop use in the classroom. Laptop use in classrooms has sparked a debate in the teaching community about the advantages and disadvantages (e.g., distractions) of using laptops in the classroom. To shed light on the possible utility of laptops in the classroom, the goal of the study was to determine if there is a difference in text comprehension when participants write text content on paper or if they type it on a computer.

Participants read two short passages of informative text. As they read, participants copied the passages either onto a notepad by writing, or by typing on a computer. After copying the passages, they were asked a series of comprehension questions pertaining to the passage. The participants were also given the Gates-MacGinitie (4th ed.) reading skill test and a short typing assessment. We found no reliable differences on the comprehension questions between the writing and typing conditions. This outcome does not indicate a bias for one method of copying text over the other. We are currently working on a second study that follows the same procedure except participants are asked to take notes either on paper or a computer. This method is likely to more authentically represent note-taking students do while reading a text or in lecture.

DETECTING DECEPTION: STUDYING THE CUES PEOPLE USE TO DISTINGUISH BETWEEN TRUTH-TELLERS AND LIARS

Amber Schramm (Department of Psychology)

Emily Stark, Faculty Mentor (Department of Psychology)

Previous research has found that although people are generally not accurate at detecting deception, when people are forced to process videos or stories intuitively, they are better at distinguishing between lies and truths (Albrechtsen, Meissner, & Susa, 2009). The current study incorporates an open-ended measure to learn more about what types of specific cues influence participants' judgments of lies and truths. Seventy-one participants viewed 16 video clips, some truths and some lies. Participants were then asked to determine whether the video clip was a truth or a lie and to write down any deception cues they noticed that helped them make their decision. Some of the categories used to code these cues include: non-verbal, verbal story content, overall tone, delivery, and emotional delivery. Participants also responded to a scale measuring the extent to which they rely on intuition when making judgments. Results show that overall accuracy for lie detection is not significant, consistent with previous research. As we complete the coding of the cue listings, we expect that those who are more accurate in lie-detection will notice more deception-relevant cues than participants who are less accurate at lie detection, and that participants who rely more on intuition will be more accurate in detecting lies. This research combines individual difference measures of use of intuition, along with open-ended assessments of the cues that participants use, which has not yet been done in previous research, and will help us to learn more about how people distinguish between lies and truths.

INVESTIGATING RACIAL STEREOTYPES FOR AFRICAN AMERICANS WITH A NEW IMPLICIT MEASURE OF READING COMPREHENSION

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Karla Lassonde, Faculty Mentor (Department of Psychology)

This study aimed to recognize how important it is to establish separate implicit and explicit stereotype assessments. Although several investigations on stereotypes have been conducted in the field of psychology, many of the measures used were insensitive to social desirability strategies on the part of the participants. We believed racial bias could be more authentically examined within narrative text as reading comprehension involves automatic memory processes outside of the reader's control. In the experiment, participants read 12 passages in which a target occupation was introduced but the race of the character holding the occupation was withheld until a series of sentences near the end of the passage. For example, when reading about a pilot, prior knowledge including racial stereotypes should become active in memory (e.g. it is more common for the pilot to be white than black). We recorded the time it took participants to read target sentences in which race was mentioned. Approximately a week later participants returned to complete an explicit measure of racism, the ASI-PAAQ(Katz & Hass, 1988) and the Marlow-Crowne (1960) which is a measure of social desirability. The results suggest that the reading task was effective in assessing implicit bias towards African Americans. Additionally, there was no relation between the results of the reading task and the explicit measure of racism. Implications regarding the differences found between the two types of measures will be discussed as well as the necessity to focus on measuring multiple aspects of racism.

PHYSICAL ACTIVITY PATTERNS OF DEAF ADULTS

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Suzannah Armentrout, Faculty Mentor (Department of Human Performance)

According to Gallaudet researchers (2012), approximately 9-22 out of 1,000 people in the United States are deaf or have severe hearing impairment. Being deaf or having a hearing impairment may influence ones' ability to participate in physical activity and even more so if one is interested in team sports due to additional communication barriers (Hopper, 2012). Much of the research examining physical activity patterns and barriers in deaf individuals has focused on youth. For instance Longmuir and Bar-Or's (2000) study examined physical activity participation of youth with a number of disabilities, including deaf children and found that children with hearing loss had the highest levels of physical activity participation compared to other disabilities. However most research investigating physical activity patterns of deaf youth has focused on physical education and sport programs within schools (Hopper, 2012). Physical activity patterns of deaf adults or those who have severe hearing impairment has received little attention (Hopper, 2012). In fact, Hopper has suggested that research focusing on physical activity, barriers to participation, exercise patterns, participation in team sports, and active living is "non-existent" (p. 1) in deaf adults. The purpose of this research is to provide a literature review on this topic which will be the foundation for a study in the near future. This research will address the gap in knowledge on deaf adults and individuals with severe hearing impairment discussed by Hopper. The research question is, what are the physical activity patterns of people who are deaf or have severe hearing impairment?

DANCING FOR EVERYONE

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Daniel Stark, Faculty Mentor (Department of Dance)

Amy Hedman, Faculty Mentor (Department of Health Science)

This program takes place in a friendly, safe environment for any type of individual. This program will focus mainly on the effects of dance therapy on the individuals with mental and or physical needs. The population is a special population and unfortunately, society pushes them to the side as if they don't matter. This program will specifically focus on the Mankato community. All individuals thrive off of different learning techniques. Therefore, if these individuals are only offered counseling and the most common form of therapy, physical therapy, then some of the individuals will not thrive the way they could be. This research will help identify whether or not some of these individuals in this specific population thrive off this therapy type.

BACK TO REALITY: EFFICACY OF REALITY ORIENTATION ACTIVITIES MINIMIZING POSTOPERATIVE DELIRIUM

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Postoperative delirium occurs in 14-56% of elderly patients and leads to serious complications (DeCrane, Ashland, Lim, Tsai, Paul & Leung, 2011). A reality orientation tool may minimize its prevalence and duration (Hudek, 2009; DeCrane et al., 2011). Delirium is defined as a sudden change in brain cognitive function and disturbance of consciousness (Inouye, 2004) and an effective nursing intervention tool is needed to reduce it. The purpose of this study is to evaluate validity and reliability of the Reality Orientation Tool. Design: A quasi-experimental quantitative study is conducted with convenience sampling. Data collection is performed via clinical interviews and medical record review. Prevalence of delirium is compared with use of reality orientation activities pre- and postoperatively. Method: Mental status and delirium are evaluated using gold standard tools pre- and postoperatively. The Mini-Mental State Exam is used to qualify a subject for the study, to determine preoperative baseline, and postoperatively, as part of the Confusion Assessment Method (CAM), in order to evaluate subjects' cognitive status. The design of the Reality Orientation Tool is based on the philosophy that stress precedes delirium and orientation to reality minimizes anxiety. The clinical implication of the study will be significant because we can increase the standard of care and patients' safety by applying a relatively simple orientation step in our current practice.

Keywords: delirium, confusion, confusion assessment method (CAM), post-operative, elderly, nursing intervention

IMPACT AND RESULTS OF CUTS IN TRAINING AND DEVELOPMENT BUDGETS ON SMALL LOCAL BUSINESS

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Queen Booker, Faculty Mentor (Department of Management)

This study investigates how southern Minnesota area businesses managed training costs between 2006-2010. The study examined the how a reduction in spending for training and development was related to company profitability during that same period. The significance of the research was to determine if prior research results are still valid in general, and more importantly, the results can help inform small business owners of probable unforeseen negative impacts of training and development loss. The results show that companies that increased or maintained their spending on training between 2006 and 2010 had higher profitability overall as compared to companies that cut or did not invest in training. Using correlation analysis, the significant difference was .005 indicating that not only was there a difference but the difference was significant. In fact, companies that continued to invest at the same or higher levels had a net income after taxes of approximately \$12,000. The research, however, was limited to companies that employed 100 or fewer people and were limited to the southern Minnesota area. The results are not generalizable to other areas.

CAREER COUNSELING: RIGHT NURSE, RIGHT POSITION

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Hans Peter De Ruiter (Department of Nursing)

This study assesses the correlation between senior year undergraduate career counseling for Registered Nurses (RN), their area of first year employment, and the RN's subsequent intent to leave his or her current position and/or profession within the first year following graduation. The two primary groups identified in this study will be represented by Group A and Group B. The **variable group** (Group B) receives standardized career counseling as well as a personality assessment, the Five Factor Model (FFM). The **control group** (Group A) will not receive a personality profile, but will participate only in a standardized counseling session according to their interests. Statistical analysis is used to identify "job satisfaction" differences between Group A and Group B within their first year of practice. The t-test will analyze the mean between two independent samples related to the participants reported satisfaction level. Identifying personality strengths based on the FFM, and applying those strengths to specific areas of practice, will ideally increase the rate of confidence and competency in novice Registered Nurses. The findings of the study will aid in identifying an important factor that may preclude attrition within the nursing field.

GENDER BIAS IS HERE TO STAY? INVESTIGATING HOW SUBTLE CHANGES IN LANGUAGE CAN INFLUENCE GENDER STEREOTYPED OCCUPATIONS

Emily Coon (Department of Psychology)

Natalie Lloyd (Department of Psychology)

Karla Lassonde, Faculty Mentor (Department of Psychology)

With women entering all areas of the workforce, traditional male-biased job titles are outdated. However, there is a strong persistence of gender in job titles. These terms are still prevalent in media outlets and influence our perspectives about job appropriateness. Lassonde and O'Brien (in press) have demonstrated that gender-neutral language (e.g., firefighter) contains bias that women are less appropriate for these positions. When participants read text describing a person holding a stereotypically male-gendered occupation, read time was slower if the person holding the position was female. Slower reading times suggest comprehension difficulty. The goal of the current project was to investigate the impact of male- and female-biased adjectives, in addition to gender-neutral language, on reading comprehension. For example, is a female-biased adjective combined with a male-biased occupation sufficient to indicate the gender? If so, then readers would no longer have difficulty when they learn that the person holding the occupation is female. Reading comprehension was indicated by the time it took participants to read target sentences within a series of passages. Combining a gender-neutral title with a female-biased adjective reduced some but not all of the comprehension difficulty on the target sentence. Male-biased adjectives had the opposite effect, reinforcing the stereotype that both male-biased and gender-neutral occupations are held by males. Implications of how subtle changes in language can influence gender stereotypes will be discussed.

THE PERCEPTION OF RESOURCES AVAILABLE TO VICTIMS OF DOMESTIC VIOLENCE IN MNSU

Abel D. Gebretkle (Department of Biological Sciences, Department of Health Science)

Mark Windschitl, Faculty Mentor (Department of Health Science)

Domestic violence against individuals- regardless of age, race, gender, and social status is a widely recognized matter within public health in every community. The purpose of this study examines the perception of resources available to assist victims of domestic violence by MNSU. The study focuses on only obtaining information from MNSU community members (students). Violence against student among campus communities and in many university settings on a regular basis goes unreported. Therefore, this research seeks out report of the prevalence and other related issues. This was a random sampling based study; that randomly selected participants from a sociology 101 class. Collected data will be kept confidential and it will remain protected by Dr. Mark Windschitl for the next three years. The overall prevalence of sexual, emotional, psychological, physical and other form of violence reported by males were 16% females 55% and 29% unreported. Regarding the resources available more than 60% of the students knew MNSU offers counseling programs. The survey questionnaire had multiple open ended questions that required a verity of input from students. The overall perception students regarding of sexual, psychological, physical, and other form of violence on campus has a huge contribution to public health interventions and prevention measures.

A RETROSPECTIVE ANALYSIS OF THE PERCEIVED BENEFITS OF PARTICIPATING IN A STUDY ABROAD PROGRAM

Emma Grumke (Department of French)

Evan Bibbee, Faculty Mentor (Department of French)

College is the perfect time for young adults to gain a global perspective, especially in an educational and professional context. Although most universities have requirements to assist students in expanding this global knowledge, the courses offered do not compare to the experiences and knowledge gained through participation in a study abroad program. Research that has been done on the topic of participating in a study abroad program has indicated that most students go in order to gain a better world-view, become more culturally aware, and in most cases, further their language development. This research will identify and further solidify the documented benefits of studying abroad and provide explanations for these benefits.

To gain first-hand insights to the benefits of participation, a survey (with both qualitative and quantitative components) was distributed to alumni of the Summer Study in France program. The responses received thus far have echoed the opinion that participation in a study abroad program is invaluable to students for the remainder of their academic career and in almost all personal and professional contexts that they might encounter. It is my hope that the results of this survey will be used to inspire other college students to participate in a study abroad program for the experience of immersing themselves in a new culture and also for the life-long benefits that they will gain.

ANOREXIA NERVOSA AND OTHER EATING DISORDERS

Kennyeh Momoh (Department of Health Science)

Amy Hedman, Faculty Mentor (Department of Health Science)

I care about the eating disorder problem because there are a good number of people who don't know that they have eating disorder tendencies. People go on with their daily lives being cautious of what they eat, eat much they eat, and having a low self-esteem based on their image. Not many know that 90-95% of adolescent females are diagnosed with anorexia or another eating disorder. The top country of mortalities from eating disorders is our own country, the United States of America. This is a large conflict that can be reduced by informing communities with the causes, effects, symptoms, and treatment of eating disorders.

I started this activity by researching articles and medical websites and tying papers about my findings. Methods that I used were creating a survey of questions directed to students at MSU taking a health class. The survey questions were based on eating habits and general eating disorders of college students.

From the articles that I read, some of the major findings were, Caucasian males and African American females are having increased rates of being diagnosed with an eating disorder. I am still yet to receive result from the surveys from the students enrolled in health courses.

The expected larger implications of my findings are for people to be more aware of the signs and symptoms of eating disorders and using the treatments to attend to them as soon as possible.

IDENTITY FORMATION AND EMOTION MANAGEMENT STRATEGIES OF MOTHERS

Annakeiko Reichel (Department of Sociology)

Emily Boyd, Faculty Mentor (Department of Sociology)

ONGOING DEBATE: IMMIGRANT POLICY, DREAM ACT, AND BORDER COSTS

Serena Quaye (Department of Sociology)

William Wagner, Faculty Mentor (Department of Sociology)

WOMEN'S EXCUSES AND JUSTIFICATIONS FOR PORNOGRAPHY CONSUMPTION

Rachel Verde (Department of Sociology)

Maria Bevacqua, Faculty Mentor (Department of Gender and Women's Studies)

THE ARAB SPRING: THE CHALLENGE AND RESPONSE TO ARAB AUTHORITARIANISM

Jordan Teslow (Department of Government)

Abdalla Battah, Faculty Mentor (Department of Government)

IDENTITY FORMATION AND EMOTION MANAGEMENT STRATEGIES OF MOTHERS

Annakeiko Reichel (Department of Sociology)

Emily Boyd, Faculty Mentor (Department of Sociology)

When a woman becomes a mother it is arguably one of the most life changing and defining moments of their lives. It is evident that the social world assumes mothers will automatically adjust to the role of being a mom without asking questions such as, what are the challenges moms face after having children? Or, how is a mother's identity shaped after having children, while adjusting to the role as mom? I became motivated to research this topic because, as a mother myself, I recognize the covert difficulties of one's identity changing after becoming a mother. To investigate emotion management and identity transitions of mothers, I conducted five semi-structured qualitative interviews with young mothers in Minnesota using the Grounded Theory method (Charmaz 2006). I transcribed and coded each interview and wrote thorough analytical memos, which helped in writing my final analysis. The most important finding in my study is that moms are constantly negotiating and projecting a perfected identity in an effort to assimilate to the idealized version of what a mom "should" be in the social world. Specifically, I found they do this while interacting with other moms in their friendship networks as well as through online sources such as Facebook. Thus, moms are actively manipulating their presentation of self through social media websites and interactions with their peers. In conclusion, being a mom is a difficult process and these difficulties are clearly exacerbated by society's portrayal of the ideal version of a mom.

ONGOING DEBATE: IMMIGRANT POLICY, DREAM ACT, AND BORDER COSTS

Serena Quaye (Department of Sociology)

William Wagner, Faculty Mentor (Department of Sociology)

Since the 2001 legislative proposal of the DREAM Act (Development, Relief and Education for Alien Minors), public and political discourse on the issues has not been short of shortcoming. Public discourse has since increase to favor increase border patrol preventing illegal aliens coming into the country. Sentimental citizens' appraisal has provoked both domestic and foreign policy. Analysis of National database and periodicals published between 2001 and to date is carried out, articulating that pessimistic discourse among politicians and the media outlet concerning the absorbcency of the US-Mexico border increased overtime. Multiple samples of such pessimistic discourse are examined in depth, signifying that undocumented immigrants were perceived as trespassers and threat to the American culture, as America was losing control over its cultural and political scheme, and control over the border regions, as illegal aliens were viewed an epidemic. Strategic measures called for addressing problems proposed by undocumented immigrants deployed the use of military force was seen necessary to deviate strains of undocumented immigrants entering the country. In contrast, to the number of increase funding to support border patrol, after the September 11, 2001, terrorist attacks, it shown that the number of arrest made for undocumented immigrants has risen inconsistently, thus proposing that budget increase was unnecessary and futile.

WOMEN'S EXCUSES AND JUSTIFICATIONS FOR PORNOGRAPHY CONSUMPTION

Rachel Verde (Department of Sociology)

Maria Bevacqua, Faculty Mentor (Department of Gender and Women's Studies)

Although pornography has been a contested issue among feminists since the 1980's, much of the feminist research on pornography has been conducted from an anti-pornography perspective. However, sex-positive feminists need a louder voice in the scholarly literature on pornography. This study uses data from both surveys and in-depth interviews from female respondents to examine how women who enjoy pornography either excuse or justify their consumption of pornographic material. The findings of the study suggest that women often have nuanced relationships with pornography, including how they reconcile or experience conflict with their enjoyment of pornography and their self-definitions of femininity, their feminist political views, or their expressions of sexuality.

THE ARAB SPRING: THE CHALLENGE AND RESPONSE TO ARAB AUTHORITARIANISM

Jordan Teslow (Department of Government)

Abdalla Battah, Faculty Mentor (Department of Government)

The ongoing political turmoil in the Middle East represents a paradigm shift from dictatorship to a more open society. This promises to have a profound impact on US relations with the region for years to come. My research offers analyses of the socio-economic conditions that underpin these uprisings. These uprisings can be seen as analogous to the collapse of the Soviet Union and its satellite states in the 1980s-90s. In both the Middle East and Eastern Europe regimes broke down after a collapse of popular support or acceptance. This study relies on a compilation of relevant newspaper articles, statistics from both governments and NGOs. My chief contention is that economic mismanagement and autocratic methods by Arab dictators spurred the Arab Spring. Each country however, has unique circumstances that either hinder or hasten the success of the revolutionary movements.

AN ANALYSIS OF THE MARKET REFORMS AND THEIR IMPACT ON THE FOREIGN TRADE AND CAPITAL INFLOW IN FORMER SOVIET UNION COUNTRIES.

Gulmira Fazilova (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

THE EFFECTS OF U.S. AGRICULTURAL SUBSIDIES ON FARMLAND RENTAL RATES

Victor Agunbiade (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

DECLINING EMPLOYMENT OF PROFESSIONAL FIREFIGHTERS: HOW IS IT AFFECTING OUR CHANCE OF SURVIVAL?

Justin Bemenderfer (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

AN ANALYSIS OF THE RELATIONSHIP BETWEEN HEALTH EXPENDITURE AND SUICIDE RATE FOR SENIOR

Hanako Maruyama Jeong (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

AN ANALYSIS OF THE MARKET REFORMS AND THEIR IMPACT ON THE FOREIGN TRADE AND CAPITAL INFLOW IN FORMER SOVIET UNION COUNTRIES.

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The period of 1985 - 1990 for Former Soviet Union is characterized by macroeconomic chaos, fiscal crisis, repressed inflation and balance of payment deficits. Failure of the old centralized socialist economic system in balancing aggregate supply and aggregate demand, conducting international trade and implementing efficient fiscal and monetary policies resulted in its dissolution and formation of 15 new sovereign countries in Eastern Europe and Central Asia.

This paper analyzes and provides an overview of post - soviet transitioning economies and highlights the impact of market reforms, such as liberalization of prices and trade, sharp reduction of budget deficits, strict monetary policy and massive privatization, on the foreign trade and capital inflow in Former Soviet Union countries.

The study uses statistical tests to examine the effect of such policies by contrasting the pre - independence economy of transitioning countries to post - independence economic environment. Later it assesses the economic goals of these countries and given the findings, focuses on the significance of international trade and foreign capital investment in achievement of better economic performance.

THE EFFECTS OF U.S. AGRICULTURAL SUBSIDIES ON FARMLAND RENTAL RATES

Victor Agunbiade (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

Recent government data shows that the United States government currently spend \$20 billion per year to farmers in direct subsidies. However, the effect of this subsidies on rental subsidies may be higher than predicted from theory. This shows that the U.S. government spending on farm subsidies is significantly greater than the typical estimates in the long run. The econometric model suggests that there is a strong correlation between increase in government spending on farm subsidies and the rates of farmland rentals.

DECLINING EMPLOYMENT OF PROFESSIONAL FIREFIGHTERS: HOW IS IT AFFECTING OUR CHANCE OF SURVIVAL?

Justin Bemenderfer (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

This research presents an economic model for medical emergency survival rate determined by the community's choice between volunteer and professional firefighting services. Using county-level data from the US Census Bureau and United States Fire Association, OLS regression techniques will be used to estimate the age-adjusted mortality rate from variables of: community staffing choice of public services, community demographics and the demand equation for public services. The model will predict evidence that communities with a larger percentage of professional firefighters will result in a higher age-adjusted mortality rate. If these results prove positive, this research could influence the public demand for fire protection, government policy and an increase in budgets for public safety service.

AN ANALYSIS OF THE RELATIONSHIP BETWEEN HEALTH EXPENDITURE AND SUICIDE RATE FOR SENIOR

Hanako Maruyama Jeong (Department of Economics)

Ihsuan Li, Faculty Mentor (Department of Economics)

Since Hamermesh and Soss (1974) built a framework for the economic study of suicide, many research have tried to explain suicide from the financial and health perspectives. However, none of them specifically examined suicide rate for the elderly population even though suicide rate among senior tends to be higher than the national average. In this research, I will extend the work by Bijou Yang (1992), Hwei-Lin Chuang and Wei-Chial Huang (1997), Jochen Jungeilges and Gebhard Kirchgässner (2002), Camelia Minoiu and Antonio Rodoriguez Andrés (2008), Justin M. Ross, Pavel A. Yakovlev , and Fatima Carson (2010). This study seeks to test if government expenditure on health reduces the suicide rate for senior using cross national data. Data is collected on estimated total death caused by self-inflicted injuries of 1,000 people for 60 years and older population from World Health Organization website for 190 nations. Additional data for health expenditure ratio, per capita health expenditure, and other socio-economic factors at nation's level are collected from World Health Organization, United Nations, and their member countries. Within a consistent and sound economic theory of suicide, I test the relationship between suicide rates for the 60 and older population and elderly dependency ratio, divorce, income, migration, population density, total fertility rate, unemployment, women's participation in labor, and expenditure on health. Using Stata SE 11, least squared estimates and fixed-effect (and random effect) methods are used to calculate the marginal impact of the covariates. My findings confirmed the hypothesis that government expenditure on health has a negative and significant effect on suicide rates among senior, holding other relevant factors constant.

QUALITATIVE ANALYSIS OF THE IMPACT OF A CULTURAL PARTNERSHIP ON THE CULTURAL ORIENTATION OF UNDERGRADUATES

Sadie Liedall (Department of Educational Studies: Elementary and Early Childhood)

Sarah Lieske (Department of Educational Studies: Elementary and Early Childhood)

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

SECOND-LANGUAGE ENGLISH FLUENCY CHANGE IN NATIVE-SPEAKER CONTEXT

John Zehnder (Department of English)

Karen Lybeck, Faculty Mentor (Department of English)

SPANISH FOR THE PROFESSIONS: EXPLORING CONNECTIONS TO THE COMMUNITY

Yadira Salinas (Department of World Languages and Cultures)

Kimberly Contag, Faculty Mentor (Department of World Languages and Cultures)

QUALITATIVE ANALYSIS OF THE IMPACT OF A CULTURAL PARTNERSHIP ON THE CULTURAL ORIENTATION OF UNDERGRADUATES

Sadie Liedall (Department of Educational Studies: Elementary and Early Childhood)

Sarah Lieske (Department of Educational Studies: Elementary and Early Childhood)

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

This study compared changes in the Cultural Orientation of four groups of undergraduate students in a course, Human Relations in a Multicultural Society. The hypothesis for this study was that the intentional, cross-cultural experiences the students experienced in the course did have an impact on the Cultural Orientation of each student. A convenience sample of 85 students registered for 4 sections during fall 2011. The course design provided for intercultural partnerships with individuals from diverse populations outside the classroom and for reflection on such interactions. Each student completed (1) minimum of 18 hours service learning at an agency with persons of a culture different than that of the students, (2) a minimum of 9 hours of cultural partnership with a person of a culture different than that of the students, and (3) several self-reflection papers about temperament and course experiences. The Intercultural Development Inventory (IDI) (Hammer and Bennett, 1998 and 2001) was used as a measure of Cultural Orientation. The IDI was completed by subjects at the beginning and at the conclusion of the semester. The two researchers coded two reflection papers according to the five stages of Cultural Orientation described by the IDI. The two researchers compared their own scores of the papers to determine inter-rater reliability and also compared their scores of the papers with the subjects' scores on the IDI.

SECOND-LANGUAGE ENGLISH FLUENCY CHANGE IN NATIVE-SPEAKER CONTEXT

John Zehnder (Department of English)

Karen Lybeck, Faculty Mentor (Department of English)

In a world with an increasing number of English language learners, measuring language fluency and understanding the development of fluency are critical issues in the field of second language acquisition. Previous studies (Lybeck, 2002) have measured change in language ability using specific language features, while other studies have pinpointed the language features that are most closely associated with the quality of perceived fluency (Kang, Rubin, & Pickering, 2010; Kormos & Denes, 2004). Specifically, speaking rate appears to be an especially accurate measure of global language fluency. The current study aims to measure fluency change quantitatively among a population of nine English language learner international students in a native-speaker context. Samples were extracted from a pair of interviews conducted with the participants at a nine-month interval. The speech segments were analyzed for speaking rate by calculating the number of syllables per second. This was accomplished by means of an automated script created as an extension for the phonetic analysis program PRAAT. Results show that participants varied in their level of fluency change over the course of the study. Social factors such as native-speaker contact and social groupings appeared to play a major role in the maintenance of fluency.

SPANISH FOR THE PROFESSIONS: EXPLORING CONNECTIONS TO THE COMMUNITY

Yadira Salinas (Department of Spanish)

Kimberly Contag, Faculty Mentor (Department of World Languages and Cultures)

This project focuses on exploring the connection between Spanish-language speakers at Minnesota State University, Mankato and the community of future employers. The purpose of the project is to help identify what employers look for in terms of skill sets when they hire people who are bilingual or who speak Spanish as a heritage language or as a second language and the perception that students have of their own skill sets in English and Spanish. The goal of my research is to help Spanish-speaking students understand what employers seek so they can prepare to meet these expectations before they leave college.

The method I used to identify skill sets was a questionnaire for 250 Spanish-speaking students (intermediate through advanced levels) and a second questionnaire that I sent to 250 employers who traditionally hire at MSU. The questionnaire highlights career interests, writing, reading, speaking and listening comprehension skills. The questionnaire also inquires about what additional activities would attract the attention of employers.

The expected results are that I will be able to identify which career paths students are self-selecting along with some of the skill they perceive they have for the workplace and I will be able to see if there is a correlation between the self-selected career paths and the employment opportunities and desired qualifications.

OXIDATION AND FLUID INFLUENCE IN THE MESABI IRON RANGE: THE SEARCH FOR HIGH-GRADE ORE

Ryan Rague (Department of Chemistry and Geology)

Steven Losh, Faculty Mentor (Department of Chemistry and Geology)

QUANTIFYING LAKE SEDIMENT ELEMENTAL ABUNDANCE WITH A SCANNING ELECTRON MICROSCOPE

Brady Lubenow (Department of Chemistry and Geology)

Chad Wittkop, Faculty Mentor (Department of Chemistry and Geology)

COLLECTION AND ANALYSIS OF A ^{13}N LABELED AMMONIA RADIOTRACER

Nicholas Compton (Department of Mathematics and Physics)

John Clymer (Department of Electrical Engineering)

James Cotter (Department of Electrical Engineering)

Henry Dam (Department of Physics)

Zach Lesko (Department of Mathematics and Physics)

Lucas Swanson (Department of Physics)

Andrew Roberts, Faculty Mentor (Department of Physics and Astronomy)

OVERNIGHT PEDIATRIC OXYGEN DELIVERY SYSTEM

Brian Stephenson (Department of Integrated Engineering)

Eric Diep (Department of Integrated Engineering)

Les Flemming, Faculty Mentor (Department of Integrated Engineering)

OXIDATION AND FLUID INFLUENCE IN THE MESABI IRON RANGE: THE SEARCH FOR HIGH-GRADE ORE

Ryan Rague (Department of Chemistry and Geology)

Steven Losh, Faculty Mentor (Department of Chemistry and Geology)

For over a century, the 1.85-billion year old iron-rich sedimentary rocks of the Mesabi Iron Range of Northern Minnesota have been a major resource of high-grade iron ore to the United States. High-grade iron ore in the Mesabi Range resulted from fluids dissolving soluble minerals from the iron formation at some time in the past, before the rocks became exposed at the Earth's surface by erosion. If these fluids had derived from the subsurface, there could be more high-grade ore at greater depths within the range. Mineral assemblages and oxidation trends within iron range samples will help determine the cause of high-grade iron ore deposition.

To determine the possibility that the fluids responsible for high-grade ore flowed up from below, fluid inclusion and SEM analysis was performed on iron formation samples. Fluid inclusions are microscopic bubbles of fluid trapped in minerals as they precipitated from hot water and that, when heated or frozen under the microscope, indicate the temperature and salinity of the fluid. Scanning Electron Microscope imagery is useful in studying the interaction of mineral assemblages. Magnetite and Hematite interaction in altered rocks indicates that subsurface fluids may be directly linked to the deposition and oxidation of high-grade iron ore. From my information, it appears that there is influence between faults containing quartz and calcite veins in respect to Hematite and Magnetite grains within high-grade iron ore. Average fluid inclusion temperature and salinity is indicative of fluids of non-meteoritic sources, within or below the Mesabi Iron Range.

QUANTIFYING LAKE SEDIMENT ELEMENTAL ABUNDANCE WITH A SCANNING ELECTRON MICROSCOPE

Brady Lubenow (Department of Chemistry and Geology)

Chad Wittkop, Faculty Mentor (Department of Chemistry and Geology)

Our previous work quantified siderite (FeCO_3) abundance within the sediments of Otter Lake, Michigan. Siderite forms in a restricted geochemical environment and is often associated with hydrocarbons and iron ore deposits. To further understand how siderite forms, we collected elemental data from Otter Lake sediments with a scanning electron microscope (SEM).

SEMs are used to perform microanalysis by reflecting electrons off the surface and greatly magnifying the specimen. When electrons with several kilovolts of energy encounter a surface, X-rays are produced and emitted that show the characteristics of the atoms present. From the measurement of the wavelength of the emitted X-rays we are able to quantify how much of an element is present.

We collected bulk elemental abundance data throughout the Otter Lake core in 20-cm intervals and plotted them against calendar years before present (cal yr BP). We then compared elements sensitive to reduction-oxidation (redox) with non-sensitive redox elements to further understand the controls of siderite production. We also examined siderite crystal morphology compared to various elemental abundances.

We also tested whether the SEM elemental abundance data compares to previously collected data of a more reliable, but expensive method to quantify elemental abundance, inductively coupled plasma mass spectrometry (ICPMS).

SEM's elemental data shows that when more iron is available, the more abundant siderite is; except after 2200 cal yr BP, where iron is still available, but siderite is not produced. We also determined that SEM's data is comparable to ICPMS data.

COLLECTION AND ANALYSIS OF A ^{13}N LABELED AMMONIA RADIOTRACER

Nicholas Compton (Department of Mathematics and Physics)

John Clymer (Department of Electrical Engineering)

James Cotter (Department of Electrical Engineering)

Henry Dam (Department of Physics)

Zach Lesko (Department of Mathematics and Physics)

Lucas Swanson (Department of Physics)

Andrew Roberts, Faculty Mentor (Department of Physics and Astronomy)

The production of ^{13}N ($t_{1/2} \sim 9.96$ minutes) was accomplished at the applied nuclear science lab at Minnesota State University, Mankato. Using a 400keV Van de Graaff positive ion accelerator, one can create the nitrogen isotope through the $^{12}\text{C}(d,n)^{13}\text{N}$ reaction. Radiolabeled ^{13}N compounds are commonly used for physiological imaging using PET. The method used to drive such a reaction involves irradiating the custom carbon target with a deuteron beam. The carbon target is then heated by an electric current to release the nitrogen isotope while passing a suitable reaction gas through the target apparatus to extract the ^{13}N from the carbon matrix. The released gas will be in a form that can be used for Positron Emission Tomography (PET), a quantitative nuclear imaging technique. One tracer of particular interest is the compound $^{13}\text{NH}_3$. Although the amount produced is insufficient for imaging work, the theory and procedure may be applied at higher energy laboratories, capable of a greater yield reaction such as $^{13}\text{C}(p,n)^{13}\text{N}$.

OVERNIGHT PEDIATRIC OXYGEN DELIVERY SYSTEM

Brian Stephenson (Department of Integrated Engineering)

Eric Diep (Department of Integrated Engineering)

Les Flemming, Faculty Mentor (Department of Integrated Engineering)

Current methods for at-home pediatric oxygen delivery are uncomfortable to children, and difficult for caretakers. The two common methods are via face mask or nasal cannula. Repetitive taping of these products may be damaging to the skin. Children also have a low tolerance for these products, requiring frequent caretaker intervention. The overnight pediatric oxygen delivery (OPOD) system is a non-invasive solution. The objective of this project is to track the position of a child's face for selective oxygen delivery. Development of the tracking system consisted of four major steps. First, the project was scoped with the client. Second, previous and newly generated options were compared to determine the best method. Third, specifications were designed for the project. And fourth, the design was tested and improved over two improvement cycles. Throughout the semester, there was weekly communication with the client and faculty advisor for feedback and client approval. Using a sleeping pad which incorporates pressure sensors to noninvasively track the position of a child's head is the first step to selectively deliver oxygen. To increase accuracy, a head band with reflective shapes can be worn so that an infrared camera can detect the position of a child's head. The non-invasive methods of the OPOD system will allow children to live normally until they mature into more adult oriented treatments. Moreover, the methods developed for use in the OPOD system will be portable to adult and geriatric populations. Patient acceptability for oxygen therapy for all age levels should increase with OPOD use

STATISTICAL MODELS OF SELF-EFFICACY IN STEM STUDENTS

Sarah Painter (Department of Mathematics)

Rebecca Bates, Faculty Mentor (Department of Computer Science)

NETWORK MODELING OF SOCIAL INFLUENCES

Jordan Tait (Department of Mathematics)

In-Jae Kim, Faculty Mentor (Department of Mathematics)

SMOOTHING FUNCTION FOR MINIMUM 1-NORM LINEAR EQUATION SYSTEM

Nhung Do (Department of Mathematics)

Hongxia Yin, Faculty Mentor (Department of Mathematics)

IMPACT ON THE SETTING TIME AND STRENGTH OF CONCRETE WHILE USING A COLORING AGENT

Khondoker Ashif (Department of Civil Engineering)

Farhad Reza, Faculty Mentor (Department of Civil Engineering)

STATISTICAL MODELS OF SELF-EFFICACY IN STEM STUDENTS

Sarah Painter (Department of Mathematics)

Rebecca Bates, Faculty Mentor (Department of Computer Science)

Persistence through undergraduate education may be explained by self-efficacy. It is the belief in one's self to persevere through challenges. Bandura stated four areas that are thought to influence self-efficacy: mastery experience, social persuasion, vicarious experience, and physiological state. In this study, we focused on general and academic self-efficacy in STEM students, in the hopes of learning more about the relationships between Bandura's categories, demographics, and self-efficacy. Data was taken from two institutions: one, a large research focused university, and the other, a smaller teaching focused university. In the first phase, surveys on general self-efficacy were taken at both institutions by 118 students. In the second, academic self-efficacy data was taken from 599 students. These surveys included questions concerning demographics, Bandura's categories, and self-efficacy. Scores were summed for constructs relating to one of Bandura's four categories. We used Cronbach's alpha as a measure of internal reliability within each of the constructs. Correlation and linear regression analyses were used to study the data. Dummy variables for demographic data were created and used in the regression models. The best current model found for general self-efficacy, including all phase 1 constructs and dummy variables, has an r^2 value of 0.558. For academic self-efficacy, our best model includes all constructs and dummy variables and has an r^2 value of 0.526. The goal of this work is to find factors that may potentially influence self-efficacy, in the hopes that they may be used in further research aimed at ensuring persistence of STEM students.

NETWORK MODELING OF SOCIAL INFLUENCES

Jordan Tait (Department of Mathematics)

In-Jae Kim, Faculty Mentor (Department of Mathematics)

With the recent advancements in social networking websites such as Facebook and Twitter, it has become imperative to understand how social influences affect the adoption of innovations, ideas, and opinions. In this presentation, we examine how ideas and opinions spread through various network models under two propagation rules. Our main goal is to find the minimum number of initial adopters of an idea which results in complete propagation of the idea through the rest of a social network. We also discuss real-world situations in which we can apply the findings in propagation analysis.

SMOOTHING FUNCTION FOR MINIMUM 1-NORM LINEAR EQUATION SYSTEM

Nhung Do (Department of Mathematics)

Hongxia Yin, Faculty Mentor (Department of Mathematics)

In this paper, we propose a new smoothing function for L1-norm minimization problems where the objective function is not differentiable. Such optimization problems arise from wide applications such as compressed sensing, image restoration, signal reconstruction, etc. that have direct influence on the technology we use every day. For instance, compressed sensing is the process of acquiring and reconstructing a signal that is supposed to be sparse or compressible in electrical engineering, particularly in signal processing. Furthermore, we analyze the properties of the smoothed optimization model to the problem as well as produce a new algorithm for solving it. The global convergence and rate of convergence of the algorithm are also taken into consideration. Although there are numerous algorithms that have been introduced and studied for solving the aforementioned L1-problem, we hope to find a more efficient method for solving a non-smooth optimization problem which results in a minimum 1-norm solution for linear equation system.

IMPACT ON THE SETTING TIME AND STRENGTH OF CONCRETE WHILE USING A COLORING AGENT

Khondoker Ashif (Department of Civil Engineering)

Farhad Reza, Faculty Mentor (Department of Civil Engineering)

Concrete has been one of the most important materials used in constructing the built environment since ancient times. It is widely used to build foundations, architectural structures, roads, pavements, walls, bridges, pipes, runways and even concrete canoes. Traditionally, concrete structures have a dull gray color but in recent years there has been an increased use of colored concrete for architecture or as safety measures such as colored concrete crosswalks for pedestrians. The addition of a coloring pigment can affect properties of the concrete mixture and a poor understanding of this effect can result in low quality non-durable products. The objective of this research was to study the effect of adding a coloring agent in a concrete mixture on its setting time at different ambient temperatures, slump, air-entrainment and compressive strength. The process to determine the setting time followed the ASTM standard C403 for penetration resistance. Compressive strength tests were performed on concrete cylinders at 7days, 14 days and 28 days. The temperatures for the setting time tests were 40o F, 70o F and 100o F to simulate conditions for winter, fall and summer temperatures. The colored concrete exhibited faster setting time and less compressive strength than the reference concrete. Results of the project will be beneficial to designers and contractors to determine the length of time that can be allowed for a colored concrete mixture from the time it is initially mixed to the time it is placed and finished. The results can also be predictors of its long-term performance.

MODERN MOSQUES OF THE MIDWEST; EXAMINING IDENTITY OF REGIONAL MOSQUES

Kathryn Carrier (Department of Art)

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Through academic and hands-on research, this study investigates how identity is expressed architecturally at Midwestern Muslim centers in Minnesota, Wisconsin, and Chicago. This research considers the kinds of identities that regional mosques are representing in the twenty-first century, at a time when religious identities seem to be increasingly politicized. Questions that are important in the analysis of the selected mosques' identities are: What identities are being represented and how? What services does the structure offer? In what ways does the structure communicate beyond its congregation? And, finally, how does the structure fit into fourteen centuries of mosque building?

Published research of mosques in the traditionally-conceived Islamic world shows that cultural and religious identity is often reflected in buildings' form and design. Because of that, after in-depth analysis, particular strategies and motifs in identity formations are apparent. The selected regions of research have similarities yet express differences supporting various identities through architecture. Acknowledging and understanding differences in identity is important because Islam can seem to be a very foreign religion. Through my research, I attempt to clarify how the structures meet both sacred and community services, functioning just like sacred spaces in other religious traditions. Important regional variations represent the rich diversity that exists in Islamic practice and indicate, most importantly, its adaptability based on the location of its community.

ORIENTALISM IN COLONIAL POSTCARD ART

Lisa Phillips (Department of Art)

Alisa Eimen, Faculty Mentor (Department of Art)

This paper will cover the use of orientalism and exoticism in the postcard art of the late 1800's and early 1900's. It briefly covers the etiology of orientalism due to the rise of tourism following the colonialization of the East by the European powers. I will do this by using examples of postcards and address specific issues related to this subject. Some of these issues are racism and other prejudices and cultural misconceptions. Also I will touch upon the use of double standards which become clearer when studying the art of the aforementioned postcards.

CHANGING ROLES OF CULTURAL IDENTITY AND CONTROVERSIAL HINDU-MUSLIM IMAGERY

Amber Phillips (Department of Art)

Alisa Eimen, Faculty Mentor (Department of Art)

The work of South Asian painter M. F. Husain embodies in many ways the cultural essence of India, but his work has been greatly contested in that society. The paper examines the controversies surrounding the artist and his work by looking primarily at the political and cultural condition of modern day India. There is a violent and ongoing conflict between the Muslim and Hindu populations of India. Husain's work portrays imagery associated with the Hindu belief system, yet he is a Muslim. This raises a question of who has the right to certain imagery. The Hindu epic the Mahabarata is iconic in Indian culture. Husain's artwork serves as a case study in this paper because of his portrayal of such iconic imagery as that found in the Mahabarata. As one of the indigenous religions of India, Hinduism is historically integral to Indian national identity. Indian's are exposed to the visual vocabulary of Hinduism on a daily basis. This paper proposes that this religious imagery has now become part of a broader cultural vocabulary that M. F. Husain is a part of simply by being Indian. This discussion is relevant not only in India, but globally as imagery becomes more and more accessible to all peoples of all nationalities and religions. The origins of Hindu imagery may not be associated with M. F. Husain by religious practice, but by the nation and its history, and therefore to the individuals who are raised in that national culture.

THE AGONY OF ILLUMINATION

Stephanie Gamboni (Department of Art)

Mika Laidlaw, Faculty Mentor (Department of Art)

The main purpose of this creative project is to take viewers out of their comfort zone and into an unfamiliar situation. I have had chronic migraines for my entire life and I have had a continuous migraine since late November of 2010. My migraines often cause me to be light sensitive and it becomes painful for me to go outside during the day, drive at night, or go into a well-lit building. This grant has given me an opportunity to let others experience this part of my life and allow them to look at light in a different way. My goal was to create a light installation of a manageable size. By creating a panel covered with lights, the viewer will be confronted with an excessive amount of illumination. I have created a 5'x5' square panel covered with a copious amount of light bulbs. This panel will create an atmosphere that overwhelms the viewer with light, letting them see light from a new perspective. By creating this light installation I feel I have taken a step towards expanding the boundaries of art, using my own artistic language to convey a new way of looking at light. This work will be exhibited in the URC show in the CSU gallery. During this show the viewer will be able to interact with this work and hopefully walk away with a new perspective on light, and possibly understand the agony of illumination.

THE HELIAND: THE WARRIOR'S STRENGTH AND THE TRANSCENDENCE OF FAITH

Nathanael Rhody (Department of German)

Nadja Kramer, Faculty Mentor (Department of German)

HOW TELEVISION AND PHOTOGRAPHS CHANGED AMERICAN PUBLIC OPINION AFTER THE TET OFFENSIVE

Saresa Rach (Department of History)

Matt Loayza, Faculty Mentor (Department of History)

WOMEN OF HORROR

Andrew Harrison (Department of Theatre)

Heather Hamilton, Faculty Mentor (Department of Theatre)

THE HELIAND: THE WARRIOR'S STRENGTH AND THE TRANSCENDENCE OF FAITH

Nathanael Rhody (Department of German)

Nadja Kramer, Faculty Mentor (Department of German)

The research project centered on the literary text, Heliand, a biblical paraphrase of the Gospel originally written in Old Saxon in the 9th century. Throughout this period, Christianity was steadily spreading to the pagan lands of northern Europe. Because this initially involved a form cultural clash between the Christian and Germanic world-views, Christianity is often thought to have been an overt replacement of the earlier traditional folk-culture of these lands. The Heliand, though, expresses differently by drawing parallels between the old Germanic warrior culture and the Christian faith. The project examines how this is accomplished by exploring deeper into the specific foundations that defined Germanic tribal culture of the day and how the Heliand appealed to each element in terms of the intimacy of kinship, the heroism of individual conduct and the presence of strong spiritual forces such Fate. Additionally, the project takes into consideration the effects of certain historical events, such as the Saxon Wars and the conversion stories of some of the major Germanic tribes, and the roles they played in the final incorporation of the Germanic culture into Christendom. In the end, this text has given greater insight on how the person of Jesus Christ, as the center of the Christian faith, could also be the ultimate embodiment of the warrior ideology of the northern peoples.

HOW TELEVISION AND PHOTOGRAPHS CHANGED AMERICAN PUBLIC OPINION AFTER THE TET OFFENSIVE

Saresa Rach (Department of History)

Matt Loayza, Faculty Mentor (Department of History)

M.J. Arlen coined the phrase 'Living Room War' to describe Americans' reliance on television as their main source of news of the Vietnam War. Historian Rodger Streitmatter states television and film have a huge impact on public opinion. Print media can describe combat, but film and photographs can show the true horrors of war. Images of war on television and in newspapers were very damaging to Lyndon B. Johnson's administration's public support to wage war. The sources used for this research include photographs taken by American journalists, newspaper articles from the New York Times and The Times, journal articles such as "Rethinking American Press Coverage of the Vietnam War, 1965-1968" by Andrew Huebner and books, like *The "Uncensored" War* by Daniel Hallin, *Reporting Vietnam: Media and Military at War* by William Hammond, *A Vietnam Reader: Sources and Essays* by George Donelson Moss, *A Century of Media, A Century of War* by Robin Andersen, *Media and the Politics of Failure: Great Powers, Communication Strategies, and Military Defeats* by Laura Roselle and *Mightier than the Sword: How the News Media Have Shaped American History* by Rodger Streitmatter. The media's use of television and photographs during the Vietnam War provided a powerful indictment of LBJ's administration's reports of success in Vietnam. Television news reports became more critical of government policies and increased the exposure of graphic photographs of wounded American soldiers and Vietnamese civilians to the American public and changed public opinion to disapproval of the Vietnam War.

WOMEN OF HORROR

Andrew Harrison (Department of Theatre)

Heather Hamilton, Faculty Mentor (Department of Theatre)

Horror films have often been labeled as being sexist and objective towards women. The analysts who have postulated on this topic have neglected the evolution of the heroine and even of the killer. The examination of women in horror films provides a new prospective of the role of females in society and their subsequent portrayal in the media. What has been neglected is how gender equality has progressed and translated to horror films. Heroines and female killers have gained in strength, intelligence, and power. This gradual change has a direct correlation with altered status of women in society. In horror films women have gone from men save them, to defending themselves, to now working alongside men and even having to save the men

One of the side effects of this progression is a change in terminology. The idea of a final girl: the heroine who remains standing at the end of the film. At the time, that was enough. As the films and the heroines have grown, survivor girl and even a survivor couple should be included in the vernacular

This project is a chronological study of the strides that have been made for gender equality, how the political and societal climate affects horror films and vice versa. It reapplies the analysis of horror scholars to account for the current status of women in society. Looking at the horror genre will open a discussion of the advancement of women and the struggle they have gone through to get here.

Congratulations to the Minnesota State Foundation and North Star STEM Grant Recipients

Oluwakorede Amusan (James Rife, Faculty Mentor). *Ethanol Production from Fall Leaves*, Department of Chemistry and Geology.

Kelsey Anderson and Kelly Wilson (Marilyn Hart, Faculty Mentor). *Structural Analysis of Heart, Eye, and Skeletal Muscle in Genitically Altered Mice*, Department of Biological Sciences.

Jose Barriga (Timothy Secott, Faculty Mentor). *Evolution of Medicinal Plant Use in Rural and Urban Areas*, Department of Biological Sciences.

Brittan Block, Ryan Meyer (Karla Lassonde, Faculty Mentor). *Laptops in the Classroom: Evaluating the Potential Benefits of technology Against Distractions*, Department of Psychology.

John Bygrave (Cindra Kamphoff, Emily Stark and Karla Lassonde, Faculty Mentors). *Is it All the Mind? Predicting the Performance of Marathon Running*, Department of Human Performance.

Young-Hee Cho (Theresa Salerno, Faculty Mentor). *Effects of Methyl Jasmonate on Pea Lipoxigenase Isoforms Using RT/qPCR*, Department of Chemistry and Geology.

Carrie Claussen, Megan Selberg (Karla Lassonde, Faculty Mentor). *Investigating Racial Stereotype for African Americans with a New Implicit Measure of Reading Comprehension*, Department of Psychology.

Sam Erickson, Samantha Bergmann, Sarah Lewer (Karla Lassonde, Faculty Mentor). *In One Ear and Out the Other: The Correction of Misconceptions and our Mind's Resistance to it*, Department of Psychology.

Courtney Frank and Kayla Anderson (Michael Bentley, Faculty Mentor). *Vascular Regrowth Following Partial Hepatectomy in Rat*, Department of Biological Sciences.

Ashley Germscheid (Carlos Panahon, Faculty Mentor). *College Students' Perceptions and Misconceptions about Attention Deficit Hyperactivity Disorder*, Department of Psychology.

Nathan Gonzales and Kali Trukia (Michael Bentley, Faculty Mentor). *Effects of Strontium (Sr) in the Bone Density of Mice Research*, Department of Biological Sciences.

Lee Han (Geoff Goeller, Faculty Mentor). *Mitochondria as a Potential Localization site for the Novel Protein*, Department of Biological Sciences.

Amy Harris (Cindra Kamphoff and Suzannah Armentrout, Faculty Mentor). *Beyond Limits: Exploring Motivation and Gender Barriers in Ultramarathoning*, Department of Human Performance.

Jennifer Heibel (Marilyn Hart, Faculty Mentor). *Characterization of Mouse Hearts Using Scanning Electron Microscopy*, Department of Biological Sciences.

Cameron Hovey (Danae Dorr, Faculty Mentor). *Identification of Metabolic Adducts Formed Between the Common Food Contaminant HMF and DNA*, Department of Chemistry and Geology.

Paul Kirchner (Gary Mead, Faculty Mentor). *Formula SAE Thermoformed Polycarbonate Body*, Department of Automotive Engineering Technology.

Jiyeong Lee (James Rife, Faculty Mentor). *Response of Lipoxigenase Expression to Wounding and Methyl Jasmonate in Soybean Leaves*, Department of Chemistry and Geology.

Brady Lubenow (Chad Wittkop, Faculty Mentor). *Quantifying Lake Sediment Elemental Abundance with a Scanning Electron Microscope Research*, Department of Chemistry and Geology.

Jerry Schimmel, Chase Radue, Hyunjung Lee, Nridendra Bastola, Akinola Asaolu (Stephen Druschel, Faculty Mentor). *Effects of Flocculents on storm Water Sediment Detention*, Department of Mechanical and Civil Engineering.

Eva Serem (James Rife, Faculty Mentor). *Time Course of the Wounding Effect on Lipoxigenase Expression in Soy Bean Leaves Research*, Department of Chemistry and Geology.

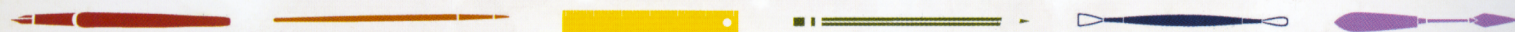
Melissa Stewart (Carlos Panahon, Faculty Mentor). *Surveying College Students with Disabilities About Their Perceptions of Test Accommodations*, Department of Psychology.

Clayton Wagner (Trent Vorlicek, Faculty Mentor). *Separation and Quantification of Molybdate and Thiomolybdate Anions at Concentrations Found in Natural Anoxic Waters Using Ion chromatography*, Department of Chemistry and Geology.

2012 UNDERGRADUATE RESEARCH SYMPOSIUM



WORKS



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