4-23-2010

2010 Undergraduate Research Symposium Abstract Book

Academic Center for Enrichment

The 2010 Tenth 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.

2010 Undergraduate Research Symposium

The University of Minnesota, Morris

- 2010 -

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

Friday, April 23, 2010

12:30 p.m. – 1:15 p.m.	Registration: HFA Recital Hall
1:00 p.m. – 1:30 p.m.	Improv Performance: *Unusual Suspects* HFA Recital Hall
1:30 p.m. – 1:45 p.m.	Welcome: Dr. Cheryl K. Contant Vice Chancellor for Academic Affairs and Dean
1:50 p.m. – 2:20 p.m.	Featured Presentation: HFA Recital Hall Mitch Grussing - *A Prairie Cantata*
2:30 p.m. – 4:55 p.m.	Performance and Oral presentations: HFA #170 and John Q. Imholte Hall, Room #s: 101, 109, 111, 112, 114, 202, 217
5:00 p.m. – 7:00 p.m.	Posters/Visual Displays and Reception: Science Atrium

ORAL PRESENTATIONS
John Q. Imholte Hall Room #s 101 and 109

Room #101

3:45 Matthew Bombyk (Economics): **Does Costly Cooperation in the Lab Predict Similar Behavior on the Job? Evidence from Field Experiments with Truckers** (Adviser: Steve Burks), abstract pg. 9

4:10 Michael Zajicek (Economics): **Electricity Demand Smoothing: A Case Study at the University of Minnesota, Morris** (Adviser: Arne Kildegaard), abstract pg. 20

4:35 Andrea Lund (Biology/Environmental Science): **The Relationship Between Housing Conditions and Respiratory Illness in Migrant Ngöbe Children: A Global Public Health Study** (Adviser: Karen Mumford), abstract pg. 15

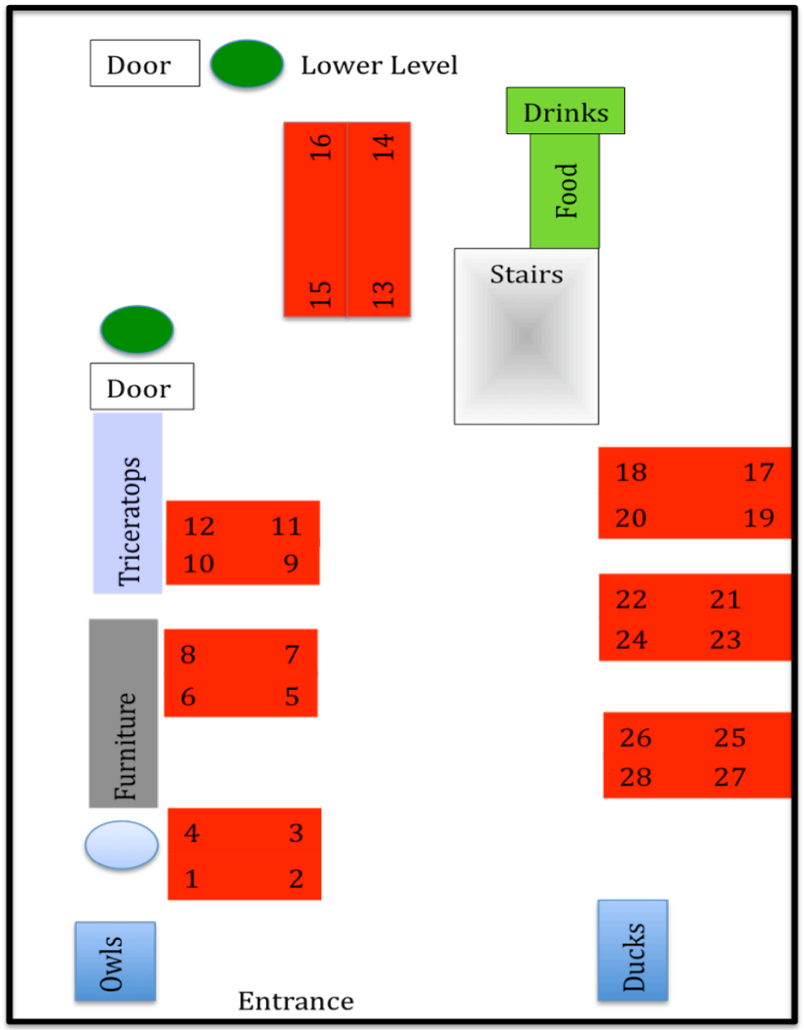
Room #109

3:45 Katrina Flaig (Art History): **Hercules in Early Christian Art** (Adviser: Jimmy Schryver), abstract pg. 12

4:10 Dugan Flanders (Art History): **Mycenaean Tholos Tombs: Construction and Significance** (Adviser: Jimmy Schryver), abstract pg. 12

4:35 Laura Sims (Art History): **The Photography of Sally Mann: Child Porn vs. A Mother's Prerogative** (Adviser: Julia Dabbs), abstract pg. 17

NOTES



Science Atrium
Poster Presentations

2010 Undergraduate Research Symposium

ORAL PRESENTATIONS
John Q. Imholte Hall Room #s 111 and 112

Room #111

2:30 Allison Haas (English): **The Last of the Anishinabeg?: Worldview, Narrative, and the "Vanishing Indian" in Louise Erdrich's *Tracks*** (Adviser: Becca Gercken), abstract pg. 13
2:55 Alex McGreavey (English): **When it's Not American They're Writing: Effectively Integrating ESL Students into Peer Group Writing Sessions** (Adviser: Tisha Turk), abstract pg. 15
3:20 Dominic Scheck, Katharine Engdahl, and Joshua Johnson (English): **Failure and Functionality in Virginia Woolf's Natural Orders** (Adviser: Brook Miller), abstract pg. 17
3:45 Sarah Ranney (French): **Michif: Anatomy of a Mixed Language** (Adviser: Stephen Martin), abstract pg. 16
4:10 Kelley Swanlund (French): **Firmaman: A Double Birth** (Adviser: Sarah Buchanan), abstract pg. 18
4:35 Katharine Engdahl (French/Francophone): **Fight of the Berbers** (Adviser: Sarah Buchanan), abstract pg. 11

Room #112

4:10 Matt Nelson (History): **Improving the Big Woods: Carver County Agriculture 1860-1870** (Adviser: Stephen Gross), abstract pg. 16
4:35 Elizabeth Thoma (History): **The Influence of Political Cartoons on Public Opinion during World War II** (Adviser: Marynel Ryan Van Zee), abstract pg. 19

ORAL PRESENTATIONS
John Q. Imholte Hall, Room #s 114 and 202

Room #114

2:30 Mike Beach (Art History): **Greek Life and Art in Central Asia** (Adviser: Jimmy Schryver) abstract pg. 8

2:55 Erin Booher (Art History): **Artistic Couples of the 18th through 20th Century: The Nature of Intimate Association** (Adviser: Julia Dabbs), abstract pg. 9

3:20 Angela Connors (Art History): **Nan Goldin and Her Critics** (Adviser: Joel Eisinger), abstract pg. 10

3:45 Talia Earle (Art History): **You've Come a Long Way, Baby: An Analysis of Editorial Cartoons of Women Smoking** (Adviser: Julia Dabbs), abstract pg. 11

4:10 Melissa Kloek (Disabilty Issues): **Assistive Technology in Stevens County Minnesota: An Assessment of its Availability, Accessibility, and Public Awareness** (Advisers: Tammy Berberi and Argie Manolis), abstract pg. 13

4:35 Eva Wood (Disability Issues): **Impaired Justice: Ableism in Court Decisions** (Adviser: Tammy Berberi), abstract pg. 20

Room #202

2:30 Gabriel Bruguier (Philosophy): **A Defense of Mathematical Platonism** (Adviser: Pieranna Garavaso), abstract pg. 10

2:55 Jing Li (Statistics): **An Introduction to the Directional Dependence in the Copula Regression Setting** (Adviser: Engin A. Sungur), abstract pg. 14

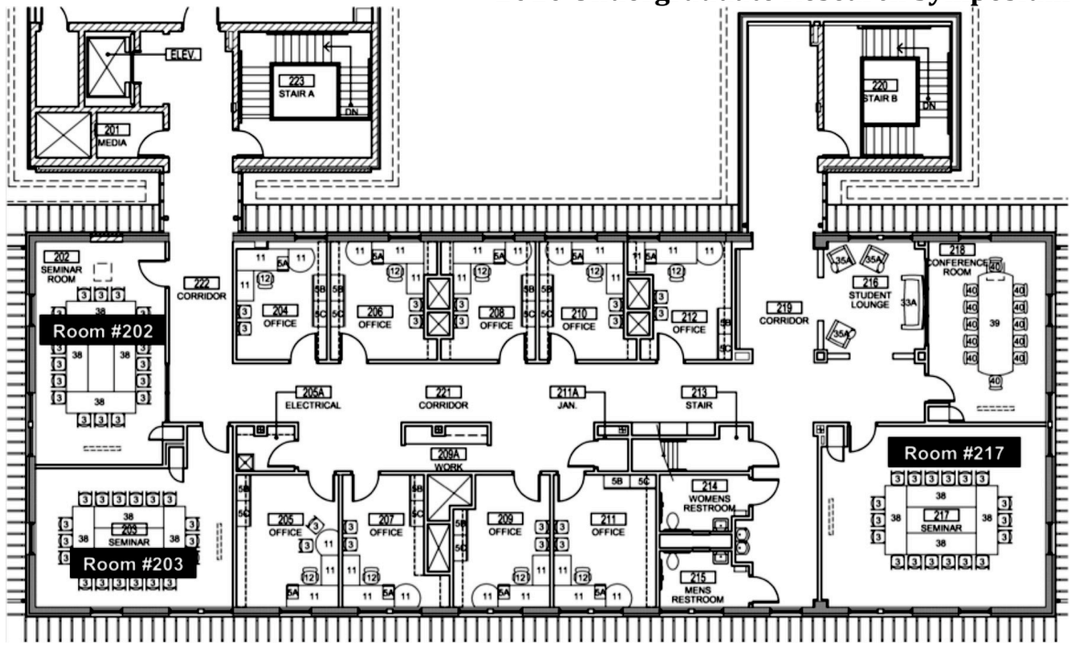
3:20 Anne Krohmer (Psychology): **Stress, Trauma, and Addiction: The Relationship between Posttraumatic Stress Disorder and Substance Abuse and Dependence** (Adviser: Leslie Meek), abstract pg. 14

Room #217

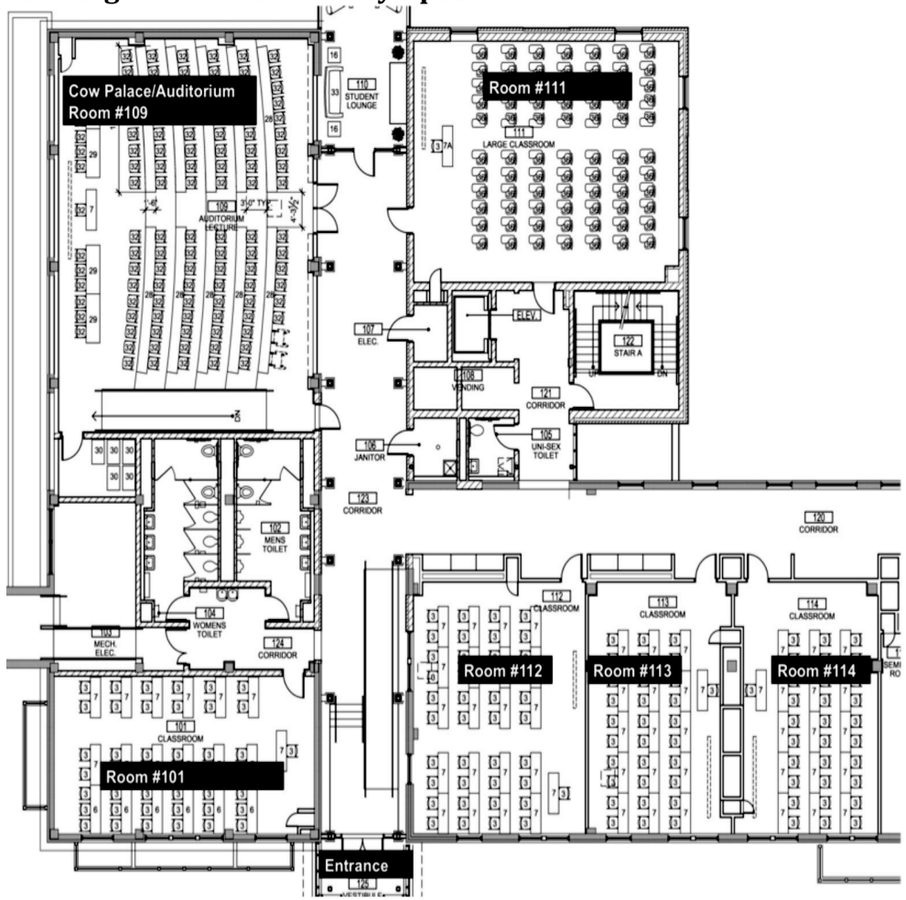
2:30 Katie Barron (Political Science): **The Problem of Bolivarian Socialism: Hugo Chávez and Domestic Policy in Venezuela** (Adviser: Sheri Breen), abstract pg. 8

2:55 Colin Stemper (Political Science): **Downfall of the CPRF: What Went Wrong?** (Adviser: Seung-Ho Joo), abstract 18

3:20 Rachael Tripp (CMR): **The Modern Period: An Analysis of Feminine Hygiene Product Advertisements,** (Adviser: Barbara Burke), abstract pg. 19



John Q. Imholte Hall, 2nd Floor
Oral Presentations



John Q. Imholte Hall, 1st Floor
Oral Presentations

PERFORMANCE PRESENTATIONS
HFA Choral Room #170

2:30 Eric Gorecki (Music): **Gerry Mulligan's *All the Things You Are*** (Adviser: Joe Carucci), abstract pg. 21

2:55 Megan Haman (Music): **Three Hundred Years Brings Uncertainty: Musicians Interpreting Baroque Performance Practice Today** (Adviser: Denise Odello), abstract pg. 21

3:20 Molly Kvam (Music): **Robert Schumann: *Papillons* and *Die Flegeljahre*** (Adviser: Ann DuHamel), abstract pg. 22

3:45 Jenna Reiser (English/ American Indian Studies): **In Search of a Native Voice: American Indian Identity on the Page and the Stage** (Adviser: Becca Gercken), abstract pg. 22

POSTER PRESENTATIONS 5:00 – 7:00 p.m.
Science Atrium

#1 Kevin Arhelger and Fernando Trinciante (Computer Science): **The Observer Effect of Profilers on Computer Program Running Time** (Adviser: Elena Machkasova), abstract pg. 23

#2 Sara Lahr and Justin Mullin (Computer Science): **Utilizing Test Case Subsets to Improve Genetic Programming Performance** (Adviser: Nic McPhee), abstract pg. 30

#3 Jeff Aday (Biology): **White-tailed Deer (*Odocoileus virginianus*) as Facilitators of a European Buckthorn (*Rhamnus cathartica*) Invasion into Western Minnesota Forests** (Adviser: Peter Wyckoff), abstract pg. 23

#4 Kele Cable, Yiqing Cheng, Melissa Kloek, Levi Simonson, and Julia Welle (Biology): **Improving Transformation Efficiencies for Green Fluorescent Protein** (Adviser: Christopher T. Cole), abstract pg. 25

#5 Madelyn Gerber (Biology): **Bafilomycin-resistant Reovirus Mutants are More Sensitive to Proteolysis** (Adviser: Timna Wyckoff), abstract pg. 28

#6 Jackie Hanson and Maddy Gerber (Biology): **Surveillance of Antibiotic Susceptibility of *Staphylococcus* in Milk Samples from a Dairy Herd while Transitioning to Organic Management** (Adviser: Timna Wyckoff), abstract pg. 29

#7 Logan Luce (Biology): **Use of Terrestrial Organic Matter by Macroinvertebrate Shredders in a West Central Minnesota Lake** (Adviser: Tracey M. Anderson), abstract pg. 31

#8 Jonna Maas and Alicia Johnson (Biology): **Novel Responses in the Bioluminescent Circadian Rhythms of *Neurospora crassa* in the Presence of Constant Dim Light** (Adviser: Van D. Gooch), abstract pg. 31

#9 Melissa Carnicle (Geology): **A Possible Late Paleozoic Novaculite Deposit in the Parana Basin, Witmarsum Parana State, Brazil** (Adviser: Lea Gilbertson), abstract pg. 26

#10 Beth Novak (Geology): **Sedimentological and Stratigraphic Analysis of Low Relief Ridges near Padua, Stearns County, Minnesota** (Adviser: James Cotter), abstract pg. 32

#11 Anne Dillon (Mathematics): **What Makes a Search Engine Tick?** (Adviser: Peh Ng), abstract pg. 26

POSTER PRESENTATIONS 5:00 – 7:00 p.m.
Science Atrium

#12 Lea Awoudi and Olivia Awoudi (Statistics): **Factors Related to Survival of Veterans During the Civil War** (Adviser: Jon Anderson), abstract pg. 24

#13 Andrew Bowe (Statistics): **Vaccination Beliefs and Perspectives at UMM** (Advisers: Karen Mumford and Engin Sungur), abstract pg. 25

#14 Tricia Steffen and Chris Thorne (Statistics): **Effects of BMI on Accident Risk** (Adviser: Jon Anderson), abstract pg. 35

#15 Nick Grieme and Jamin Ivers (Economics): **The Health Insurance Crisis: Evidence from West Central Minnesota** (Adviser: Bart Finzel), abstract pg. 29

#16 Anne LaFrinier-Ritchie (Psychology): **American Indian Successful Aging: Where Is The Model?** (Adviser: Heather Peters), abstract pg. 30

#17 Manjari Govada (Statistics): **Predictive Factors of Truck Driver Accidents** (Adviser: Jon Anderson), abstract pg. 28

#18 Kim Rocha (Econmics/Management & Statistics): **Comparative Analysis of Cognitive Skills, Personality Traits, and Social/Economic Preferences Among Truckers, UMM Students, and Morris-area Adults** (Advisers: Stephen Burks and Jon Anderson), abstract pg. 33

#19 Will Setzer (Physics): **Spectroscopic Measurements of Highly Excited Potassium Atoms in an Electric Field under the Influence of Diffuse Krypton Gas** (Adviser: Len Keeler), abstract pg. 34

#20 Remi Patriat (Physics): **The Lifetime of R Cassiopeia's SiO Maser Features** (Adviser: Gordon McIntosh), abstract pg. 33

#21 Zach Boser (Chemistry): **Synthesis and Characterization of Tricyanovinyl-dithienylpyrroles and R-group Influences on Physical Properties** (Adviser: Ted Pappenfus), abstract pg. 24

#22 Josie Skala (Chemistry): **Effects of Temperature and Concentration of Hofmeister Series Ions on Hydrogen Bonding in Liquid Water Measured using ^{1}H NMR** (Adviser: Jennifer Goodnough), abstract pg. 35

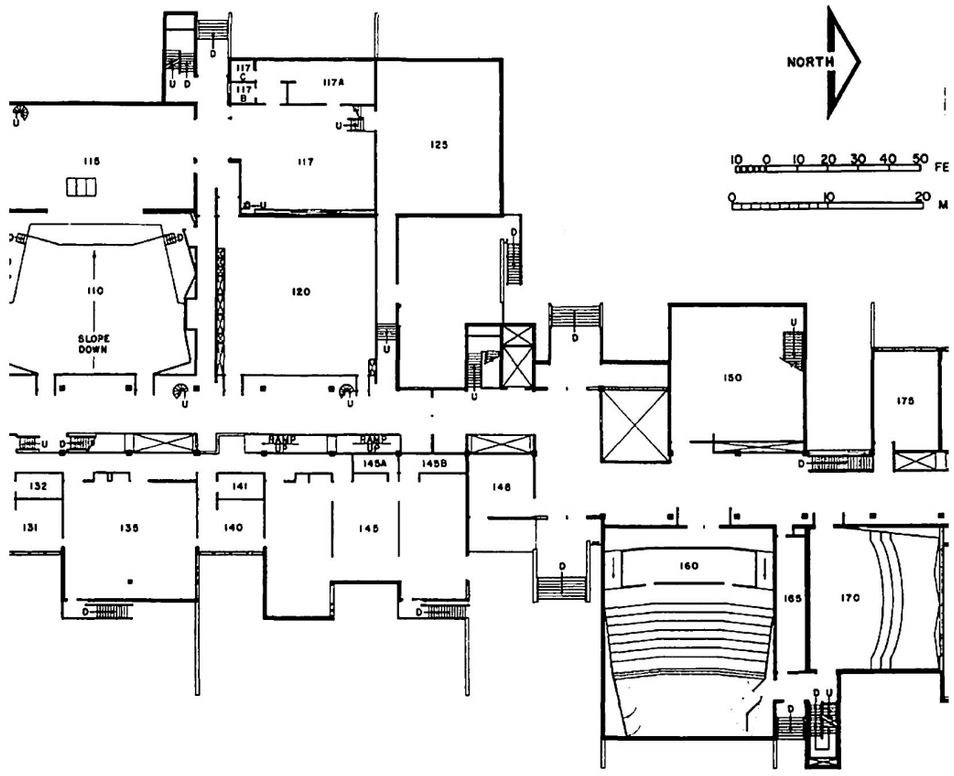
#23 Debbie Schneiderman (Chemistry): **Theoretical Investigations of oligo-and poly(3:2-b:2',3'-d) dithienopyrroles** (Adviser: Ted Pappenfus), abstract pg. 34

#24 Alex Madsen (Chemistry): **pH Sensitive Polymersomes for Cancer Targeting** (Adviser: Jennifer Goodnough), abstract pg. 32

#25 Aurora Turgeon (Chemistry): **Prediction of ^{13}C and ^{15}N Kinetic Isotope Effects for the Aqueous Oxidation of Substituted Anilines** (Adviser: Joe Alia), abstract pg. 36

#26 Carly Dukart and Stephanie Ranzau (Chemistry): **Ir(ppy)2(cs-acac) and Polyhedral Oligomeric Silsesquioxanes in Oxygen Sensing** (Adviser: Ted Pappenfus), abstract pg. 27

#27 Mohammed Farah (Chemistry): **Synthesis and Investigation of Platinum (II) and Ruthenium (II) Materials for Sensing Applications** (Adviser: Ted Pappenfus), abstract pg. 27



HFA Floor Plan
Registration, Improv Performance, Welcome, Featured Presentation and Performances

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***denotes co-presenter(s)**

2010 Undergraduate Research Symposium

Featured Presentation
HFA Recital Hall
1:50 pm

Presenter: Mitch Grussing
Project Adviser: Ken Hodgson (Music)
Title: ***A Prairie Cantata***
Type of Presentation: Performance
HFA Recital Hall, 1:50 p.m.

Abstract:
In collegiate music ensembles, compositions with environmental themes are seldom encountered, especially music and lyrics by local and regional artists. Since UMM has devoted itself to providing a renewable and sustainable education, it now has a stronger connection to the surrounding environment than ever before, and this connection needs to be explored artistically as well as scientifically. In order to unite these concerns, as well as to provide myself an enhanced experience in composition that is not offered through formal classes at UMM, I have crafted *A Prairie Cantata*. The Cantata is a multi-movement piece for mixed (four-part) choir and wind ensemble. After reading letters and journals by early Morris residents and examining texts by regional poets, I settled on one text each from three Minnesota poets and one South Dakota poet to be used in choral settings. Because I express my artistic feelings though music, and because I have such a deep appreciation for the prairie, this experience has given me an opportunity to unite the two.

Oral Presentations
John Q. Imholte Hall
Room #s: 101, 109, 111, 112, 114, 202, 217

Presenter: Katie Barron
Project Adviser: Sheri Breen (Political Science)
Title: The Problem of Bolivarian Socialism: Hugo Chávez and Domestic Policy in Venezuela
Type of Presentation: Oral
John Q. Imholte Hall, Room #217, 2:30 p.m.

***Abstract*:**
This presentation explores the term "petro-socialism", featured in Manuel Hidalgo's article, *Hugo Chá*vez's *"Petro Socialism"*, within the context of Venezuelan domestic policy. While calling himself a populist, this presentation explains how Hugo Chávez has used the policy of "petro-socialism" to instigate a system of "Bolivarian socialism" in Venezuela by nationalizing its most important resource, oil. "Bolivarian Socialism" or "21st Century Socialism" is defined in part by Chávez as nationalizing oil refineries to fund social programs in Venezuela, therefore instituting a new form of economic socialism. But this presentation argues that, while his economic policies may be socialist, the type of government Chávez has instituted has more in common with an authoritarian regime than a populist administration. This presentation illustrates that Chávez's domestic policy has more in common with Fidel Castro's socialist-authoritarian Cuba, rather than pure "Bolivarian Socialism". And though maintaining his power through populist rhetoric, Chávez has turned to executing his "Bolivarian Socialism" in an authoritarian manner. This presentation shows that, while Chávez claims to be populist, he is executing decisions unilaterally without the consent of his people and uses "Bolivarian Socialism" as a means to distract them from his authoritarian government.

To all my professors, without whose support none of this would be possible.

Presenter: Mike Beach
Project Adviser: Jimmy Schryver (Art History)
Title: Greek Life and Art in Central Asia
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 2:30 p.m.

Abstract:
Following the conquests of Alexander the Great in the late 4th century, Greek or Hellenistic civilization found itself spread all of the way from Turkey to India. In most areas of the Hellenistic world outside of Greece proper, the Greeks tried to recreate the culture of their homeland in their new environments. This recreation met with varying degrees of success. Yet in Bactria, which was roughly concurrent to modern Afghanistan, a more comprehensive cultural exchange took place. I will explore the question of why there was such a marked difference regarding the cultural exchange between the Greeks and the native population in Bactria compared to the rest of the Hellenistic world. To answer this question I shall examine several pieces of art and architecture produced by the Bactrian Greeks that represent a clear cultural exchange. I will then address the issue of why it was only in Bactria that this level of exchange took place. My research leads me to believe that this cultural exchange was a result of both the political environment of this particular region and a process of cultural exchange between non-political actors. The need of Greek rulers to legitimate themselves to both Greek and non-Greek would inspire bold new works of art. The rise of non-Greek powers which would reshape the political landscape and the flow of ideas across the land would influence this unique outpost of Hellenistic civilization.

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*** denotes co-presenter(s)**

Presenter: Aurora Turgeon
Project Adviser: Joe Alia (Chemistry)
Title: Prediction of ^{13}C and ^{15}N Kinetic Isotope Effects for the Aqueous Oxidation of Substituted Anilines
Type of Presentation: Poster #25

***Abstract*:**
Nitroaromatic compounds (NACs) are found in common ground water and soil contaminants such as agrochemicals, explosives, polyurethane foams, unrecovered land mines, dyes, and the products of the incomplete combustion of fossil fuels. Exposure to NACs has been shown to cause serious health problems including methemoglobin, anemia, local irritation, liver damage, and bladder tumors. Measuring the isotope effects, the enrichment or depletion of a particular isotope during specific transformations, can be a useful tool for assessing the environmental impact of this contaminant. Previous research has examined the reduction of NACs to aniline. Recent studies have sought to assess the transformations of the substituted aniline species. Specifically, there is an interest in the nitrogen isotope effects during the oxidation of substituted aniline. Additionally, ^{15}N isotope effects can be associated with the analytical method employed for the extraction of the neutral anilines from the reaction mixture. Small ^{13}C isotope effects may be present during the oxidation and extraction of the aniline species. The kinetic and equilibrium isotope effects were computationally predicted using the Gaussian 03 electronic structure program suite. The isotope effects for the oxidation and extraction of substituted aniline both predict a depletion in the ^{15}N isotope over the ^{14}N isotope. The ^{13}C isotope effects predict enrichment of the ^{13}C isotope over the ^{12}C isotope.

Presenter: Matthew Bombyk
Project Adviser: Steve Burks (Economics)
Title: Does Costly Cooperation in the Lab Predict Similar Behavior on the Job? Evidence from Field Experiments with Truckers
Type of Presentation: Oral
John Q. Imholte Hall, Room #101, 3:45 p.m.

***Abstract*:**
We asked 1,065 trainee truckers to take part in a sequential variant of a Prisoner's Dilemma game, with fellow trainees in a field laboratory at their training school. We identified the "social preference types" of our subjects from their choices in the game as: egoists (always defect--the behavior predicted by simple models of rational self interest), conditional cooperators (cooperate only if counterpart did), or altruists (always cooperate). For the 768 drivers for whom we have complete data, we identified two distinct on-the-job settings involving sending messages over the satellite link from each truck to the central dispatch office, in which the material incentives are similar to those in the lab. Specifically, cooperation provides benefits to others but is individually costly, these costs are of similar magnitude in the lab and field, and the driver is essentially anonymous, implying self-interested persons will not cooperate. Using the social preference type as an explanatory variable, we predicted the frequency of two types of satellite message transmissions: a) a message that is primarily helpful to other drivers, and b) a different message that is primarily helpful to the firm. We found that conditional cooperators and altruists send messages of type (a) but not of type (b) at significantly higher rates than egoists, which is consistent with parallelism between lab measures of other-regarding preferences and actual behavior in similar natural settings. This is the first study to demonstrate this link using an on-the-job measure of costly cooperation that is free of major confounding factors.

Presenter: Erin Booher
Project Adviser: Julia Dabbs (Art History)
Title: Artistic Couples of the 18th through 20th Century: The Nature of Intimate Association
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 2:55 p.m.

***Abstract*:**
Women artists in history faced many challenges while trying to pursue an artistic profession, including educational, financial, and moral barriers. Yet, what if a male artist was intimately associated with a woman's career? This study focuses on three artistic couples ranging from the 18th through 20th century: Élisabeth-Louise Vigée-Le Brun and Jean-Baptiste-Pierre Le Brun, Sonia and Robert Delaunay, and Camille Claudel and Auguste Rodin. Through critical analysis of documentation concerning their lives, and visual analysis of works of art created during and outside of the period of their relationship, I will examine some essential questions about characterizing the careers and lives of women artists involved with influential male counterparts. How does their association affect their own and their partner's artistic production and individual evolution as artists? Did contemporary critics support the women artists as separate identities or forever associate them with their partner? And finally, could the woman artist have had a successful career without male intervention?

Presenter: Gabriel Bruguier
Project Adviser: Pieranna Garavaso (Philosophy)
Title: A Defense of Mathematical Platonism
Type of Presentation: Oral
John Q. Imholte Hall, Room #202, 2:30 p.m.

***Abstract*:**
This presentation deals with contemporary metaphysical and epistemological topics in the philosophy of mathematics. Broadly put, I will defend the view that numbers exist, and that we can have knowledge of them. Such a view will be defined in this presentation as mathematical platonism (for short: platonism), which is a contemporary derivation of Platonism, the historical position of the ancient Greek philosopher, Plato. For platonism, numbers are defined as being abstract entities that exist outside of space and time. However, opponents of platonism argue that since our cognitive capacities, which are commonly assumed as founding empirical experience, primarily interact with "concrete" objects, then due to the abstract nature of numbers, we cannot have knowledge of numbers, and therefore platonism is incorrect. The rationale behind this argument will be thoroughly discussed, and a response will be given. Roughly, the response holds that those who argue against platonism have a limited conception of knowledge, which rests on the mistaken assumption that empiricism exhausts all possible knowledge. If the concept of knowledge is broadened to allow for rationalistic knowledge, that is, knowledge based on reason, a possibility for mathematical knowledge is created. If such knowledge is possible, then the objection to platonism is met, and platonism is a viable position.

Presenter: Angela Connors
Project Adviser: Joel Eisinger (Art History)
Title: Nan Goldin and Her Critics
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 3:20 p.m.

***Abstract*:**
This paper is an examination of the strengths and weaknesses of conflicting critical approaches to the photographs of Nan Goldin, in particular her most famous work, *The Ballad of Sexual Dependency*, which documented her life among a bohemian community of free spirited addicts, musicians, and drag queens on the lower east side of Manhattan from 1978 into the late 1980s. The *Ballad* provides an intimate and uncensored portrayal of a subculture consumed by drugs and sex of which Goldin herself was a part. Those who praise Goldin's work view her images as more than a celebration of marginal societies but also as commentary on the condition of being human and the pain and the difficulty of survival that are inherent in existence. They also see the symbiotic relationship between Goldin's art and life as a powerful means of expression. Critics of Goldin's work view her photographs as overbearing, desperate, narcissistic, and self-indulgent. This critical debate is representative of two major methodologies in contemporary art criticism in which either the formal elements of an artwork are emphasized, or the emphasis is placed on subjective information, such as biography and social situations. My position is that neither approach is entirely valid by itself because critics may ignore important elements of the artwork when they adhere firmly to a particular critical method. In the case of Goldin, her supporters have overlooked several formal weaknesses in favor of subjective information, while her detractors neglect to appreciate the power of the viewer's identification with Goldin.

2010 Undergraduate Research Symposium

Presenter: Josie Skala
Project Adviser: Jennifer Goodnough (Chemistry)
Title: Effects of Temperature and Concentration of Hofmeister Series Ions on Hydrogen Bonding in Liquid Water Measured using ^{1}H NMR
Type of Presentation: Poster #22

***Abstract*:**
Water is one of the most abundant and important molecules on Earth; life would not be possible without it. The unique properties of water such as its high boiling point and low viscosity but high surface tension are all attributed to hydrogen bonding. The Hofmeister Series is a ranking of ions based on their ability to alter the structure of water. ^{1}H NMR (Nuclear Magnetic Resonance) chemical shift data were collected and used to study the effects of temperature and ion concentration (sodium thiocyanate, sodium nitrate, and sodium chloride) on hydrogen bonding in liquid water. Hofmeister Series anions Cl^-, NO_3^- and SCN^- effects were also characterized relative to one another simultaneously. The results of this research support conclusions from several previous studies that temperature and the presence of salt in aqueous water affect the hydrogen bonding network. Both increasing the temperature and concentration of the salts resulted in an inverse linear trend of the H_2O signal upfield. In the concentration data, this trend is explained by the increasing amount of ions disrupting the hydrogen bond network, in turn causing the formation of weaker hydrogen bonds. In the temperature data, the trend is explained by the higher amount of energy present in systems at increased temperatures. The increase in energy allows individual water molecules to break their hydrogen bonds, which increases the electron density around the protons. The relative abilities of the anions to disrupt the hydrogen bonding system also generally agree with the ranking of the Hofmeister series.

Presenters: Tricia Steffen and Chris Thorne
Project Adviser: Jon Anderson (Statistics)
Title: Effects of BMI on Accident Risk
Type of Presentation: Poster #14

***Abstract*:**
Obesity among US adults has more than doubled in recent decades, and such increases are expected to continue. Because of robust associations with obstructive sleep apnea (OSA), excessive daytime sleepiness (EDS) and fatigue, obesity could present significant risks during the performance of complex tasks that require constant attention and vigilance. One such task is long haul truck driving, in which obesity is likely present in more than 50% of commercial drivers. The Truckers & Turnover Project has been working with a cooperating carrier in a progressive study of 1,069 new driver-trainees recruited by the firm to examine the risk of crashes as a function of BMI. Using these data, we analyzed the relationship between BMI and crashes using two approaches: Poisson regression and Cox regression. For the Poisson regression model, we found that drivers with a BMI greater than 35 have crash risks that are 1.6 times higher than drivers with normal BMI (18.5 - 25). After adjusting for important operational factors in a Cox model, drivers with a BMI between 35 and 40 again have an adjusted crash risk of about 1.6 times that of a driver with normal BMI.

Presenter: Debbie Schneiderman
Project Adviser: Ted Pappenfus (Chemistry)
Title: Theoretical Investigations of oligo- and poly(3:2-b:2',3'-d) dithienopyrroles
Type of Presentation: Poster #23

Abstract:
Polymers are molecules characterized by long chains of repeating subunits. While many familiar and useful organic polymers, polyvinyl chloride for instance, have insulating properties, some organic polymers can conduct electricity. The physical and electronic properties of these conducting polymers make them attractive materials for a wide variety of industrial applications including transistors, LEDs and solar cells. The energies of oxidation and reduction of these polymers are important and must be considered when examining the suitability of the polymer for real-world applications. This research was a theoretical analysis of the electronic properties of two lesser studied types of conducting polymers namely dithieno[3,2-b:2′,3′-d]thiophene (DTT) and N-functionalized dithieno[3,2-b:2',3'-d]pyrroles (DTPs). The HOMOs (highest occupied molecular orbitals) and LUMOs (lowest unoccupied molecular orbitals) of the molecules were calculated through the use the Gaussian 03 molecular modeling program. These values are of interest because the energy of the LUMO can give a good indication of the energy of reduction of the molecule. Similarly, the HOMO can be used to predict the oxidation energy of the molecule. The difference in energy of these two values is defined as the band gap and is directly related to the conducting ability of the molecule. Gap values were also determined using two other computational methods: time dependent and PBC (periodic boundary condition). The results of these three methods were compared each other to determine the accuracy of the each of the methods. The effect of different R-groups on the band gap of the DTP molecule was also studied.

This work was supported by the Morris Academic Partnership program and the UMM Faculty Research Enhancement Fund.

Presenter: Will Setzer
Project Adviser: Len Keeler (Physics)
Title: Spectroscopic Measurements of Highly Excited Potassium Atoms in an Electric Field under the Influence of Diffuse Krypton Gas
Type of Presentation: Poster #19

Abstract:
The optical absorption spectrum associated with the high n-states of atoms in an electric field is fairly well understood. We will present spectroscopic measurements of highly excited potassium atoms in an electric field under the influence of diffuse krypton gas. We will be investigating spectral line shifts and line broadenings as a function of pressure as the inert gas is added to the chamber. Also, we will be observing how the presence of an inert gas will encourage rare atomic transitions to occur. The above effects and other subtle perturbations can ultimately be interpreted in terms of specific scattering mechanisms between the excited potassium electron and the krypton gas atoms. The purpose of this research is to use the experimental technique of recurrence spectroscopy to acquire the absorption spectrum and gain insight into how classically modeled electron orbits are affected by these scattering mechanisms.

2010 Undergraduate Research Symposium

Presenter: Talia Earle
Project Adviser: Julia Dabbs (Art History)
Title: You've Come a Long Way, Baby: An Analysis of Editorial Cartoons of Women Smoking
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 3:45 p.m.

Abstract:
In the present day, we are assaulted with sexualized images of women smoking, whether it is in magazines, films, or billboard advertising. However, this undercurrent of sensuality was not always the case at the beginning of the cigarette's history. Research into late 19th/early 20th century images of women smoking has been practically untouched by art historians. In doing this research, I want to expose this subject matter to others and help explain why men during this time would negatively portray women doing "masculine activities." In my presentation, I will visually analyze various cartoons from the highly influential and popular American magazine, Puck; starting in 1890 and ending in 1918. These cartoons illustrate differing portrayals of women smoking, which tended towards a masculinization of the woman. Also, I will be researching when the shift occurred from negative to positive imagery. I believe this shift is related to the time when tobacco companies started to target women more aggressively in their advertising campaigns.

This research has been supported by the UROP.

Presenter: Katharine Engdahl
Project Adviser: Sarah Buchanan (French/Francophone)
Title: Fight of the Berbers
Type of Presentation: Oral
John Q. Imholte Hall, Room #111, 4:35 p.m.

Abstract:
Throughout history, the Berber people have been underrepresented in academic research. After being colonized by at least seven waves of invaders, including the Romans, the Arabs, and the French, the Berbers (the indigenous tribes of North Africa) have long had cultures mostly unchanged by the dominant and invading cultures. In fact, they remained isolated for the most part, until quite recently when a new movement took hold in the region. Arabization, the push to expel any non-Arab influence, which began in the 1960s, has caused a definite shift in the cultures of the Berbers, one that has led to more assimilation. Through reading *L'amour, la fantasia* by Assia Djebar (1995), *L'enfant de sable* by Tahar ben Jelloun (1985), *Mountains Forgotten by God* by Brick Oussaid (1989), *Les silences du palais* by Moufida Tlati (1994), *A Spider's House* by Paul Bowles (1982), and *In Arabian Nights* by Tahir Shah (2008), I have compiled literary pictions of Berbers, and contrasted them with the actuality of their cultures to bring attention to cultural prejudices about these people. Based on these comparisons, it is clear that not only are the Berbers underrepresented, but also that they are misrepresented as a culture in need of saving, an act that could negatively affect their cultures, ultimately leading to its complete elimination from Maghreb life.

This research has been funded by UROP.

Presenter: Katrina Flaig
Project Adviser: Jimmy Schryver (Art History)
Title: Hercules in Early Christian Art
Type of Presentation: Oral
John Q. Imholte Hall, Room #109, 3:45 p.m.

Abstract:
As a growing number of Romans moved away from their traditional religion to practice monotheism during the Late Roman Empire, the use of Hercules in Early Christian Art exemplified his popularity in contemporary society. Before the conversion of Emperor Constantine on October 28, 312 C.E., all persons who identified with the name "Christian" lived and worshipped in a politically volatile climate. Of the art produced either for or by early Christians during this period, what has survived is commonly located on sarcophagi or in frescoes adorning catacomb walls. Though Hercules was a popular symbol for heroism and morality, the inclusion of his image in Early Christian Art contradicts an underlying group philosophy. For many converts during this period, the Roman pantheon was believed to be fallen angels who had tricked humankind into mental slavery. Thus begging the question, if Hercules was a fallen angel, then why use his image in Early Christian Art? All of the surviving art reflects, to some degree, the traditional Roman compositional elements of charity, piety, wisdom, and nature. Hidden within these popular themes are examples of Judeo-Christian iconography that, if viewed by a non-initiate, would continue to remain unseen. Was the illustration of Hercules in Early Christian Art recognition of popular culture? Or was it instead used as a tool to hide the true message of the art? By answering these questions, a comprehensive cultural model for the Late Roman Empire would emerge, thereby allowing for an in-depth analysis of popular symbolism within the artistic representations of Hercules during the transformation of pagan Rome to Christian Rome.

Presenter: Dugan Flanders
Project Adviser: Jimmy Schryver (Art History)
Title: Mycenaean Tholos Tombs: Construction and Significance
Type of Presentation: Oral
John Q. Imholte Hall, Room #109, 4:10 p.m.

***Abstract*:**
Monumental architecture during the Late Mycenaean period of Greek history (1600-1100 B.C.E.) included innovations that made it the most advanced architecture in early Greece, and the Tholos tombs of Mycenae represent the peak of innovation and engineering of this period. These tombs were domed circular structures constructed from stone and buried under man-made hills. Over 200 Tholos tombs have been found in ancient Greece and the surrounding area, and they have a significance that goes far beyond their function as a burial structure. The development of Tholos tomb architecture out of previous tumuli and chamber tomb structures, specifically in the Treasury of Atreus, represents a level of architectural sophistication within Mycenaean society that would not again be reached until the height of Classical Greece. Tholos tombs like the Treasury of Atreus were built using the most advanced corbelling techniques ever developed, and adhere to strict mathematical proportions. Nothing on a similar scale is seen in any ancient Greek society until approximately 700 years later. The incredible architectural innovation in the construction techniques of Tholos tombs is evidence of a much more sophisticated civilization than would normally be associated with Bronze Age cultures. This presentation explores the innovations of Tholos tomb construction and demonstrates their significance in a larger cultural context, creating a view into the Mycenaean mind of more than 3000 years ago and providing insight into the importance of development and human innovation during the Mycenaean period.

2010 Undergraduate Research Symposium

Presenter: Remi Patriat
Project Adviser: Gordon McIntosh (Physics)
Title: The Lifetime of R Cassiopeia's SiO Maser Features
Type of Presentation: Poster #20

Abstract:
Maser spectra of the long period variable star R Cassiopeia have been observed over approximately four stellar periods in the silicon monoxide v = 1, J = 1 - 0 transition. The linear polarization characteristics of the spectra have been determined. The lifetimes and beginning and ending phases of nineteen maser features have been extracted from Gaussian fits to the polarized spectra. It has been proposed that the maser emissions of long period variables are affected by the passage of a shock wave through the circumstellar region in which the masers originate. The proposed shock passage produces a fading of the emission by phase 0.4. The results of the Gaussian fits indicate that six features went out of existence between phases 0.3 and 0.4. In no other phase range did more than three features go out of existence which confirms the theory. Maser stands for Microwave Amplification of Stimulated Emission of Radiation. Maser radiation is emitted from molecules such as H^2O, OH, and SiO. These molecules are present in the environment of long period variable stars and emit at a certain frequency. A spectrum refers to a signal that can be divided into frequency components or, here, into velocity components. Linear polarization describes the orientation of the electric field of the electromagnetic radiation in the detected signal. Finally, phase stands for the time location of the star is in its oscillation cycle.

This research has been supported by NSF Grant AST-0606764.

Presenter: Kim Rocha
Project Adviser: Stephen Burks (Econmics/Management) and Jon Anderson (Statistics)
Title: Comparative Analysis of Cognitive Skills, Personality Traits, and Social/Economic Preferences Among Truckers, UMM Students, and Morris-area Adults
Type of Presentation: Poster #18

Abstract:
The Truckers & Turnover Project has been working with a cooperating carrier in a study to examine the impact of cognitive skills, personality characteristics, economic preferences, and social preferences on job performance, retention, and on-the-job outcomes among newly recruited professional truck drivers. The data were collected from a study of 1,069 new driver-trainees recruited by the firm to start their education at a training school operated by the firm. Similar data were collected from a group of UMM students, and non-student adults from the Morris area. A one-way analysis of variance highlights the similarities and differences between these three populations with respect to cognitive skills measures: non-verbal IQ, numeracy, and backward induction. Personality traits measured by the Multidimensional Personality Questionnaire (MPQ), measures of social and economic preferences, were analyzed using the same method. Differences between these populations with respect to these attributes will help customize initial training, and subsequent driver education programs to improve productivity, retention, and safety of drivers.

Presenter: Alex Madsen
Project Adviser: Jennifer Goodnough (Chemistry)
Title: . pH Sensitive Polymersomes for Cancer Targeting
Type of Presentation: Poster #24

Abstract:
Cancer is the second leading cause of death in the United States. Of the 1.5 million new cases every year, 150,000 of those people are diagnosed with colorectal cancer, making it the third most common cancer. Conventional chemotherapy is currently being used to fight cancer, but it can have detrimental side effects to the patient. A recent approach to treatment is self-assembled, nanoscale polymeric vesicles. Also known as polymersomes, these are drug delivery vehicles that can accumulate in tumor tissue and release drugs directly into cancer cells. The use of specific targeting ligands promises to enhance the specificity and efficacy of this process, reducing the side effects to the patient. My summer research included the synthesis of diblock copolymers made of vinyl sulfone-terminated poly(ethylene glycol) and poly(Ɣ-methyl-€-caprolactone) through multistep syntheses. These diblock copolymers will be dispersed in water to form degradable polymersomes. The degradation of these polymersomes will later be studied at multiple values of pH to better predict degradation inside the acidic environment of a cancer cell. The goal of this research is to synthesize polymersomes that degrade between a pH of 6.5 and 5 in a matter of minutes to release drugs and destroy the colorectal cancer cells.

This research has been supported by the NSF, MRSEC, and REU programs under Award Numbers DMR-0754792 and DMR-0819885.

Presenter: Beth Novak
Project Adviser: James Cotter (Geology)
Title: Sedimentological and Stratigraphic Analysis of Low Relief Ridges near Padua, Stearns County, Minnesota
Type of Presentation: Poster #10

Abstract:
The goal of this study was to determine the origin of small moraines near Padua, Stearns Co., Minnesota (a moraine is a ridge formed at the edge of a glacier). These moraines are northeast-southeast trending, low relief (7-10m high and 2 to 2.5 km long) ridges. Three hypotheses have been suggested for the origin of these landforms: 1) the ridges are lateral moraines (lateral moraines are deposited along the sides of a glacier), 2) the moraines are palimpsest (pre-existing ridges of undetermined origin covered by an over-riding glacier), and 3) these are end moraines (moraines deposited at the front of the glacier) of the Des Moines lobe. Research focused on the geology of moraines and the sediment within them. If the ridges are composed of sediments deposited by multiple glaciers then they are palimpsest moraines. If the ridges were composed entirely of Des Moines lobe sediments, then they are either lateral or end moraines. Provenance analysis (the determination of direction of flow of glaciers) should differentiate the origins.

Presenter: Allison Haas
Project Adviser: Becca Gercken (English)
Title: The Last of the Anishinabeg?: Worldview, Narrative, and the "Vanishing Indian" in Louise Erdrich's *Tracks*
Type of Presentation: Oral
John Q. Imholte Hall, Room #111, 2:30 p.m.

Abstract:
The "vanishing Indian" is one of the central ideas of 19th century "savagism," and it has since been highly prevalent in American popular culture. Louise Erdrich's *Tracks*, one of the most popular novels in modern Native Literature studies, contains certain images that appear to conform to the idea of "vanishing," yet its hopeful conclusion refutes the stereotype. To reconcile these seemingly conflicting ideas, I consulted materials concerning the tradition of the "vanishing Indian" in dominant American culture, considered historical sources about the Anishinabeg at the turn of the century, read critical articles about *Tracks* from critics both inside and outside the Anishinabe community, and engaged closely with Gerald Vizenor's narrative theory, especially his concept of worldview. I concluded that reconciling the question of "vanishing" in *Tracks* depends on the worldview one brings to the novel. A comic worldview is based in community and flexibility and is often associated with Native cultures, whereas a tragic worldview is based in conflict and stasis and is more common to Western dominant culture. Approaching *Tracks* from a tragic worldview would confirm the images of "vanishing," but considering it from a comic viewpoint opens the possibility that images of "vanishing" are being used in order to achieve comic goals, such as rebuilding the Anishinabe community. Taking the comic worldview into consideration may help a reader from the dominant culture to better understand the world and the characters in *Tracks*, and may prevent the spread of the damaging notions of "savagism."

Presenter: Melissa Kloek
Project Advisers: Tammy Berberi (French) and Argie Manolis (English)
Title: Assistive Technology in Stevens County Minnesota: An Assessment of its Availability, Accessibility, and Public Awareness
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 4:10 p.m.

***Abstract*:**
This research project, funded by the Undergraduate Research Opportunities Program, focused on the awareness, accessibility, and availability of assistive technology in Stevens County, Minnesota. Assistive technology is defined as an item, piece of equipment and/or service that may be used by any individual to increase, maintain or improve their functional capabilities and independence. This definition is used by Minnesota's Assistive Technology Act program, which served as the basis for this study. The purpose of the study was to determine if citizens living in outstate Minnesota have the same access to assistive technologies as individuals residing in metropolitan areas. Interviews were conducted with individuals representing public and private school systems, physical and occupational therapy providers, personal care service organizations, and service cooperatives. Services and devices provided by these organizations were assessed to determine if the assistive technology needs of people with disabilities residing in the area were being met. Outcomes were measured based on resources available throughout Minnesota compared to those actually being provided by area organizations. Findings suggest that the main barrier faced by providers is lack of awareness of the most current assistive technologies and/or funding resources offered by state and regional agencies. This research provides a unique look at resources available for people with disabilities in outstate Minnesota. Research participants will be provided with a copy of the final report and will be invited to a public presentation of findings in an effort to draw attention to the advantages and disadvantages faced by outstate Minnesota residents in having equal access to assistive technology as metropolitan residents.

Presenter: Anne Krohmer
Project Adviser: Leslie Meek (Psychology)
Title: Stress, Trauma, and Addiction: The relationship between Posttraumatic Stress Disorder and Substance Abuse and Dependence
Type of Presentation: Oral
John Q. Imholte Hall, Room #202, 3:20 p.m.

***Abstract*:**
Most people in the United States have experienced exposure to an extreme traumatic stressor, such as physical assault, military violence, or another event that is outside the normal range of human experience. However, only a small percentage of people who experience this kind of trauma go on to develop Posttraumatic Stress Disorder (PTSD). Research has shown that among individuals who abuse or depend on substances, the rates of PTSD are significantly higher than in the general population. Those who suffer from both PTSD and substance abuse at the same time show more severe symptoms of PTSD, have decreased levels of health and wellbeing, and demonstrate poorer substance abuse treatment outcomes. This presentation reviews the current literature on the relationship between drug abuse, trauma, and PTSD, and examines support for possible causal relationships, common environmental factors, and the role of genetics in an attempt explain why PTSD and substance abuse so frequently co-occur. In addition, findings in regard to gender differences as they relate to PTSD and substance abuse will be examined. Finally, this presentation will shed light on the implications of current research on the PTSD/Substance Abuse relationship in terms of effective treatment options and areas of further study.

Presenter: Jing Li
Project Adviser: Engin A. Sungur (Statistics)
Title: An Introduction to the Directional Dependence in the Copula Regression Setting
Type of Presentation: Oral
John Q. Imholte Hall, Room #202, 2:55 p.m.

***Abstract*:**
In this presentation, we are going to define and study the concept of directional dependence in regression settings by using copulas. Copulas are multivariate distribution functions that connect marginal distributions and joint distributions. The directional dependence model is critical because it can be easily adopted to wide range of applications, such as financial risk assessment and actuarial analysis. Directional dependence in joint behavior between two variables is defined as the form of the regression functions being different. By doing so, copulas transfer marginal distributions into uniform on the interval (0, 1). They eliminate the influence of marginal behavior and provide a clear look at dependence structure. In the research we developed how to define and create facts to indentify directional dependence between two variables, how to get the empirical cumulative probability distribution function of each variable in the data set, as well as how to search for a copula with the regression function that has the similar features as the smoothed data. The approach has been applied to various data sets.

2010 Undergraduate Research Symposium

Presenter: Logan Luce
Project Adviser: Tracey M. Anderson (Biology)
Title: Use of Terrestrial Organic Matter by Macroinvertebrate Shredders in a West Central Minnesota Lake
Type of Presentation: Poster #7

Abstract:
Much of the food in aquatic ecosystems is derived from plant matter that has fallen into the water from the terrestrial ecosystem. This organic matter is broken down by a group of macroinvertebrates called shredders. Use of leaf material by shredders has been more extensively studied in streams than in lake ecosystems. We investigated the use of leaf material by shredders that occur in lakes in West Central Minnesota. In the lab, consumption of four kinds of leaves (ash, cottonwood, willow and cattails) by the common shredder *Hyalella azteca* was assessed. Survivorship of *H. azteca* did not differ significantly between the four treatments, indicating that this shredder is a generalist feeder and can exploit many different food resources. We further investigated the use of leaf material by macroinvertebrates by placing mesh cages containing the same four plant species in Cottonwood Lake (Grant Co. MN). After six weeks, cages were recovered and all macroinvertebrates within them were preserved. Cages contained a diverse assemblage of macroinvertebrates in addition to shredders suggesting that leaves provide habitat, as well as food for macroinvertebrates in lakes. Further analysis of the shredder community will help clarify the role of terrestrially derived organic matter in lake ecosystems.

Presenters: Jonna Maas and Alicia Johnson
Project Adviser: Van D. Gooch (Biology)
Title: Novel Responses in the Bioluminescent Circadian Rhythms of *Neurospora crassa* in the Presence of Constant Dim Light
Type of Presentation: Poster #8

Abstract:
Circadian rhythms are daily oscillations in biological organisms, which typically continue in the absence of environmental cues. *Neurospora crassa*, a fungus, is a model system often used for studying rhythms. The study of the cellular and molecular components of the *Neurospora* circadian rhythm has been recently improved through the placement of an optimized firefly luciferase gene into the genome. The emission of light caused by this "reporter gene" shows when a targeted natural gene is turned on or off. The frequency (frq) gene has been shown to be an important component of the *Neurospora* circadian mechanism. Previous studies have also revealed that the frq promoter, the segment of DNA that turns on and off the frq gene, plays an important role in the light detection pathway by binding proteins to induce transcription. We are particularly interested in the responses of the frequency gene products following exposure to external light. Given the methods of previous studies, experiments have failed to observe the presence of *Neurospora's* circadian rhythm during exposure to constant bright light. We present here experiments in which circadian oscillations were observed in the presence of constant dim light. These oscillations occurred when *Neurospora* were pre-treated with at least fifteen minutes of bright light. In the absence of this bright light pre-treatment, oscillations were not observed. By using various segments of the frq promoter, these experiments continue to give us a greater understanding of the mechanism of light interaction with this gene segment as it regulates *Neurospora's* circadian rhythm.

This research has been supported by the UROP and MAP programs.

Presenter: Anne LaFrinier-Ritchie
Project Adviser: Heather Peters (Psychology)
Title: American Indian Successful Aging: Where Is The Model?
Type of Presentation: Poster #16

***Abstract*:**
The current models on aging (e.g., Baltes & Baltes, 2004; Rowe & Kahn, 1997) do not consider the unique cultural influences that affect American Indians. Rather, these models are primarily based on European American individuals from middle class income backgrounds and come from an individualistic perspective. Neglecting the aging process for American Indians is especially troublesome considering that the life expectancy of American Indians is lower than that of the general American population (Grimm, 2006). I have reviewed the literature regarding American Indian aging (e.g., Fiskes, 1996; Moss, 2006; Penman, 2000) in order to determine common themes concerning the aging process for individuals from different tribes (e.g., Ho chunk Sovereign Nation, Zuni, Dakota/Lakota). Based on the results of the literature review, Professor Peters and I have further expanded on a model for successful aging in American Indians developed by UMM graduate Lacey Running Hawk. The model identifies four key aspects of American Indian Aging: (a) importance of spirituality, (b) importance of passing on traditions orally to grandchildren/youth, (c) resilience resulting from dealing with historical trauma and discrimination, and (d) holistic health. I will discuss a description of how these four aspects overlay the medicine wheel or the sacred hoop of life. Further, I will make suggestions for how therapists can utilize the information outlined in the model, which will increase their multicultural competencies.

Presenters: Sara Lahr and Justin Mullin
Project Adviser: Nic McPhee (Computer Science)
Title: Utilizing Test Case Subsets to Improve Genetic Programming Performance
Type of Presentation: Poster #2

***Abstract*:**
Evolutionary computation (EC) is a field of Computer Science which iteratively searches for solutions to a given problem. Given a way of measuring what constitutes a reasonable solution, EC attempts to find an optimal solution using techniques inspired by biological evolution. Genetic programming (GP) is a branch of evolutionary computation where individuals in the evolving population are computer programs. For example, GP could be used to evolve a function which predicts future climate conditions, based on past history. Problems are typically composed of a collection of test cases, against which each individual is evaluated to determine which programs best match the target solution. In the example of climate modeling, the test cases could be based on the environmental conditions during particular months. Traditionally, GP programs are evaluated against all available test cases at once. In this study, we are exploring the feasibility of evaluating programs against subsets of the test cases, to allow the system to focus on local features of the problem. These subsets can be chosen using a number of different methods. In the example, then, subsets could consist of data selected from series of consecutive months, series of alternating months, or even simply random series of months. Using a number of test problems, we are examining the accuracy of our genetic programming system using this subset evaluation technique, as compared to the traditional approach. So far, our results suggest that this method is able to improve the success rate of the GP system across several test problems.

Mullin was supported by the Morris Academic Partners (MAP) program. Lahr was supported by the Undergraduate Research Opportunity Program (UROP).

Presenter: Andrea Lund
Project Adviser: Karen Mumford (Biology/Environmental Science)
Title: The Relationship Between Housing Conditions and Respiratory Illness in Migrant Ngöbe Children: A Global Public Health Study
Type of Presentation: Oral
John Q. Imholte Hall, Room #101, 4:35 p.m.

Abstract:
The indigenous Ngöbe population migrates annually from northern Panama to work on coffee plantations in southern Costa Rica. There have been concerns that the poverty and poor living conditions of this group render them vulnerable to many health problems. In particular, smoke-producing activities in poorly ventilated houses were hypothesized to predispose Ngöbe people to respiratory illnesses. To examine the relationship between respiratory health and plantation housing among Ngöbe children, survey data were collected by staff from Finca Sana, a local health organization. Individual interviews of Ngöbe mothers were conducted in Ngöbere, the indigenous language, and responses were recorded in Spanish. Data from 120 surveys were analyzed using descriptive statistics, Chi-square analysis, and logistic regression. Over 50% of mothers reported respiratory symptoms among their children. Analyses suggested that crowding in houses (p = 0.0032), trash burning (p = 0.0207) and wood burning (p = 0.0256) increased the likelihood of respiratory symptoms such as cough, runny nose and shortness of breath. The significance of these factors and the high prevalence of recent respiratory symptoms in Ngöbe children are alarming and warrant further investigation. In order for local public health authorities to be able to effectively address the needs of this vulnerable population, more thorough empirical examination of the factors that may be contributing to their health status is necessary.

This research was part of the curriculum for the Global Health Semester in Costa Rica through Duke University and the Organization for Tropical Studies.

Presenter: Alex McGreavey
Project Adviser: Tisha Turk (English)
Title: When it's Not American They're Writing: Effectively Integrating ESL Students into Peer Group Writing Sessions
Type of Presentation: Oral
John Q. Imholte Hall, Room #111, 2:55 p.m.

Abstract:
Current topics in the field of education include discussions focused on working with English as a second language (ESL) students as well as discussions focused on peer group writing sessions; however, little research has been done to combine these two discussions. My presentation will outline the necessary steps needed in a classroom with ESL students in order for peer group writing sessions to be successful. My project consists of proposals based on the research of success stories from the two discussions in education. I have composed a seven step method in which to conduct a peer group writing workshop inside of a classroom in order to successfully include the needs of all students. The most important aspect of my proposal is the inclusion of two teacher-led demonstrations. These include an initial demonstration in which students participate as a class in assessing an example of a written work focusing on content alone, and a second in which the students proof-read and edit for grammar. Demonstrating and elaborating on these seven steps, my presentation will illustrate the importance of integrating the needs of ESL students. Through doing so, ESL students will benefit by having writing anxiety alleviated, grammar strengthened, and practice with the written English language. Although this proposal is designed with ESL students' needs in mind, Native English speaking students will also benefit in much the same way, as well as gaining the skills needed to properly assess an ESL classmate's written work.

Presenter: Matt Nelson
Project Adviser: Stephen Gross (History)
Title: Improving the Big Woods: Carver County Agriculture 1860-1870
Type of Presentation: Oral
John Q. Imholte Hall, Room #112, 4:10 p.m.

Abstract:
In the 1850s, Minnesota farmers had economic access to the rest of the country through the Mississippi River and a railroad to Wisconsin. Carver County in Minnesota acts as the perfect laboratory to address the agricultural transition debate from both cultural and economic perspectives. The debate ultimately discusses whether economic or cultural perspectives better explain the commercialization of agriculture. Using the 1860 and 1870 US Census material, a data set of 2400 farmers was created to analyze production of commodities such as wheat, corn, oats, hay, butter, potatoes and livestock among farmers of different ethnicities. Many of these farmers, though of different ethnic origins, displayed similar patterns of semi-subsistent production in 1860. While all farmers exploited the high gains of market agriculture in 1870, farmers commercialized at different rates along ethnic lines. Interestingly, American born farmers appear to be the least market oriented in 1870. Ethnic differences in production patterns can be best explained by pointing to differences in persistence patterns with farmers with long tenure being more market oriented than newcomers. Moreover, the accessibility of markets appears to play a role in wheat production, suggesting that the varying distances from each township to markets did play a part in market agriculture. Based on this research, economic factors such as market accessibility and persistence complement cultural explanations such as ethnicity for agricultural production in the mid 19th century.

Presenter: Sarah Ranney
Project Adviser: Stephen Martin (French)
Title: Michif: Anatomy of a Mixed Language
Type of Presentation: Oral
John Q. Imholte Hall, Room #111, 3:45 p.m.

Abstract:
The Michif language, spoken by the descendants of French traders and indigenous peoples of North America, is a combination of French and Algonquian languages. It has been argued that, because Michif takes its nouns from French and its verbs from Algonquian, Michif is a naturally occurring "mixed language," unable to be classified into either the Indo-European or the Algonquian language families. In my research project, I investigated the claim that Michif defies classification within the current framework and should be classified in a new mixed-language category. To explore this assertion, I examined the Michif language itself. Through the use of primary-and secondary-source materials including dictionaries and audio recordings of the spoken language, I analyzed the language's structure and the way that it combines French and Algonquian. I then compared Michif's structure to mainstream conceptions of the processes of language contact and combination. Finally, I looked at other languages described as mixed, with a focus on the Light Warlpiri language of Australia, to determine whether they are structurally similar enough to be classified together in a new mixed-language category.

This research has been supported by a UROP grant.

2010 Undergraduate Research Symposium

Presenters: Nick Grieme and Jamin Ivers
Project Adviser: Bart Finzel (Economics)
Title: The Health Insurance Crisis: Evidence from West Central Minnesota
Type of Presentation: Poster #15

Abstract:
Health insurance should be a familiar topic to most Americans, considering well over half of our population is insured. Higher health insurance costs along with less coverage can be problematic to individuals as well as our economy as a whole. In the fall of 2009, the West Central Minnesota Healthcare Purchasing Alliance mailed surveys to nearly 2500 randomly selected small businesses and farmers throughout the 12 county west central Minnesota area to ascertain the extent of the problem in the region. Survey recipients were offered a cash incentive to improve response rates. Of those surveyed, 199 responded. Those surveyed were asked how the cost of health insurance has changed within the past few years, how much coverage they currently offer employees, the type of coverage they offer, and if they were considering dropping coverage due to the increasing cost of health insurance. We also compare the results of our survey to the results of a similar survey taken in 2003. The results of this survey confirm that those problems central to the national debate, including rising health insurance premiums, small businesses dropping coverage, and rising rates of poor quality insurance coverage, are occurring within the region.

Presenters: Jackie Hanson and Maddy Gerber
Project Adviser: Timna Wyckoff (Biology)
Title: Surveillance of Antibiotic Susceptibility of *Staphylococcus* in Milk Samples from a Dairy Herd while Transitioning to Organic Management
Type of Presentation: Poster #6

Abstract:
Antibiotic use, which is widespread in livestock production for prevention and treatment of disease, can lead to bacterial antibiotic resistance. Organic livestock production guidelines prohibit the use of antibiotics, and thus farms under this type of management offer an opportunity for comparison of disease frequency and resistance development. In November 2008, the University of Minnesota West Central Research and Outreach Center in Morris, MN began to transition half of their conventionally managed dairy herd to organic management. This presents a unique opportunity to follow the pattern of bacterial antibiotic resistance over time as antibiotic use changes. We chose to focus our investigation on *Staphylococcus*, a major cause of mastitis in dairy cows. To this end, we have isolated *Staphylococcus* from milk samples collected every two to three months from every lactating cow, starting three months prior to the transition. Using disc diffusion, we have determined susceptibility to several antibiotics for all *Staphylococcus* strains isolated. Here we present our preliminary results from our surveillance of antibiotic resistance during the first 18 months of this transition. Relative to isolates from the conventionally managed herd, a smaller percentage of isolates from the organic herd is resistant to antibiotics now than before the transition. In addition, our data suggest that there may be seasonal variation in the types of *Staphylococcus* present in the herds that differs by management type. We plan to continue our surveillance at least through summer 2010 to determine whether these trends are maintained over time.

This work was funded by National Science Foundation STEM Talent Expansion Program funding to J.A.H., University of Minnesota, Morris Multi-Ethnic Mentorship Program funding to J.A.H., and University of Minnesota Undergraduate Research Opportunities Program funding to M.M.G.

Presenter: Madelyn Gerber
Project Adviser: Timna Wyckoff (Biology)
Title: Bafilomycin-resistant Reovirus Mutants are More Sensitive to Proteolysis
Type of Presentation: Poster #5

Abstract:
Viral vectors can be used to selectively infect cancer cells and deliver therapeutic agents to targeted tumor growths. These oncolytic, or 'cancer-killing', viruses can be engineered to enter and destroy specific cancer cell types. Reovirus is one of several viruses being developed as an oncolytic therapeutic agent. Because proteolytic degradation of the reovirus outer capsid protein s3 is a critical step in cell entry, reovirus may preferentially infect cancer cells and tumors in which proteases are overexpressed. In this study, reovirus mutants were selected for growth in the presence of the entry inhibitor bafilomycin A1. By inhibiting vacuolar H+-ATPase, bafilomycin A1 raises the pH of endosomes and lysosomes, which contain internalized viruses and acid-dependent proteases. The increase in vacuolar pH inhibits these acid-dependent proteases, thus hindering their ability to cleave s3. Without degradation of s3, reovirus cannot escape from the vacuole and initiate infection. However, three bafilomycin-resistant viruses were determined to have mutant entry phenotypes that enable better replication in the presence of various entry inhibitors compared to their wild type parental virus. Furthermore, the mutant entry phenotypes conferred enhanced sensitivity to proteolysis by the ubiquitous lysosomal aspartyl protease cathepsin D. Sequencing of S4, the gene encoding s3, revealed that these mutations map to residue 354 of the s3 protein. The tyrosineà⇒histidine mutation observed at residue 354 has been previously associated with more rapid proteolytic degradation of s3. With further research, the administration of reovirus mutants with enhanced sensitivity to proteases unique to, or overexpressed by, tumor cells could become a less invasive alternative to traditional cancer therapies.

Presenter: Manjari Govada
Project Adviser: Jon Anderson (Statistics)
Title: Predictive Factors of Truck Driver Accidents
Type of Presentation: Poster #17

Abstract:
Over a two-year period, The T&T Project studied a panel consisting of 1065 new drivers at a cooperating trucking firm to identify factors associated with driver safety. Previous analyses have found that age, driver experience, marital status, miles driven, and the number of trip segments are associated with accident risk. Using a Cox proportional hazards multivariate survival model to control for these known risk factors, we estimate the effects of the following explanatory factors: past accidents of any severity, backward induction ability, a driver impatience measure, and credit score. One finding shows statistical evidence that past accidents predict higher risk for future accidents by the same driver, after adjusting for other control variables. This finding could play an important role in driver continuing education or training programs, and provide ideas for operational policy changes in the trucking industry.

Presenters: Dominic Scheck, Katharine Engdahl, and Joshua Johnson
Project Adviser: Brook Miller (English)
Title: Failure and Functionality in Virginia Woolf's Natural Orders
Type of Presentation: Oral
John Q. Imholte Hall, Room #111, 3:20 p.m.

Abstract:
In this panel, we will investigate a variety of ways in which Virginia Woolf's fiction indicates the presence of natural orders that language cannot directly convey. Rather than seeing the representations of gender, selfhood, and sense perception as socially determined, our panel explores *The Waves, To the Lighthouse* and *Kew Gardens* to consider how they founder in acts of communication These failures of language each suggest an underlying natural order: androgyny, autobiography as an essential component of self-construction, and the isolating exclusivity of a private self's phenomenological experience. The implication of such a view of Woolf's writing is that her texts gesture towards an underlying order in the natural world. Language fails to fully convey this order, but these failures are in fact functional; they facilitate the dynamics that ensure the preservation of the very order they fail to express. Woolf's art, in exploring the possibilities of language, is thus characterized by dual purposes: on the one hand, it depicts an underlying order negatively, through blockage and failures of communication; on the other hand, it represents the functionalism of failures to communicate. Failed heteronormative conversations, failed gestures of self-depiction, and failed attempts to communicate the phenomenality of experience lead not to dissolution but to the renewed pursuit of communication. In this way, language's failures to recognize and confront the underlying natural order are crucial to Woolf's characters' pursuits of cultural ends that are in themselves functional. Failures of communication stand as the markers of this functionalism.

Presenter: Laura Sims
Project Adviser: Julia Dabbs (Art History)
Title: The Photography of Sally Mann: Child Porn vs. A Mother's Prerogative
Type of Presentation: Oral
John Q. Imholte, Room #109, 4:35 p.m.

Abstract:
Controversy and speculation surround the work of Sally Mann. As a contemporary American photographer, Mann's work has undergone great scrutiny. Much of Sally Mann's work focuses on her children who are depicted in scenes that juxtapose child's play and fantasy with more grown-up situations. Quite a few photos show the children nude and so many critics have used the words "child pornography" when describing Mann's work. However, Mann and others, myself included, disagree with these sentiments. Her photos are about capturing her children in typical child's play, but add a whole new depth. The eyes of a mother extend through the camera lens in Mann's photographs. In my presentation I argue that Mann is not objectifying her children but working with them to create juxtaposition. I look at her pieces in depth and analyze their visual composition and their intentions from both the perspective of Mann and her children.

Presenter: Colin Stemper
Project Adviser: Seung-Ho Joo (Political Science)
Title: Downfall of the CPRF: What Went Wrong?
Type of Presentation: Oral
John Q. Imholte Hall, Room #217, 2:55 p.m.

Abstract:
The years following the break-up of the Soviet Union were a time of great change in Russia, including an explosion in the number of political parties vying for seats in the State Duma. The post-Soviet legislature was dominated by the Communist Party. However, the past decade saw the Communists lose complete control of the government to a party that appeared around the turn of the millennium, United Russia. Scholars have provided a number of theories as to why the Communists would lose power upon the emergence of United Russia. Those theories rely too strongly on institutional factors and roadblocks while completely ignoring the nature of Russia's political culture. This work fills the gap that is left by ignoring culture. Using qualitative patterns found in other research, but not addressed in it, I argue the Communist Party of the Russian Federation fell from power for two principal reasons. First, the party lost its main core of support in the regions, a resource that sustained it throughout its success in the decade before. Second, United Russia and the other main parties co-opted the CPRF's highly nationalistic message that had played well with the electorate. Additionally, I will argue that the Communists' days are numbered. The decline will be slow, but the next several elections will see the CPRF devolve into insignificance. Ultimately, the power previously enjoyed by this party has increasingly transferred to the hands of others.

Presenter: Kelley Swanlund
Project Adviser: Sarah Buchanan (French)
Title: Firmaman: A Double Birth
Type of Presentation: Oral
John Q. Imholte Hall, Room #111, 4:10 p.m.

Abstract:
This paper uses Julia Kristeva's theory of the *Chora* (1984) to analyze the message that Vanessa Paradis conveys through "Firmaman," a ballad written for and dedicated to her newborn daughter. Vanessa Paradis, a French pop singer commonly known in the United States solely as Johnny Depp's long time partner, boldly asserts her own identity, that of mother, publicly for the first time in 2000 with the release of her CD of popular music entitled *Bliss*. After more than a decade of interpreting the work of others, notably that of Serge Gainsbourg and Lenny Kravitz, Paradis began writing and composing works of her own in order to encapsulate and express the emotions of her pregnancy, thus putting herself in the role of song-writer. In this newfound role, Paradis liberally exercised her creativity through the artistic and aesthetic choices she made during the production of *Bliss*. In particular, Paradis decided to mobilize the poetic and musical elements of the *Chora* by recording her infant's voice, and by using a rather repetitive melody, endless metaphors, and a pulsating heartbeat. My project is important because very little academic work has been published on Vanessa Paradis, none of which breaches the subject of her musical career. Until now, her songs, their poetic content, and the underlying messages have gone unexamined on a scholarly level.

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Presenters: Carly Dukart and Stephanie Ranzau
Project Adviser: Ted Pappenfus (Chemistry)
Title: Ir(ppy)2(cs-acac) and Polyhedral Oligomeric Silsesquioxanes in Oxygen Sensing
Type of Presentation: Poster #26

Abstract:
Oxygen sensors have many uses in medical, industrial, and agricultural fields. The purpose of this research was to design suitable materials for molecular oxygen sensing. Previous research of oxygen sensing materials uses ruthenium as the transition metal in the synthesized compounds. This research explores an alternate metal system involving iridium and is focused on the luminescent properties of the compound. The main iridium (III) complex synthesized was Ir(ppy)2(cs-acac), where ppy indicates phenyl pyridine and cs-acac indicates non-8-ene-2,4-dione. This complex was then attached to a polyhedral oligomeric silsesquioxane (POSS). All eight POSS-silyl protons were substituted via the terminal alkene on the cs-acac to form the final product, Ir(ppy)2(cs-acac)8POSS. Complexes in the experiment were characterized using 1H NMR, infrared spectroscopy, Gas Chromatography-Mass Spectrometry, and absorption and emission spectra. Both iridium-containing materials proved to be efficient oxygen sensors by their emission characteristics under nitrogen and oxygen.

Presenter: Mohammed Farah
Project Adviser: Ted Pappenfus (Chemistry)
Title: Synthesis and Investigation of Platinum (II) and Ruthenium (II) Materials for Sensing Applications
Type of Presentation: Poster #27

***Abstract*:**
Inorganic materials have a wealth of practical applications including those related to energy production and the environment. This research focused on two types of inorganic compounds containing platinum and ruthenium centers for use as environmental sensors. Current methods in making these compounds are poor so this research also focused on improved synthetic methods. The first part of the research focused on a novel platinum (II) compound which was successfully prepared. Platinum-platinum double salt compounds can be vapochromic and are useful as chemical and biological probes. The second part of the research focused on a ruthenium (II) compound. Ruthenium $[Ru(bpy)_3]^{2+}$ was used as a cation to fill in the space between clay layers and make a luminescent material. X-ray diffraction was used in detecting the shift in the spacing between the clay layers. After the determination that there was a shift in the clay spacing, the material was tested for oxygen sensing. The data collected suggest that the ruthenium (II) compound senses oxygen and the platinum (II) compounds are capable of sensing volatile organic compounds.

Presenter: Melissa Carnicle
Project Adviser: Lea Gilbertson (Geology)
Title: A Possible Late Paleozoic Novaculite Deposit in the Parana Basin, Witmarsum Parana State, Brazil
Type of Presentation: Poster #9

Abstract:
Novaculite is a specific type of cryptocrystalline quartz found in the Ouachita Mountains of Arkansas and Oklahoma and in the Marathon Uplift of Texas. Novaculite probably formed as a siliceous ooze in the Devonian Period and was metamorphosed into chert during the Ouachita Orogeny. Native Americans mined Novaculite for sharpening stones, arrowheads and spear points and it is used commercially today as a whetstone. A cryptocrystalline siliceous unit that resembles Novaculite was first found in Late Paleozoic glacial units in the southeastern Parana Basin, Brazil. The goal of this study was to determine if the Brazilian deposit is Novaculite *sensu stricto*. Fieldwork for this study consisted of detailed mapping of Paleozoic units, description of possible Novaculite outcrops and sample collection. Lab work consisted of making thin sections and thin section analysis, X-Ray Diffraction analysis and sample preparation for X-Ray Fluorescence analysis. Field evidence suggested that the Brazil deposit was not Novaculite *sensu stricto*. At the time of deposition, the southern Parana basin was characterized by a high influx of terrestrial glacial and glacio-fluvial sediments. A siliceous ooze, in contrast, only forms in sediment starved environments. Additionally, bedding and contact features indicate a rapid, contemporaneous accumulation of the siliceous unit and glacial units. Both U.S.P. research and this study indicate that an alternative model for the origin of the Parana Basin siliceous unit may be volcanic tephra. However, a specific volcanic source is difficult to identify even though tephra are known throughout the Parana Basin.

Research for this study was funded by a grant from the N.S.F.- S.T.E.P. Program (NSF-DUE-0653063).

Presenter: Anne Dillon
Project Adviser: Peh Ng (Mathematics)
Title: What Makes a Search Engine Tick?
Type of Presentation: Poster #11

Abstract:
Search engines are of inestimable value for navigating the World Wide Web. They allow us to quickly sort through a network of billions of pages, handle millions of searches per day, and have enormous influence on how the Web has evolved. One of our goals is to make more people aware of the mathematics behind search engines, as search engines are used daily but many people are completely unaware of how they operate. We will explore the PageRank algorithm, which is used by Google to rank the pages returned in a search. In its most basic form, PageRank assigns an importance score (xk) to each page (k) in a web, which depends on the importance scores of all of the pages which link to page k. In this way, pages "vote" for one another through links. This forms a system of linear equations which can be written in matrix form as Ax = x, where x is the importance score vector to be solved for. We will explain the mathematics (linear algebra and graph theory in particular) behind the algorithm as used by Google. We will then introduce our research, namely testing a few possible variations to the existing methods. We will show the computational and numerical results of implementing these variations in terms of the time-efficiency of convergence and integrity of the resulting importance score vector.

This research has been funded by UROP.

Presenter: Elizabeth Thoma
Project Adviser: Marynel Ryan Van Zee (History)
Title: The Influence of Political Cartoons on Public Opinion during World War II
Type of Presentation: Oral
John Q. Imholte Hall, Room #112, 4:35 p.m.

Abstract:
My research focuses on the transformation of public opinion toward war in the United States before and after Pearl Harbor as expressed in cartoons. An abundance of political cartoons from the period exists, yet few scholars have researched them in any depth or tried to ascertain what effects they may have had on public opinion. One of my main goals has been to understand how World War II cartoonists simplified the issues and events of the time and to ascertain (to the degree that I can) whether this simplification encouraged pro- or anti- war responses. My presentation will explain how cartoons can serve as historical sources, how the methods used by the cartoonists affect their messages, and what we can tell about public opinion more broadly from their representations. This study will provide insight into what the cartoonists emphasized and how they hoped to influence public opinion, American attitudes concerning Pearl Harbor, the value of cartoons as historical sources, and the individual cartoonists and publishers who capitalized on editorial cartoons. I will display my results through an oral presentation supplemented with cartoons.

Presenter: Rachael Tripp
Project Adviser: Barbara Burke (CMR)
Title: The Modern Period: An Analysis of Feminine Hygiene Product Advertisements
Type of Presentation: Oral
John Q. Imholte Hall, Room #217, 3:20 p.m.

Abstract:
The politics of sex and gender have been applied to our ways of creating meanings about our bodies. Advertising presents cultural needs; by using keywords, expressions and phrases the advertising industry provides and articulates meanings for our desires and offers gratifications for purchase. Addressing research questions regarding advertising for "hygiene products," this study explores how ideas about women's bodies have changed. Applying a qualitative analysis of advertisements from Good Housekeeping and Ladies Home Journal Magazines, Berger's semiotic method and Rank's model of persuasion are used to compare ads from 1920-1950 and from 1990-2010. I used feminist theory to describe how American advertisers influence and reflect that our culture's views about women's bodies and menstruation change over time. In the 1920s-1950s, advertisers used keywords that echo feelings of secrecy, fear, and shame. In the 1990s-2010s the emphasis is on freedom, flexibility, and feminine power.

Presenter: Eva Wood
Project Adviser: Tammy Berberi (French)
Title: Impaired Justice: Ableism in Court Decisions
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 4:35 p.m.

Abstract:
This research explores the history, content and precedent set by court decisions involving the Americans with Disabilities Act (ADA). The ADA was designed to prohibit ableist practices and actions in the public sector. Ableism is analogous to racism or sexism, and is thus defined as discriminatory practices, actions, and thoughts based on perceptions of ability or disability. This study reviews the original legislation and portions of the law that have mitigated against the plaintiff. Study reveals a judicial system that interpreted the ADA most often in the interests of businesses, undermining the rights of the very people it was drafted to protect. These decisions prompted Congress to more clearly define the ADA with several amendments in 2008. These amendments revised some of the loopholes relating to "undue hardship" and "reasonable accommodation," while resolving the fundamental problems with the Supreme Court's definition of disability. The impact of these amendments remains to be seen. I will analyze *Sutton v United Airlines*, one of two precedents overturned by Congress, to examine a history of what Ruth Colker has called "judicial backlash," and to gauge how the amendments might shape future decisions that better reflect the spirit of the original legislation.

Presenter: Michael Zajicek
Project Adviser: Arne Kildegaard (Economics)
Title: Electricity Demand Smoothing: A Case Study at the University of Minnesota, Morris
Type of Presentation: Oral
John Q. Imholte Hall, Room #101, 4:10 p.m.

Abstract:
The University of Minnesota, Morris, pays an average of $33,000 per month for electricity. In 2009 almost 26% of this bill, or approximately $8580 per month, came in the form of a "peak demand charge" which is charged based on the single highest point of electricity usage during a 15-minute period for industrial scale users of electricity. These peak electricity demand periods are very short in nature, and thus if we could reduce these peaks the University of Minnesota could potentially save a significant amount of money. Through the use of a smart grid system to monitor electricity usage it is possible to automate systems to respond to rising electricity demand by either slowing down or shutting off entirely. This allows us to lower our peak demand by effectively spreading out these peaks over longer periods of time, thus lowering our peak demand charge. This project researched the possibility of implementing such a system on the UMM campus. Extensive background research on the electricity industry coupled with an exploration of UMM's electricity infrastructure and electricity billing data led to a model for how we could succeed in the creation of such a system. This could potentially save the University money, create a model that other large users of electricity could follow, and if implemented on a large scale could create a more efficient electricity industry.

This research has been supported by UROP funding.

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Presenter: Andrew Bowe
Project Advisers: Karen Mumford (Biology) and Engin Sungur (Statistics)
Title: Vaccination Beliefs and Perspectives at UMM
Type of Presentation: Poster #13

Abstract:
College campuses are ideal settings for the spread of contagious disease due to the close living and working arrangements of students, faculty, and staff. Vaccinations are an important public health intervention designed to slow the spread of disease and prevent additional infections. Despite the evidence that indicates the importance of vaccinations, rates of compliance can be relatively low. Low vaccination compliance is due to many factors such as concerns about vaccine safety, lack of information about vaccinations, and apathy. The emergence of the 2009 H1N1 influenza reignited the vaccination debate since the vaccine was rapidly developed to combat a potential pandemic. To determine the factors that may be associated with vaccine compliance, I designed the "UMM (University of Minnesota Morris) Seasonal and H1N1 Influenza Vaccination Survey." Specifically, the survey was designed to understand vaccination behaviors, beliefs, and attitudes among a college-based population. The survey asked vaccination behavior and attitude questions associated with seasonal influenza vaccines and the H1N1 influenza vaccine. In addition, demographic information was collected. The survey was disseminated electronically to all members of the UMM campus in December of 2009. The 183 completed surveys will be analyzed using multivariate statistical analysis to see if significant trends in the thoughts, beliefs, and actions exist among members of the campus community. This information may be very useful in the development of strategies to increase vaccination rates among campus community members.

Presenters: Kele Cable, Yiqing Cheng, Melissa Kloek, Levi Simonson, and Julia Welle
Project Adviser: Christopher T. Cole (Biology)
Title: Improving Transformation Efficiencies for Green Fluorescent Protein
Type of Presentation: Poster #4

Abstract:
This study initiated development of a new lab project for Molecular Biology (BIOL 3121) using the green fluorescent protein (GFP) gene, originally isolated from jellyfish. We examined the efficiency of two methods, heat shock and electroporation used to insert the plasmid (pGlo), on which GFP is located, into E. coli. The study helped determine which method was superior for use by lab students. Heat shock used salts and rapid changes in temperature to attach the plasmid to a weakened bacterial membrane and then induce its uptake. Alternatively, electroporation shocked young bacterial cells to create pores in the bacterial cell membrane that allowed for the uptake of the plasmid. Our results revealed the transformation efficiency for electroporation was about three times higher than for heat shock.

Presenters: Lea Awoudi and Olivia Awoudi
Project Adviser: Jon Anderson (Statistics)
Title: Factors Related to Survival of Veterans During the Civil War
Type of Presentation: Poster #12

Abstract:
Our research focused on a dataset of Civil War veterans from the Union Army. The data were obtained from the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan. The purpose of the research was to identify factors that contributed to risk of death during the war. We used cumulative hazard curves to display differences between groups. These curves measure the accumulated risk of death over time. We also estimated a multivariate Cox regression survival model that adjusts for several predicting factors simultaneously. We discovered that veterans of rank corporal, private, and other enlisted men were at a higher risk of death than officers, or musicians. After adjusting for other control variables in our Cox survival model, we discovered that survival varied depending upon the state where the soldier enlisted. We also found the occupation of the soldier before the war was an important predictive factor, even after adjusting for other characteristics of the soldier.

Olivia Awoudi and Lea Awoudi would like to thank the LSAMP (North Star Alliance) Program, Professor Jon Anderson and all the faculty that helped make this research opportunity possible.

Presenter: Zach Boser
Project Adviser: Ted Pappenfus (Chemistry)
Title: Synthesis and Characterization of Tricyanovinyl-dithienylpyrroles and R-group Influences on Physical Properties
Type of Presentation: Poster #21

Abstract:
Previous research has looked at the synthesis of materials that show promising electronic and physical properties for uses in organic electronics. This research was aimed at the synthesis of various dithienylpyrrole (TPT) molecules and their bis-tricyanovinyl (BTCV) counterparts and observing the effects the R-group has on the physical and electronic properties of the molecules to see if they can be improved. Various TPT molecules were synthesized via the previously studied Paal-Knorr condensation reaction. These molecules were then reacted with tetracyanoethylene to form the various BTCV-TPT molecules. These molecules were then characterized by various analytical techniques. Although the electronic properties of the phenyl-substituted oligomers are very similar, alkyl-substituted materials display the highest energy electronic transitions. More dramatic effects are seen in the solid state properties of the materials as indicated by a diverse range of melting points for these materials. These materials display promising physical and electrochemical properties for use in electronic devices.

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Performance Presentations
HFA #170

Presenter: Eric Gorecki
Project Adviser: Joe Carucci (Music)
Title: Gerry Mulligan's *All the things You Are*
Type of Presentation: Performance
HFA Room #170, 2:30 p.m.

Abstract:
The goal of this research project is to gain further understanding of Gerry Mulligan's improvisational approach to Jerome Kern's *All the Things You Are* from the 1962 album *Two of a Mind* and present my findings in a lecture recital. The project will include a study of the history of the recording and an analysis both harmonically and melodically of Mulligan's two solo choruses. I will use that analysis to describe Gerry Mulligan's improvisational techniques on this jazz standard. Another key to this project is demonstrating the authentic performance practice of the song. The goal would be to match sound qualities to the original and perform it in a similar way to how it was performed on the recording. I will be basing my work on Miles Osland's transcription of the song. The presentation will culminate with a performance of the transcription in a jazz quartet.

Presenter: Megan Haman
Project Adviser: Denise Odello (Music)
Title: Three Hundred Years Brings Uncertainty: Musicians Interpreting Baroque Performance Practice Today
Type of Presentation: Performance
HFA Room #170, 2:55 p.m.

Abstract:
How does one approach musical performance of a piece from a period long gone? The interpretations of written music varied three hundred years ago, during the Baroque period, as embellishments and ornamentation, such as articulation, dynamics, and phrasing, often went unwritten. The performers at the time, educated in the practices of the day, knew when to embellish and when not to embellish even if the composer's specific expectations were not notated in the piece. Unfortunately, as no recording devices existed, the exact way in which these educated performers decorated a piece, and by extension, how the piece was to be decorated, is unknown. Therefore, performers face the challenge of hypothesizing what is expected of them when they perform the piece. In order to get even a slight idea of how a piece would have been played, performers have to search for teaching manuals and guides to performance relevant to and accurate for that time period. Through an examination of musical scores of works composed in this time period, and through various sources that contain information on contemporary performance practices, I will explore the issues that face a modern performer in the interpretation of Baroque pieces, and demonstrate this process using Johann Christoph Pepusch's Sonata in F (for flute).

Presenter: Molly Kvam
Project Adviser: Ann DuHamel (Music)
Title: Robert Schumann: *Papillons* and *Die Flegeljahre*
Type of Presentation: Performance
HFA Room #170, 3:20 p.m.

Abstract:
Robert Schumann contributed significantly to piano repertoire of the Romantic period, writing almost exclusively for the instrument from 1830-1840. His work *Papillons (Butterflies)* is a set of dances that can also be considered a character piece. Through its title, a character piece suggests a certain mood or scene. The poetry and literature of Romantic German writers influenced much of Schumann's music. Schumann's strong literary influences stemmed from his father, who was a publisher, and Schumann himself founded and edited the music journal *Neue Zeitschrift fur Musik*. The literature of novelist Jean Paul Richter especially affected him, and his novel *Die Flegeljahre* ("Years of Indiscretion") serves as a basis for understanding *Papillons*. Through analysis of the work as well as research from other books and journals, I will examine relationships between the final chapter of *Die Flegeljahre* and *Papillons*, specifically the musical elements of harmony, melody, and form of the piano work. The analysis contextualizes the piece, both on the smaller scale of Schumann's musical relations with *Die Flegeljahre* and on the broader historical scales of form and aesthetics in the Romantic period.

Presenter: Jenna Reiser
Project Adviser: Becca Gercken (English/ American Indian Studies)
Title: In Search of a Native Voice: American Indian Identity on the Page and the Stage
Type of Presentation: Performance
HFA Room #170, 3:45 p.m.

Abstract:
The nature of Native American identity has been and continues to be a highly-contested issue not only within the state of Minnesota, but also throughout the United States. Defined disparately by biology, federal legislation, and self-identification, the determining factor inherent in Native identity is difficult to definitively identify. Hoping to discover what it means to be a Native person in the United States, I have created a piece of performance art inspired by interviews with Native American women that discusses the nature of Native identity. Drawing on my understanding of journalistic theatre and academic research, I have conducted a series of interviews with 10 Native women, studied federal Indian policy, and compiled my research in a written text intended to eventually be performed as a one-woman show. This research illuminates the common threads that underlie perceptions of Native American identity in the United States. An understanding of these paradigms is not only important to the Morris community – given the history of its university – but to anyone intending to fully comprehend the complex and tenuous history of relations between Indian and non-Indian people in this country, both historically and contemporarily.

Poster Presentations
Science Atrium
5:00 – 7:00 p.m.

Presenter: Jeff Aday
Project Adviser: Peter Wyckoff (Biology)
Title: White-tailed Deer (*Odocoileus virginianus*) as Facilitators of a European Buckthorn (*Rhamnus cathartica*) Invasion into Western Minnesota Forests
Type of Presentation: Poster **#3**

Abstract:
Invasive European buckthorn (*Rhamnus cathartica*) is the only tree species with substantial regeneration in forests along prairie-forest borders in western Minnesota. We examined the role white-tailed deer (*Odocoileus virginianus*) may play in facilitating invading R. cathartica. Deer populations have grown dramatically in Minnesota, rising 500% since 1974. In the spring of 2008, we constructed 10 (1.5 m x 2 m) deer exclosures across a light gradient in a forest near Herman, Minnesota. In each exclosure, we planted 45 seedlings—fifteen R. cathartica and two dominant native species, bur oak (*Quercus macrocarpa*) and green ash (*Fraxinus pennsylvanica*). Equivalent exposed control plots were established adjacent to each exclosure. Growth, survival, and environment were monitored periodically for all seedlings. Growth for all species dramatically decreased when exposed to deer browsing, but not all species were equally impacted. Inside exclosures, *Q. macocarpa* grew fastest and *R. cathartica* grew slowest. Outside exclosures, order was reversed, *R. cathartica* exhibited fastest growth. Two-year seedling survival rate inside exclosures was 93% for *Q. macrocarpa* and *F. pennsylvanica*, but only 48% and 55% respectively in control plots. *R. cathartica* had similar two-year survival inside (87%) and outside (84%) exclosures. As with growth, survival rankings were reversed by protection from browsing. When protected, *Q. macrocarpa* fared best and *R. cathartica* worst. When unprotected, *R. cathartica* had the highest survival rate among the three species. Our results suggest deer may play a substantial role in facilitating current *R. cathartica* invasions in forests of western Minnesota.

Presenters: Kevin Arhelger and Fernando Trinciante
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Title: The Observer Effect of Profilers on Computer Program Running Time
Type of Presentation: Poster #1

Abstract:
Programs written in the Java programming language are executed by a run-time system that performs program instructions. Additionally the run-time system may change program instructions to more efficient ones as the program is being run. One such common change is known as function inlining. Without inlining, every time a program uses a function, the run-time system must locate the function, execute its instructions, and return to continue the main program execution. Inlining copies the function's instructions directly into the main program, eliminating the overhead of locating the function and returning. Profilers are software tools that monitor programs as they are running. A profiler gathers information about the proportions of the total time that is spent on various segments of a program. The goal of our research project was to determine the accuracy of this information for a common profiling approach, known as byte-code injection: inserting instructions that record timings of individual program segments. We developed one set of programs where inlining was occurring and another set where inlining was not taking place; otherwise these programs were the same. By comparing the running times of these two sets of programs with and without the use of a profiler, we have shown that by inserting instructions to monitor a program, profilers disable inlining, causing a slowdown. Thus we demonstrate that the "observer effect" of profilers makes them inaccurate tools to monitor performance when inlining is involved. Profilers are commonly used in programming languages research and researchers should be aware of their potential inaccuracy.