The 2011 Eleventh Annual UMM Undergraduate Research Symposium (URS) celebrates student scholarly achievement and creative activities. The URS provides an opportunity for students to inform the campus community and visitors of the quality and variety of research that occurs at UMM.

Research projects from all disciplines participate in the URS. Types of presentations include posters, oral presentations, and short or abbreviated theatrical, dance, or musical performances. Presentations are accompanied by discussions and multimedia presentations.

The University of Minnesota, Morris
- 2011 -

UMM Undergraduate Research Symposium
Featuring student research and scholarship from across campus

Saturday, April 16, 2011

10:00 a.m. – 3:00 p.m. Registration, Science Atrium and John Q. Imholte Hall

10:00 a.m. – 12:15 p.m. Poster/Visual Display, Science Atrium

10:30 a.m. – 10:35 a.m. Opening Welcome-Dr. Jeffrey Ratliff-Crain Assistant Dean

12:15 p.m. – 1:15 p.m. Lunch, Oyate Hall

12:30 p.m. – 12:40 p.m. Welcome-Dr. Jacqueline Johnson Chancellor

1:30 p.m. Introduction of Featured Presentation-Dr. Cheryl Contant Vice Chancellor for Academic Affairs and Dean

1:30 p.m. – 2:00 p.m. Featured Presentation, John Q. Imholte Hall #109 Elizabeth Grave - Hands On!

2:00 p.m. – 5:00 p.m. Oral presentations: John Q. Imholte Hall, Room #s: 101, 109, 111, 112

3:45 p.m. – 4:45 p.m. Performances, HFA #170
ORAL PRESENTATIONS
John Q. Imholte Hall, Room #s 101 and 109

Room #101

2:00  Peter Hard (English): The Quest Will Go On: Rider Haggard’s *She*  
(Adviser: Bradley Deane), abstract pg. 11

2:25  Dominic Scheck (English): Saying, “I cannot say, I”: Spectral Subjectivity in *The Picture of Dorian Gray* and *Dr Jekyll and Mr Hyde*  
(Adviser: Bradley Deane), abstract pg. 16

2:50  Hannah Lindquist (English): Infiltrating the Classroom: High-Stakes Essay Tests and High School Writing Instruction  
(Adviser: Tisha Turk), abstract pg. 13

3:15  Taylor Lunemann (Communication, Media, and Rhetoric): Selling the Droid: An Analysis of Online Advertising Strategies  
(Adviser: Barbara Burke), abstract pg. 13

4:05  Andrea Saunders (Communication, Media, and Rhetoric): Asian Cultures and Contemporary Individualization - Respect, Deference, and Hard Work as Determinants of Self-Worth  
(Adviser: Barbara Burke), abstract pg. 15

Room #109

1:30  Elizabeth Grave (Art History): Hands On! : Creating a Virtual Exhibit of Hands as Represented in the History of Art  
(Adviser: Julia Dabbs), abstract pg. 7

2:00  David Schlimoeller (Art History): Roman Treasure, Greek Science  
(Adviser: James G. Schryver), abstract pg. 17

2:25  Joshua Smith (Art History): Petah Coyne: A Catholic Interpretation  
(Adviser: Joel Eisinger), abstract pg. 17

2:50  Kayla Hagen (Art History): Douglas Chandor’s Incomplete Portrait of Franklin Delano Roosevelt: an Analysis  
(Adviser: Julia Dabbs), abstract pg. 10

3:15  Mandi Riley (Art History): The Many Faces of Michelangelo in the *Last Judgment*  
(Adviser: Julia Dabbs), abstract pg. 14

3:40  Susan Robertson (Art History): The Iconic Mrs. Jack: A Portrait of a Lady by John Singer Sargent  
(Adviser: Julia Dabbs), abstract pg. 15
ORAL PRESENTATIONS
John Q. Imholte Hall Room #s 111 and 112

Room #111

2:00 Austin Kelsey (Environmental Studies): The Minnesota Statewide Health Improvement Program-Evaluating Outcomes at Community Gardens (Advisers: Jessica Beyer and Karen Mumford), abstract pg. 12
2:25 Alicia Johnson (Biology and Sociology): Convenience, Culture, and Support: Why Some Women Choose to Use Formula to Feed their Infants (Advisers: Karen Mumford and Jennifer Rothchild), abstract pg. 11
2:50 Dugan Flanders (Economics): Economic Viability of Hydrostatic Transmissions in Wind Turbines (Adviser: Arne Kildegaard), abstract pg. 9
3:15 Colin Scheck (Political Science): Defending Sovereignty in the Midst of Giants: Mongolian Foreign Policy in the New Millennium (Adviser: Seung-Ho Joo), abstract pg. 16

Room #112

2:00 Josephine Corley (Communication, Media, and Rhetoric): First Amendment Controversies and Communication (Adviser: Mary Elizabeth Bezanson), abstract pg. 8
2:25 Oliver Goulet (Communication, Media, and Rhetoric): First Amendment Controversies and Communication (Adviser: Mary Elizabeth Bezanson), abstract pg. 9
2:50 Morgan Turner (Communication, Media, and Rhetoric): First Amendment Controversies and Communication (Adviser: Mary Elizabeth Bezanson), abstract pg. 18
3:15 Michael Ward (Communication, Media, and Rhetoric): First Amendment Controversies and Communication (Adviser: Mary Elizabeth Bezanson), abstract pg. 18
3:40 Kathryn Barron (Spanish): The First Republic: Political and Literary Foundations of Modern Spanish Liberalism (Adviser: James Wojtaszek), abstract pg. 8
4:05 Abram Henry (Spanish and Political Science): Multilateral Diplomacy, Multilateral Roles: The Many Understandings of the “Role” of International Organizations in Modern International Relations (Advisers: Stacey Parker Aronson and Paula O’Loughlin), abstract pg. 10
PERFORMANCE PRESENTATIONS 3:45 p.m. – 4:45 p.m.
HFA Choral Room #170

3:45  Anthony Bannach (Music): Studies of Electronic Instrumentation within a Standard Orchestra Score (Adviser: Joseph Carucci), abstract pg. 19

POSTER PRESENTATIONS 10:00 a.m. – 12:15 p.m.
Science Atrium

#1 Elise Porcher (Biology): Developing an Optimum Method for Harvesting Seeds of *Cuphea wrightii* (Adviser: Chris Cole), abstract pg. 29

#2 Alicia Johnson (Biology): Light to Dim Oscillatory Response in *Neurospora crassa* Circadian Rhythms (Adviser: Van Gooch), abstract pg. 25

#3 Kele Cable (Biology): Variation in Limb Structure of Salamanders (Adviser: Paul Myers), abstract pg. 21

#4 Ashleigh Thompson and Ember Phillips (Biology): Cottonwoods: Trade-offs between Biomass Production and Chemical Defense (Adviser: Chris Cole), abstract pg. 32

#5 Andrea Lund (Biology): Effects of Machismo and Acculturation on HPV Vaccination Status and Willingness among White and Latina Women (Adviser: Karen Mumford), abstract pg. 27

#6 Lisa Larson, Bailey Stanard, Hannah Schubloom, and A. Hunter Baldry (Biology): Pollinator Constancy in the Foraging Behavior of Syrphid and Tachinid Flies Toward *Solidago canadensis* and *Symphyotrichum laeve* in Pomme de Terre Park (Adviser: Margaret Kuchenreuther), abstract pg. 26

#7 Guinevere P.E. Bitker (Chemistry): Isoergic Hydrogen Bonding in Substituted Acetic Acid Dimers (Adviser: James B. Togeas), abstract pg. 20

#8 Alex Madsen (Chemistry): Teaching Electrochemistry: Addressing Misconceptions by the Development of Educational Materials that Promote Conceptual Understanding (Adviser: Jernnifer Goodnough), abstract pg. 28


#10 Deborah Schneiderman and Matthew Lovander (Chemistry): Oligothiophene tetracyanobutadienes as Alternative Donor-Acceptor Materials (Adviser: Ted Pappenfus), abstract pg. 31

#11 Jerome John Kessler (Physics): Weather Trends Spanning a Hundred Years from the Morris Region (Adviser: Sylke Boyd), abstract pg. 25

#12 Jeffrey Lind (Physics): Skylight Polarization from a Balloon Flight (Adviser: Gordon McIntosh), abstract pg. 27


#14 Brian Goslinga and Eugene Butler (Computer Science): Improving Error Messages in the Programming Language Clojure (Adviser: Elena Machkasova), abstract pg. 22
POSTER PRESENTATIONS 10:00 a.m. – 12:15 p.m.
Science Atrium

#16 Michael Rislow (Mathematics): Special Structures and Decomposition Patterns of 3-Directed Hypergraphs (Adviser: Peh Ng), abstract pg. 30
#17 Chad Seibert (Mathematics): Adaptive GPS Algorithms (Adviser: Peh Ng), abstract pg. 31
#18 Rachel Harstad (Horticulture, St. Paul campus): Effects of Cultivar and Initial Plant Spacing on Growth and Development of Primocane-Fruiting Raspberries Grown in High Tunnels (Advisers: Jon Anderson and Emily Hoover), abstract pg. 22
#19 Rachel Harstad (Chemistry): Semi-empirical Study of the Effects of Temperature on Hydrogen Bonding Strength and Liquid Salt Water Dynamics (Adviser: Jennifer Goodnough), abstract pg. 23
#20 Liz Vold (Statistics, Horticulture, West Central Research and Outreach Center): Raspberry Size and Total Yield in a High Tunnel Compared to Traditionally Managed Fields (Advisers: Jon Anderson, Emily Hoover, and Steven Poppe), abstract pg. 34
#21 Alissa Hawks (Sociology and Biology): Breastfeeding in Rural Minnesota (Advisers: Jennifer Rothchild and Karen Mumford), abstract pg. 23
#22 Ayano Jiru and Lea Awoudi (Statistics and Management): Workers Compensation Claims: Analysis of Injuries and Costs (Advisers: Jon Anderson and Stephen Burks), abstract pg. 24
#23 Ruth Potter and Manjari Govada (Economics and Statistics): Obstructive Sleep Apnea (OSA) and Accident Risk Among Commercial Truck Drivers (Adviser: Stephen Burks), abstract pg. 29
#24 Clara Dux and Ellis Valentiner (Psychology): Effects of Caffeine Consumption on Mood and Physiological Responses to a Speech Task (Adviser: Jeffrey Ratliff-Crain), abstract pg. 21
#25 Ellis Valentiner (Statistics and Biology): Seasonal Influenza Vaccination Behavior in Stevens County (Advisers: Jon Anderson and Karen Mumford), abstract pg. 33
#26 Douglas Armstrong (Wellness and Sport Science): Skin Preparation for Bursal or Articular Injection (Adviser: Richard Hardy), abstract pg. 20
#27 Alaina Pearce and Ellis Valentiner (Psychology): Effects of Lexical Shortenings and Word Errors on Cognitive Processing (Adviser: Cheryl Stewart), abstract pg. 28
#28 Mathew Turkson, Austin Kelsey, Joe Dunlavy, and Jon Braegelmann (Math and Science Center for Small Towns): Evaluation of School Physical Activity and Nutrition Initiatives in Western Minnesota (Advisers: Karen Mumford and Jessica Beyer), abstract pg. 33
#29 Kara Thomas (Sports Management): The IKDC is the dominant Outcome Measure of ACL Reconstruction (Adviser: Richard Hardy), abstract pg. 32
Featured Presentation
John Q. Imholte Hall, Room #109
1:30 pm

Presenter: Elizabeth Grave
Project Adviser: Julia K. Dabbs (Art History)
Title: Hands On! : Creating a Virtual Exhibit of Hands as Represented in the History of Art
Type of Presentation: Oral

Abstract:
Just as hands are an important part of our everyday activities and interactions, it has become obvious to me through the study of art history that hands also play an important role in interpreting art. Through visual analysis and biographical research I have explored the symbolism of hands in selected works of art dating from the Prehistoric period through electronic media of the 1980s. With the knowledge learned from my research, I created a virtual art exhibit bringing to mind the importance of hands and hand gestures in such works as Frida Kahlo’s The Two Fridas and Alfred Stieglitz’s photos of Georgia O’Keeffe. This exhibit, Hands On!, is a unique way to bridge the gap between traditional museum techniques and that of the current media-driven generation, allowing for a broader audience to experience art in new ways. Through examining the works in this exhibit, I will consider the advantages and disadvantages of experiencing art in a virtual exhibit versus a traditional museum visit.
Oral Presentations
John Q. Imholte Hall
Room #s: 101, 109, 111, 112

Presenter: Kathryn Barron
Project Adviser: James Wojtaszek (Spanish)
Title: The First Republic: Political and Literary Foundations of Modern Spanish Liberalism
Type of Presentation: Oral
John Q. Imholte Hall, Room #112, 3:40 p.m.

Abstract:
The Spanish First Republic was established in 1873 to replace the Spanish monarchy, yet ended eleven months after it began. Even though the First Republic failed, the ideals of liberal government endured in Spanish political life during the rest of the 19th and 20th Century. My research, sponsored by the UROP scholarship, focuses on the importance of the First Republic as the birth of liberalism in modern Spanish politics, how the First Republic influenced political theory during the time it was in place, and how the Constitution of 1873 reflected universal liberal values still seen in Spanish politics today. To make my conclusions, I use the text of the Constitution of 1873 to demonstrate the liberal values behind the First Republic. I also use the text of Benito Pérez Galdós’s novel, La Primera Republica, as an example of general public sentiment towards the liberal Spanish government. I conclude by showing the First Republic to have played an important part in 19th Century Spanish political tradition and how it made an important contribution to Spanish politics through the literature and policy of its time.

Presenter: Josephine Corley
Project Adviser: Mary Elizabeth Bezanson (Communication, Media, and Rhetoric)
Title: First Amendment Controversies and Communication
Type of Presentation: Oral
John Q. Imholte Hall, Room #112, 2:00 p.m.

Abstract:
The freedoms of religion and speech are protected by the First Amendment under the United States Constitution. However, in U.S. history, the boundaries for religion and speech can conflict and thus create ambiguities when the interactions between the two freedoms are in practice. Such was the case in 2005 when Thomas Van Orden, who identified as an atheist, was offended by a monument with an inscription of the Ten Commandments that was on the grounds of the Texas State Capitol. The U.S. Supreme Court decided in the case of Van Orden v. Perry that the placement of the monument was constitutional. This ruling shows that even though the content of the monument’s text was religious, it is the context in which the monument was given and erected that proves to hold a higher significance in constitutionality. This higher significance of the context also suggests that more regard should be given to a sender’s intention than a receiver’s perception of message.
In the last twenty years, the development of wind power as a major source of renewable energy has progressed rapidly. However, as turbine sizes and developments have increased, so have premature failure rates. For many turbine subassemblies, technological innovations have allowed premature failure rates to decrease in recent years. However, no such technological innovations or decreasing rates have been found in the data for wind turbine gearboxes. Premature gearbox failure is the top cause of prolonged downtime among turbines in Sweden, Germany, and Denmark, and the extremely high costs associated with gearbox failure have made the issue a priority among both manufacturers and developers. This study uses raw data from the Windstats database of German and Danish turbine reports, along with various Swedish and Finnish sources of data to determine annual gearbox failure rates. The failure data are then used in partnership with actual production and cost data to formulate, in present value terms, an accurate comparative calculation of the costs associated with hydrostatic transmissions then reveals the potential economic viability of the innovation, and whether it is something to expect in future wind turbine development.
Abstract:

Every American president has a painted portrait commissioned at the end of their presidency, even in the present day. The way in which they are depicted reflects how they want to be etched into history. For example, Richard Nixon chose to be portrayed in a relaxed, intimate setting with the hopes that people would remember him as a human being in a more positive light rather than for the mistakes he made during his presidency. On the other hand, Franklin Delano Roosevelt was popular and his portrait portrays him in a position of authority to recall his time in office. Interestingly, the portrait for Franklin Delano Roosevelt by Douglas Chandor never reached completion but is currently housed and accepted as an official portrait in the National Portrait Gallery in Washington. The painting includes a portrait of Roosevelt, various studies of his hands, and a sketch of what the final work would have been. In my presentation, I will visually analyze Chandor’s study of FDR, compare the painting to the way other presidents were portrayed and interpret the portrait in the context of Roosevelt’s time in office. I will also discuss the reasons as to why the work, although incomplete, is still powerful and explore how the painting is able to capture the character of FDR.

- 10 -

Abstract:

In the academic field of international relations (IR), the utility of international governmental organizations (such as the UN) is highly disputed. In their work, most academics studying IR propose unilateral understandings of the utility of international governmental organizations (IOs). Thus, this work strives to refute the unilateral understanding of the role of IOs and instead proposes multilateral understandings or various roles that IOs fulfill. The methodology of this paper employs constructivist theory, while realist theory and liberalist theory are examined and refuted for their unilateral understandings of the roles of IOs. This paper proposes as its central thesis that IOs play multiple and unquantifiable roles in IR. The thesis is supported by an organized examination of the definitions and understandings of IOs by governments, non-government actors, and IOs themselves.

Through first examining current literature on IOs, this work begins to set the base for the counter proposal against the unilateral understanding of the organizations. It then examines the multilateral relations between IOs and their member countries, specifically focusing on the Organization of American States. It then examines the relations between IOs and non-governmental actors and the role IOs play in international development. The thesis is supported by the work in that a clear vision of the extremely complex multilateral roles of IOs is given. This work legitimizes itself in that it shows the multifaceted reality of globalization.

A world with such distinct cultures, languages, and understandings, a multilateral understanding of IR is crucial to proper diplomacy and global interactions.
Abstract: A high tunnel is a large hoop house covered by a single layer of greenhouse grade plastic, which can be left on or removed seasonally. High tunnels are used to extend the growing season of a variety of fruits and vegetables. Primocane or fall-fruiting raspberries are becoming common to high tunnels, especially in colder climates as the fruit’s growing season is often cut short by cold weather. While it is known that the growing season can be extended by high tunnels, this UROP funded research determines if high tunnels have comparable yields and berry size to conventional growing methods. This study compares the yields and berry sizes in the field trial and the high tunnel, in two locations. The first is at the University of Minnesota West Central Research and Outreach Center (WCROC) in Morris, MN, the second of which is on the University of Minnesota, St. Paul Campus. Both sites have the same cultivars and initial plant spacing. For the analysis a free statistical computing program called “R” was used. R software has a variety of capabilities, for our purposes the lme function was used because it allows for random error between the plots and within the plots. Data analysis showed that berry size and yield were enhanced used. R software has a variety of capabilities, for our purposes the lme function was used beca
**2011 Undergraduate Research Symposium**

**Presenter:** Austin Kelsey  
**Project Advisers:** Jessica Beyer and Karen Mumford (Environmental Studies)  
**Title:** The Minnesota Statewide Health Improvement Program-Evaluating Outcomes at Community Gardens  
**Type of Presentation:** Oral  
**John Q.inholt Hall, Room #111, 2:00 p.m.**  

**Abstract:**  
The Minnesota Statewide Health Improvement Program (SHIP) provides funds to Minnesota counties to implement policy or environmental interventions to promote healthy behaviors and reduce the burden of chronic disease. Counties can use SHIP funds to address nutrition, physical activity, and smoking cessation. Morrison, Todd, and Wadena counties in central Minnesota used SHIP funds to support several community garden projects in these counties. Evaluation of the impacts of these gardening projects was conducted by UMM staff and student research assistants. This presentation focuses on findings from the evaluation of three community garden projects.  

Qualitative interviews of participants were conducted during the summer and fall of 2010. Interview instruments were drafted and finalized by team members. Student research assistants conducted interviews in person. Interview responses were recorded manually and with digital recording equipment. Preliminary review of interview data indicated a rich array of garden participants and users, including food shelves, school children, educators, religious leaders, family and neighbors of gardeners, and community organizations. Participants stated that the quantity and diversity of local fruits and vegetables increased due to the SHIP-funded gardens. In terms of key successes, most participants indicated the increase of nutritious foods, exercise associated with gardening, and socializing with community members. However, concerns were raised about the need for local leadership and resources to sustain these initiatives into the future. These findings suggest that while community garden projects are viable, public health practitioners need to assist communities in building the capacity to sustain these initiatives.

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**Presenter:** Sam Krumpp-Johnson, Alex Kies, Alek Sievert, Matt Privratsky, Mark Privratsky, and Wyatt Nolan  
**Project Adviser:** Barbara Burke (Communication, Media, and Rhetoric and English)  
**Title:** A Websseries is Born: Practice in the Collaborative Process of Comedic Productions Intended for Internet Consumption  
**Type of Presentation:** Oral  
**John Q. inholt Hall, Room #101, 4:30 p.m.**  

**Abstract:**  
In order to further their understanding of and ability in video production, acting and directing, six students created the comedic websseries "Sketch 90." A Webseries is a media term for a video series created solely for use streaming entertainment on the web, divided into segments called "webisodes." Sketch 90, the webseries, chronicles the lives of three young men who time travel to the present day from the 1990's, as well as the new inhabitants of what used to be their house using 8 minute webisodes. This presentation will be about the creative processes used to accomplish a finished product, and all of the trials and errors that the group faced in the name of entertainment. Topics discussed will include formation of creative ideas, director’s process as inspired by John Jory’s Tips for Directors, transformation from script to video, and differences between editing for web based versus for DVD. The presentation will also contain a portion of video from one of the webisodes in the series.

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**2011 Undergraduate Research Symposium**

**Presenter:** Masera Turkson, Austin Kelsey, Joe Dunlavy, and Jon Braegelmann  
**Project Adviser:** Karen Mumford and Jessica Beyer (Math & Science and Center for Small Towns)  
**Title:** Evaluation of School Physical Activity and Nutrition Initiatives in Western Minnesota  
**Type of Presentation:** Poster #28  

**Abstract:**  
The Minnesota Statewide Health Improvement Program (SHIP) provides funds to school-supported K-12 projects that encourage healthy behaviors among students. Twenty-two projects are underway across elementary, middle, and high schools within these counties. These initiatives include various nutrition projects (e.g. school gardens, local foods curricula) and physical activity projects (e.g. winter snow shoeing, classroom balance balls). The purpose of this study was to evaluate the degree to which six school nutrition projects met their intended objectives and the types of challenges they faced during project planning and implementation. To assess each school project, qualitative interviews were conducted with project leaders and related-project staff. Interviews included questions about project implementation, goals, and capacity challenges. UMM faculty, staff, and students traveled to school sites to conduct in-person interviews. Responses were drafted for any transcripts indicated that major challenges in implementation were due to understimation of preparation and start-up time. Despite these challenges, respondents also observed increased interest among other teachers and administrators to expand these initiatives to other classrooms and future. Respondents also voiced concerns about capacity challenges associated with the availability of outside resources or staff to help in project planning and implementation. Results from this evaluation will help statewide health planners understand the successes and difficulties schools face when implementing nutrition programs to encourage healthy eating.

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**Presenter:** Ellis Valentinier  
**Project Advisers:** Jon Anderson and Karen Mumford (Statistics and Biology)  
**Title:** Seasonal Influenza Vaccination Behavior in Stevens County  
**Type of Presentation:** Poster #25  

**Abstract:**  
Vaccination is a proven method of prevention against seasonal influenza that provides little risk of side effects. However, many individuals choose not to vaccinate themselves against the illness. The present research compared the attitudes, beliefs, and behaviors of those who received the seasonal influenza vaccine and those who did not to identify opportunities to improve compliance. Participants were selected from households in Stevens County, Minnesota using a two-stage cluster selection process. U.S. Census data were used to calculate the number of households necessary to achieve a representative sample using probability proportional to size of each census block. Interview surveys were conducted between June, 2010 and October, 2010 using an online survey tool, UMsurvey. Participants consisted of 86 adult volunteer living in Stevens County who consented to participate in the survey. Survey questions were designed to gather specific information concerning current attitudes, motivations, and subjective norms toward seasonal influenza vaccinations. Results from the study show approximately 70% of respondents reported receiving the seasonal flu vaccine within the last 12 months while 30% had not. About 24% had never received a seasonal flu vaccine. Furthermore, 24% were unsure of whether seasonal flu vaccines could cause influenza. Information about local vaccination attitudes, beliefs, and behaviors is useful information for local public health officials and allows for message-framing interventions for population subgroups with known vulnerabilities. Findings will be used to assist development of strategies to increase vaccination compliance. This study was supported by the Center for Small Towns at the University of Minnesota, Morris and Bremer Foundation Fellows Program.

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2011 Undergraduate Research Symposium

Presenter:  Katrina Thomas
Project Adviser:  Rich Hardy (Sports Management)
Title:  The IKDC is the dominant Outcome Measure of ACL Reconstruction
Type of Presentation:  Poster #29

Abstract:  More clinicians and academic practitioners use outcome measures or scales to evaluate patient response to Anterior Cruciate Ligament reconstruction. The purpose of this study was to determine which scale was the most frequently used and whether it varied by continent. In order to determine which tests were used fifty studies were chosen from pubmed.com. The studies focused on the outcome after an Anterior Cruciate Ligament reconstructive surgery. The continent and scale(s) used for each publication were documented. Of the fifty studies each were broken down by continent and type of scale. It was determined that the IKDC score was the most commonly used score across the world with the exception of Asia which preferred the Lysholm score. These results show that there is a preferred score across the world, and it would be easy for everyone to perform this test for consistency.

Presenters:  Ashleigh Thompson and Ember Phillips
Project Adviser:  Chris Cole (Biology)
Title:  Cottonwoods: Trade-offs between Biomass Production and Chemical Defense
Type of Presentation:  Poster #4

Abstract:  Cottonwoods, poplars, and aspens (Populus species and hybrids) have the broadest range of all North American trees and are the main trees grown for biomass fuel production, principally in Europe but increasingly in North America. Recent research shows that, in aspens (P. tremuloides), there is a metabolic trade-off between growth and defense. Cottonwoods are notable for extremely high growth rates, and our work sought to discover whether this species (P. deltoides) also shows a trade-off between growth and chemical defense. We quantified growth by measuring annual growth rings of cores from cottonwood trees in the Morris area, and quantified defense by measuring the concentrations of condensed tannins in leaf tissue from the same trees. An abstract search shows that, in aspens (P. tremuloides), there is a metabolic trade-off between growth and defense. Cottonwoods are notable for extremely high growth rates, and our work sought to discover whether this species (P. deltoides) also shows a trade-off between growth and chemical defense. We quantified growth by measuring annual growth rings of cores from cottonwood trees in the Morris area, and quantified defense by measuring the concentrations of condensed tannins in leaf tissue from the same trees. Annual growth rings were huge, sometimes exceeding 1 cm, but often had very indistinct boundaries, and there was a high level of variation even within individual rings in a single tree. Growth rates (measured as ring widths) increased rapidly in young trees, then declined when the trees reached maturity. Condensed tannin levels were extremely low. Because the growth rates were so high, and so highly variable, and the tannin levels were so low, we found no evidence of a trade-off between growth and defense within this species. In comparing P. tremuloides and P. deltoides, the trade-off between growth and defense is very strong in P. tremuloides. Whereas aspens have more chemical defense, cottonwoods grow fast instead. Funding from the National Science Foundation STEP (Science, Technology, and Engineering Program) and the UMM MMP (Multicultural Mentorship Program) programs.

2011 Undergraduate Research Symposium

Presenter:  Hannah Lindquist
Project Adviser:  Tisha Turk (English)
Title:  Infiltrating the Classroom: High-Stakes Essay Tests and High School Writing Instruction
Type of Presentation:  Oral
John Q. Imholte Hall, Room #101, 2:50 p.m.

Abstract:  Educators and scholars of composition studies acknowledge a gap that often exists between high school and college writing instruction. Many students enter college underprepared for the academic writing and critical thinking that is expected of them. Though freshman composition courses are designed to ease this transition, some students still feel the inadequacy of their high school writing instruction. However, it is important to consider that high school teachers must balance their writing instruction to meet a variety of purposes, not solely college preparation. In my research I explore the role of high-stakes essay tests in influencing high school teachers’ instruction of writing and students’ perceptions of writing. The tests I look at are the standardized BST and GRAD tests, required in Minnesota for high school graduation; essay questions on AP exams; and the ACT and SAT essay portions. High-stakes essay tests do not claim to comprehensively assess students’ writing ability and educators agree on the limited applicability of these tests. I argue that the pressure teachers feel to “teach to the test” can unintentionally unbalance their other, though not necessarily conflicting, goal of preparing students for college. From a student perspective, I explore how classroom preparation for high-stakes essay tests and the testing contexts themselves can limit students’ understanding of writing as a process that facilitates thinking and communicates knowledge. In order to narrow this writing gap, I argue for the current conversation to expand, more fully including students and exploring the problem at the level of individual high schools.

Presenter:  Taylor Lunemann
Project Adviser:  Barbara Burke (Communication, Media, and Rhetoric)
Title:  Selling the Droid: An Analysis of Online Advertising Strategies
Type of Presentation:  Oral
John Q. Imholte Hall, Room #101, 3:15 p.m.

Abstract:  To keep up, the advertising world is changing as different sources of media are forming or evolving with the technology advances in the world. Therefore, companies choose to use various new tactics to persuade their targeted consumers to purchase their products. I studied the advertising world and discovered how the Droid smartphone is being advertised. One research method applied to this analysis was Gutman’s means-end model. This model suggests consumers buy products that bring them benefits that get them closer to valued ends. Research using this model often offers marketers a way to position products by associating means—values the product—with advertising that seeks to tie the use of products to the achievement of desired ends—valued states. By using this model, I was able to analyze which visual elements in the advertisements were used to appeal to the consumer’s personal values. Another research method applied to this research study of ads was Rank’s intensification/downplay model. In this model, persuaders choose from four strategies of action: intensify their own good points, intensify the weak points of the opposition, downplay their own weak points, and/or downplay the good points of the opposition. Using this model, I was able to determine what qualities the Droid was intensifying and downplaying about itself and its competitors. Findings from this study may be used to help scholars better understand the unique features of the world of online advertising.
portraits tell us vital personal information about this Renaissance artist. I argue that these self
portraits in the portraits in the
Last Judgment of Television Commercials from the 2010 Major League Baseball World Series Telecasts
Title: Home Run: An Assessment of Television Commercials from the 2010 Major League Baseball World Series Telecasts
Type of Presentation: Oral
John Q. Imholte Hall, Room #101, 3:40 p.m.
Abstract:
The Major League Baseball World Series is one of the most-watched sporting events on American television, with over 14 million viewers tuned in to each game of the World Series in 2010 (MLB.com). The Super Bowl, World Cup, and other major sporting event commercials have been studied frequently in the past, yet the World Series commercials have little research data to date. For the collection of 2010 commercials, this project asked: What were the most frequently advertised products? What were the most common persuasive techniques used by advertisers during commercials? What were the most common themes presented in World Series commercials and how were they related to the target audience? To answer these questions, this project used systematic content analysis to generate descriptive quantitative data, and used Rank's "model of persuasion" to create an interpretative analysis of ad characteristics and content. Each game's commercial content sets were unique, the assortment varied from game to game, and persuasive strategies within product ads varied as well. Using communication theories and analysis to learn about the placement and message strategies of commercials shown during popular sporting events can lead to better understanding about how companies use these practices to increase sales, and how they try to influence sports fans to be advertising viewers and product consumers.

Abstract:
The Last Judgment in the Sistine Chapel by Michelangelo Buonarroti has been a source of controversy since the time of its creation in 1541. More recently the arguments regarding the evidence of Michelangelo’s self-portraits within this fresco have been scrutinized and criticized by many scholars, with the result that only one of the four potential self-portraits is widely accepted as an image of the artist. My research digs deeper into this problem by examining the reasons Michelangelo would have had to portray himself in his works, in general through iconography. The presentation will also suggest that by broadening the focus to Michelangelo’s use of self-portraits in all of his works, it is possible to move beyond the controversies currently surrounding the self-portraits in the Last Judgment. Through visual analysis I will examine the possible reasons behind Michelangelo’s choice to portray himself in his works and his choice to do so in unflattering and unusual ways. I argue that these self-portraits tell us vital personal information about this Renaissance artist.
In recent years, conducting polymers have gained attention for their promising application in solar cells due to their potential low cost, lightweight, and flexibility. Polymers are molecules which have repeating units and are used in everything from plastics to paint. A variety of copolymers with alternating repeating units were calculated using the theoretical chemistry software Gaussian03. Theoretical calculations were used to calculate electronic properties of the polymers and resulting band gap energies. The band gap energy can be defined as the potential stored energy in the polymer which is important when polymers are being considered as energy sources for solar cells. Methods of finding this band gap exist using density functional theory (DFT) by calculating the energy gaps of increasing oligomer lengths (n), and plotting the energy gap (in eV) as a function of the reciprocal polymer length (1/n). This method, however, proves time consuming and computationally costly. An alternative, less time-consuming method using periodic boundary conditions (PBC) exists within the Gaussian03 program. In our research, we studied oligomer lengths (n), and plotting the energy gap (in eV) as a function of the reciprocal polymer length (1/n). This work was funded by the Morris Academic Partnership (MAP) program.
2011 Undergraduate Research Symposium

Presenter: Colin Scheck
Project Adviser: Seung-Ho Joo (Political Science)
Title: Defending Sovereignty in the Midst of Giants: Mongolian Foreign Policy in the New Millennium
Type of Presentation: Oral
John Q. Inholtte Hall, Room #111, 3:15 p.m.

Abstract:
The primary goal of this paper is to ascertain and analyze Mongolian foreign policy objectives regarding China, Russia, and the United States as well as the great powers’ interests in the landlocked third world nation. In essence, a key objective in this case study is to address how a small weak state deals with safeguarding its sovereignty in the face of its adverse geo-political position between two great powers. Research was conducted via foreign policy journals and news articles from Mongolian, British, American, Russian, Chinese and Russian sources. The paper examines Mongolia’s relations with its two immense and powerful neighbors, China and Russia, and how its “third neighbor policy” seeks to offset the influence of aforementioned states by strengthening relations with the United States. Mongolia’s neutrality and growing desire to demonstrate its value to Northeast Asian security is analyzed and critiqued in the context to its reinforcement and defense of Mongolian non-alignment. I argue that Mongolian foreign policy in the past decade is idealistic in nature and ineffective in foreign policy, despite the progress of US-Mongol relations under the Bush administration to offset the growing imbalance of influence within the small state. Chinese influence is found to be growing stronger as well as a decreasing American presence triggered by the 2008 economic crisis and Obama’s Northeast Asian policy. With little alternative, Mongolia will look to Russia in order to prevent Chinese dominance, a sharp change from their previous policy of distancing away from Moscow.

Presenter: Dominic Scheck
Project Adviser: Bradley Deane (English)
Title: Saying, “I cannot say, I”: Spectral Subjectivity in The Picture of Dorian Gray and Dr Jekyll and Mr Hyde
Type of Presentation: Oral
John Q. Inholtte Hall, Room #101, 2:25 p.m.

Abstract:
Animated by the rigorous close reading methods and binary-subverting spirit of Derridean deconstruction, my project reveals how two short novels of the British fin de siècle, The Picture of Dorian Gray and Strange Case of Dr Jekyll and Mr Hyde signed by Oscar Wilde and Robert Louis Stevenson respectively, destabilize their images of a unified subjectivity, the position of being a subject ontologically, phenomenologically, and grammatically. I argue that the titular terms of the two texts, Dorian/picture and Jekyll/Hyde, are insufficient for bounding the identities they intimate and that the texts suggest but finally evoke the inadequacy of two modes of organizing self: body and narrative. Body fails to circumscribe either of the dually-but-singularly somatic subjects, and narrative, whether textual or memorial, fails to thread together past iterations of the self and a present one. While the critical discourse on these texts has predominantly identified Jekyll and Hyde, and Dorian and his portrait, as gothic doubles or split selves, my project thus demonstrates how neither term in either pair contains in itself a subjectivity; rather, the Jekyll/Hyde and Dorian/picture dichotomies overturn themselves to show that Hyde and Jekyll are always already present in each other, in himself, and that the interplay between Dorian the portrait and Dorian the person produces Dorian’s necessarily slippery subjectivity. The implication here is that identity is, in my words (which are not actually mine) and Jekyll’s (which are not actually his), an auto-destabilizing “polity of multilarious, incongruous, and independent denizens.”

Presenter: Elise Porcher
Project Adviser: Chris Cole (Biology)
Title: Developing an Optimum Method for Harvesting Seeds of Cuphea wrightii
Type of Presentation: Poster #1

Abstract:
Cuphea is a plant, native to North America. Cuphea oil [Lauric acid] for most purposes is identical to coconut and palm oils, which has peaked the interest of Aveda, a beauty company that concentrates on botanically based products. Lauric acid is an important ingredient in beauty and personal care products. The objective of this experiment was to develop a method to optimize seed harvest of Cuphea wrightii, by using a variety of mulches and materials to collect the seeds as they dispersed. The field study was conducted at the Swan Lake Research Farm. The Cuphea seedlings were started in the green house and then transplanted into seven different mulching treatments. The purpose for the mulch was to collect the seed for easier harvest, while providing a beneficial growth environment for the plants. The treatments were also divided into frequency of harvest. Some treatments were harvested periodically on a 10 to 12 day basis, starting July 21st, while other treatments were only harvested midway and at the end of the growing season. The results of this experiment are still being analyzed, but so far these materials show a slight increase in harvest efficiency, but it is unknown how significant. The mulch did benefit in providing easier harvest. However, further research needs to be done to domesticate this crop. In conclusion, Cuphea wrightii is a rich source of Lauric acid and could be used to replace imported oils, but further research is needed.
Abstract:

Students often have a difficult time comprehending electrochemical concepts due to the level of abstraction involved. Common misconceptions exist regarding the movement of electrons through an electrochemical cell and the relationships between voltage, current, and resistance. Even textbooks contribute to these misconceptions that must be overcome in order for students to understand what is happening on the micro level. The goal of my NSF funded summer research at North Carolina State University was to develop experiments that addressed specific concepts in electrochemistry in order to address common misconceptions. Experiments were developed to help students connect the macro and micro levels of representation in electrochemistry by the unification of physical sciences’ concepts. The concepts explored included the relationship between the concentration of electrolyte in the electrochemical cell to the solution resistance, the relationship between the concentration of solution in the cell to the intensity of light from a LED, and the relationship between the resistance and voltage with varying resistors. These experiments were developed to allow students to construct definitions of concepts and qualitatively explain what is taking place in the cell with minimal guidance from the teacher. The results of this research project, the actual educational activities, will be tested in future research to see if these experiments help students to better develop a strong conceptual understanding of electrochemistry.

Presenters: Alaina Pearce and Ellis Valentinier
Project Adviser: Cheryl Stewart (Psychology)
Title: Effects of Lexical Shortenings and Word Errors on Cognitive Processing
Type of Presentation: Poster #27

Abstract:

At present, little research information exists on cognitive processing of text messaging. The present study examined the effects of lexical shortenings/text language, Standard English, and grammatically incorrect/misspelled wording and message content (academic versus conversational material) on memory in a 3 x 2 mixed factorial design, with message content as a repeated measures variable. Participants were randomly assigned to one of three language conditions, and received both the casual and academic readings in the same order of readings counterbalanced across participants. The main measures of cognitive processing included a free recall task and a multiple-choice exam. Additionally, reading time served as a secondary dependent variable. We expected that if lexical shortenings represent an emerging language then they should be processed as linguistic material, thus producing better memory for the essays than when those essays were written with grammatically correct misspelled words. Whether lexical shortenings lead to poorer memory for material relative to Standard English also was investigated. At present, texting is used primarily for casual conversations; however, texting of academic material is on the horizon. Prior to assuming that content-rich academic material can be communicated using texting, we need to know whether memory for this type of material remains intact. Finally, consistent with Perera et al. (2009), lexical shortenings should take longer to read than the same passage in Standard English; furthermore, we expect a time difference is likely to be true regardless of the content of the passage. This research was supported by UROP.
2011 Undergraduate Research Symposium

Abstract:
The right to freely communicate in the United States has long been a source of in-depth deliberation. Decisions made by the Supreme Court regarding the extent and limitations of our free speech rights impact each of our lives on a daily basis. The facts regarding the case Citizens United v Federal Election Commission, 130 S.Ct. 876 (2010) play an essential role in understanding free speech as it applies to citizenship, justice, and democracy in our society today, specifically in terms of media film content. Through analysis of the justices’ concurrence and dissenting opinions as well as the facts, prior treatment, and decisions of the case, this research addresses the current state of communication freedom within the film medium. Produced by the Citizens United corporation, Hillary: The Movie, was released preceding the 2008 primary elections. Analysis of the case brought in response to the controversial nature of this film illustrates a paradigm shift in the understanding of freedom of speech by the Supreme Court.

2011 Undergraduate Research Symposium

Abstract:
Without question, one of the most powerful liberties that exists in the world today is the freedom to communicate. In the days where books, magazines, and artwork dominated the most popular forms of public forum, a raging debate swirled over the limitation of obscene works in the United States. This deliberation holds steadfast in the culture of more modern times with the frequent use of text messaging, social networking, and the Internet as common means of communication. Using the decision within United States Attorney General John D. Ashcroft et. al. v. American Civil Liberties Union et. al. (2004), a derivative of various past United States Supreme Court obscenity, commercial speech, and balance of interests rulings, I have explored the limits of governmental censorship on specific types of material with the advance of technology. I have also examined the contribution to case law Ashcroft v. ACLU provides for future free speech cases. In addition, with an erosion of political turmoil in recent events surrounding the limitations of internet communications in both United States, as well as around the world, I have researched the negative effects and tremendous impact of limiting communication over the internet. With past case law, as well as the decision within Ashcroft v. ACLU, I establish that it is a common goal of the court to protect nearly all forms of speech, even as the spectrum of mediums for communication expand with modern technology, as they are a fundamental basis for the functioning as a united republic.

Presenters:
- Morgan Turner
  - Project Advisor: Mary Elizabeth Bezanson (Communication, Media, and Rhetoric)
  - Title: First Amendment Controversies and Communication
  - Type of Presentation: Oral
  - Room #112, 2:50 p.m.

Presenters:
- Michael Ward
  - Project Advisor: Mary Elizabeth Bezanson (Communication, Media, and Rhetoric)
  - Title: First Amendment Controversies and Communication
  - Type of Presentation: Oral
  - Room #112, 3:15 p.m.

Presenters:
- Jeffrey Lind
  - Project Advisor: Gordon McIntosh (Physics)
  - Title: Skylight Polarization from a Balloon Flight
  - Type of Presentation: Poster #12

Abstract:
This research project attempted to measure the polarization of skylight as a function of altitude using a balloon-based polarimeter. The hypothesis was that as altitude increases the model of a Rayleigh sky (single scatters from very small particles) improves because the likelihood of multiple scatters and the aerosol density decreases. Aerosols affect the amount of sunlight being reflected or absorbed in our atmosphere and play a role in planetary energy balance. This experiment was a technique to measure the distribution of aerosols as a function of altitude. The polarimeter utilized eight LED light detectors with seven detectors filtered by fixed linear polarizers and one unfiltered detector. The linear polarizers were positioned at fixed increments of ~26 degrees, and the filtered detectors were calibrated by the unfiltered detector. In November 2010, the polarimeter took data during a near space balloon flight to an altitude of approximately 80,000 ft. Results were inconclusive because of the cloudy weather that eliminated the polarization signal at lower altitudes where aerosols are most prominent. The use of the polarimeter during a balloon flight was successful because of the new design with no moving parts. A second flight to occur in March 2011 will improve directional capabilities using an accelerometer and compass measurements to record the detector’s viewing vector. With directional information, the measured degree of polarization can be compared directly to the Rayleigh sky model. This experiment was sponsored by a University of Minnesota UROP.

Presenters:
- Andrea Lund
  - Project Advisor: Karen Mumford (Biology)
  - Title: Effects of Machismo and Acculturation on HPV Vaccination Status and Willingness among White and Latina Women
  - Type of Presentation: Poster #5

Abstract:
This study examined cultural factors influencing Latina women’s attitudes towards the human papillomavirus (HPV) vaccination. Specifically, the concepts of acculturation and machismo were examined, which evaluate the degree to which participants (a) adapt to host culture and (b) agree with traditional Latino ideals of masculinity. This research is important because HPV is the most common sexually transmitted infection (STI) in the United States and Latina women are at a disproportionate risk of cervical cancer relative to other ethnic groups. Quantitative research that examines such cultural factors in relation to HPV vaccination is limited. A survey of 300 Caucasian and Latina women was conducted. Study participants were recruited from area clinics. Questions addressed measures of acculturation, machismo, social norms, and vaccination status. Logistic and linear regressions were constructed, with age as a covariate predicting vaccination status. Results indicated that increased adherence to the principles of machismo significantly decreased the odds of women (a) being vacine against HPV (Odds Ratio = .95, 95% Confidence Interval = .88-.99) and (b) being willing to receive the HPV vaccine (Odds Ratio = .94, 95% Confidence Interval = .91-.98). Acculturation measures on the same responses were not statistically significant. Machismo and acculturation also had significant effects on other factors related to HPV including injunctive and descriptive norms, HPV knowledge, number of lifetime sexual partners and having ever been diagnosed with an STI. These results indicate that cultural factors may contribute to lower rates of HPV vaccination among Latina women and thus increased risk of cervical cancer, compared to Caucasian women. This research was sponsored by the Des Moines University Summer Research Program.
The primary objective of the project was to study the effects of shockwave propagation in crystalline RDX, a common explosive. An existing computer model of the RDX crystal was used in the study. A program was developed to model the shockwave in a molecular dynamics simulation. In addition, the model itself was adapted to include buffer zones to absorb any repercussions of the shockwave caused by the limited size of the model. Two cases of RDX were studied under shockwave stresses: the ideal crystal and a crystal with a void. Voids are thought to facilitate the transfer of shock energy to intramolecular degrees of freedom. Such an energy transfer is necessary to initiate an explosion. I analyzed the dissipation of the energy of the shockwave into intermolecular and intramolecular degrees of freedom. The crystal with a void favored energy dissipation into the bend and torsion degrees of freedom within the RDX molecule. This indicated that the presence of voids favors molecular excitation during a shockwave. As shockwaves are an integral component of the detonation of RDX, the results of the study fit well into a larger effort to make the handling of RDX safer. The project was funded under the UROP program.

Abstract:

The experiment was designed with the goal of testing pollinator constancy (regularly choosing the same flowers to visit) in two different fly families (Syrphidae and Tachinidae) common to Pomme de Terre Park. Pollinator constancy in both fly families was recorded the fly’s bouquet choice. Statistical testing using a Kappa analysis and 2x2 contingency table showed a strong preference of the fly foraging on one of the two species and the other containing Solidago canadensis (Canada goldenrod) and the Symphyotrichum laeve (smooth blue aster), to a fly already foraging on one of the two species and recorded the fly’s bouquet choice. Statistical testing using a Kappa analysis and 2x2 contingency table showed evidence for pollinator constancy in both fly families and a strong preference towards S. laeve. These data and resulting conclusions will further general knowledge of fly pollination and pollinator constancy. Furthermore, the data suggest that these two fly families are important in transferring pollen between wildflowers in the Po. The evidence for pollinator constancy in both fly families will further general knowledge of fly pollination and the pollinator constancy. Furthermore, the evidence for pollinator constancy in both fly families will show how something political, like worker’s rights, can translate into music to make a forceful statement. This presentation, which will include a live performance of pieces from the piece, will demonstrate that Contemporary music, like Winnsboro Cotton Mill Blues, can create a powerful impression for a general audience.
**Poster Presentations**

Science Atrium

10:00 a.m. – 12:15 p.m.

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**Presenter:** Douglas Armstrong

**Project Adviser:** Richard Hardy (Wellness and Sport Science)

**Title:** Skin Preparation for Bursal or Articular Injection

**Type of Presentation:** Poster #26

**Abstract:**

As skin preparation for either a bursal or articular (joint) injection, Duraprep (3M, St. Paul, MN) is more expensive per use than an Iodine Sepp Applicator (Enturia, Leawood, KS) ($2.66 Vs. $0.28 per application). The purpose of this study was to compare irritation and infection rates between the two skin preparation agents after injection. We reviewed the charts of 365 patients (combined 543 injections) who were injected after the skin was prepared with Duraprep (169 patients- 92 males & 77 females) or an Iodine Sepp applicator (196 patients- 86 males & 110 females) at Heartland Orthopedic Specialists between September 2008 and April 2009. Injections of the glenohumeral joint, acromioclavicular joint, subacromial space, and the tibiofemoral joint were analyzed. Using Chi-Square tests, we found no significant difference in adverse reactions between the Duraprep group and the Iodine Sepp applicator group (p=0.07). However, males whose skin was prepared with Duraprep were more likely to experience an adverse reaction (p=0.014). Neither group experienced a culture positive infection as a result of a wound infection. There were no differences between the groups in infection rates after a culture positive wound infection.

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**Presenter:** Guinevere P.E. Biker

**Project Adviser:** James B. Togias (Chemistry)

**Title:** Isoteric Hydrogen Bonding in Substituted Acetic Acid Dimers

**Type of Presentation:** Poster #7

**Abstract:**

Two molecules of acetic acid combine by hydrogen bonding to form a dimer. The derivatives of acetic acid form dimers of the same hydrogen bond strength to within chemical accuracy, as found by calculation. The dimers were found to be isoteric, meaning that the dissociation energy of the dimer is the same regardless of the attached substituent. The dissociation energy is the energy required to break the dimer into the two molecules of acetic acid the dimer originated from. The result of isotericity is unexpected because acetic acid and its derivatives do not have the same acidic strength. Added substituents alter the strength of other types of bonds, such as covalent and ionic bonds, and it was presumed that the same trends would hold for hydrogen bonds as well. This unexpected result means that the dimer molecules are made up of two independent units: the dimer ring and the substituents attached to the ring, thus making the dimers near-invariant. The result of near-invariance is consistent with other calculated measures of stability. Calculations were run on Spartan ’08 for Windows, Macintosh and Linux. The sponsoring fund of this research was the Chemistry Undergraduate Research Fund (CURF), an alumni funded chemistry program.

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**Presenter:** Alicia Johnson

**Project Adviser:** Van Gooch (Biology)

**Title:** Light to Dim Oscillatory Response in Neurospora crassa Circadian Rhythms

**Type of Presentation:** Poster #2

**Abstract:**

*Neurospora crassa*, a fungus, is a model system often used for studying circadian rhythms. These rhythms are influenced by environmental factors such as light, although their regulation at a cellular and molecular level is not well understood. Previous studies have failed to observe circadian rhythms in *Neurospora* under constant light conditions. Through our use of an optimized Firefly luciferase reporter gene our novel experiments have shown that *Neurospora* can display circadian rhythms in dim light. These circadian rhythm oscillations are observed only when the cultures receive a light pulse as short as fifteen minutes before going into dim. We refer to this behavior as the “light to dim oscillatory response”. It is important to note that oscillations are absent in cultures that go from dark to dim conditions. We have characterized this response in respect to the length of light pulse, time of light pulse before dim, intensity of dim light, and the unique oscillatory response in dim light. Although we are unclear of the molecular mechanism that drives this light to dim oscillatory response, it is significant that the *Neurospora* are able to “remember” this light pulse given at thirty hours before they enter dim light conditions. This finding suggests that a long-term memory of bright light exists as part of the circadian molecular components and impacts the circadian timing mechanism. The light to dim oscillatory response shows the importance that light plays in influencing circadian rhythms in an area of study that has not been well explored.
Abstract:
In 1959, Sklar first introduced the idea of copulas to model multivariate distributions. Since then, copulas have become extremely important and popular in many different fields including finance, actuarial science and statistics. In finance, copulas are extremely important in determining dependence and correlations over time. A well-known problem in finance is finding good diversification strategies in order to try and limit risk of a portfolio. Copulas are used to solve such a problem because they are able to capture the “tail-end” behaviors of distributions well enough so that small sets of data are not overlooked. The significance of this research project is to get a better understanding of the importance of copulas so that we can use them to predict the probability that a certain portfolio will fail by a certain amount. We accomplish this goal by looking at the lower dependence of a copula. We looked at the stock returns of four stock indexes ideally the S&P 500, NASDAQ, FTSE, and Dow Jones indexes. We also used one-year, five-year, and ten-year bond returns. We examined the different classes of copulas and the properties of each copula class to fit a copula to each pair of stock indexes and bond returns. We then examined the predicted dependence of each pair of stocks and bonds. This finding led us to conclusions about the diversification of a portfolio and the Value-at-Risk (VaR) of each pair of copulas.

Presenters: Ayano Jiru and Lea Awoudi
Project Advisers: Jon Anderson and Stephen Burks (Statistics and Management)
Title: Workers Compensation Claims: Analysis of Injuries and Costs
Type of Presentation: Poster #22

Abstract:
Work related injuries cost trucking companies millions of dollars annually. As a result, companies have set out to find ways to reduce injuries while at work. The Truckers and Turnover Project has been working with cooperating carriers in studying workers injuries and costs. The data used are from a large trucking firm consisting of 3,400 worker’s compensation claims from 1999 to 2004. The objective of our research is to produce statistical analyses of injury types and costs. Particularly, claims frequencies over months, climate seasons, years, the amount of compensation associated with different types of injuries, and attorney involvement in the claims, were analyzed. These variables were studied using STATA statistical analysis package. Claims with zero dollar amounts were examined separately to better understand the factors that predict them. Statistical tests were performed to study the correlations between variables and the multivariate factors that affect the risk of a workers’ compensation claims. These findings will help to better assess the economic impact of work-related injuries and inform decisions on steps to limit on-the-job risk.

Presenters: Michael Hoffman
Project Adviser: Peh Ng (Mathematics)
Title: A Copula Approach to Modeling of Financial Markets
Type of Presentation: Poster #15

Abstract:
We examined variation in limb structure, such as number of tarsal bones (in forelimbs and hind limbs), of preserved salamanders bought from Carolina Biological Supply. Modeling work done on California salamanders, we developed and tested methods to dissolve tissues surrounding the bones and staining techniques for analysis. We hypothesized that we would find little variation in limb morphology because these salamanders are farmed animals bred to be similar to one another. This hypothesis was confirmed. Our findings provide a useful null model as future research expands to measuring the variation in limb morphology of local and natural populations of salamanders near Morris, MN.

Presenters: Clara Dux and Ellis Valentiner
Project Adviser: Jeffrey Ratliff-Crain (Psychology)
Title: Effects of Caffeine Consumption on Mood and Physiological Responses to a Speech Task
Type of Presentation: Poster #24

Abstract:
Caffeine is commonly consumed to aid in dealing with stressful situations. This study was designed to examine mood and physiological responses to anxiety-inducing situations when consuming caffeine. We expected greater stress responses with caffeine consumption that would be moderated by caffeine-related expectations. Participants were UMM students who each consumed at least 100mg of caffeine daily. Participants were randomly assigned to one of four conditions in a 2x2 placebo design in which the presence of caffeine and caffeine-related expectations were manipulated. Participants completed a simulated public speaking task to create an anxiety-invoking situation. Mood and physiological measurements of blood pressure and heart rate were taken throughout the study. Nonparametric tests revealed there were no significant differences among participants across conditions at baseline. Univariate analysis of variance confirmed the effect of the caffeine expectancy manipulation. The speaking task was effective in producing anxious mood and physiological responses. There was no drug effect or expectancy effect. Thus neither hypothesis was supported by the data. Further analysis revealed an interaction among total caffeine consumption, diastolic blood pressure (DBP) changes, and mood responses. Both DBP and caffeine were predictive of negative mood reactions to the speech task. This combination of mood and physiological response suggests a negative stress reaction when consuming caffeine. The presence of a negative stress reaction as a result of caffeine consumption directly conflicts with the use of caffeine as a coping strategy, one of the many reasons people self-report for consuming caffeine. This research was supported by UROP.
Abstract:
Clouge is a relatively young programming language, introduced in 2007. Clouge is developed as an Open Source language, which means that the software that translates Clouge programs into executable computer instructions (i.e. the Clouge implementation) is freely available for everyone to use and modify. Clouge has generated a strong interest in the programming community due to its support for easier and safer programming for multiprocessor systems, a traditionally difficult and error prone task. Clouge is developed under the assumption that the programmers who use it understand the details of its implementation. When a Clouge program encounters an error, the resulting error messages refer to such details. However, now that Clouge has reached a broader programming community, one can no longer assume that all Clouge programmers know about its internal details. These error messages may confuse or mislead new programmers, and often create a frustrating programming experience. Our research aims to solve this problem by decreasing the number of internal details that are exposed in Clouge’s error messages. We are modifying the parts of the Clouge implementation that check program correctness to produce more informative error messages. We present a comparison between the new and the old error messages, and show that our style of error messages is easier to understand. As programming for multiprocessor systems becomes increasingly important, our research will help to broaden Clouge’s adoption, allowing more programmers to use Clouge’s support for reliable multiprocessor programming. This research is sponsored by UMN UROP and LSAMP.