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2012 Undergraduate Research Symposium Abstract Book

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The University of Minnesota, Morris

- 2012 -

The 2012 Twelfth Annual UMM Undergraduate Research Symposium (URS) celebrates student scholarly achievement and creative activities.

Students 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.

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

Saturday, April 21, 2012

10:00 a.m. – 2:00 p.m.	Registration, Science Atrium and John Q. Imholte Hall
10:00 a.m. – 11:45 p.m.	Poster/Visual Display, Science Atrium
10:30 a.m. – 10:35 a.m.	Opening Welcome-Manjari Govada President, Morris Campus Student Association
11:50 a.m.	Lunch, Oyate Hall
12:15 p.m.	Announcements-Gordon McIntosh, URS Chair Welcome-Jacqueline Johnson, Chancellor
1:00 p.m.	Introduction of Featured Presentation-Bart Finzel Interim Vice Chancellor for Academic Affairs and Dean
1:00 p.m. – 1:30 p.m.	Featured Presentation, HFA #160 – Recital Hall Anika Kildegaard - “ <i>Do You Want To Be Like God?</i> ”: An analysis of Context and Text Painting in Jake Heggie’s <i>Eve-Song</i>
1:30 p.m. – 4:30 p.m.	Oral presentations: John Q. Imholte Hall, Room #s: 101, 109, 111, 112

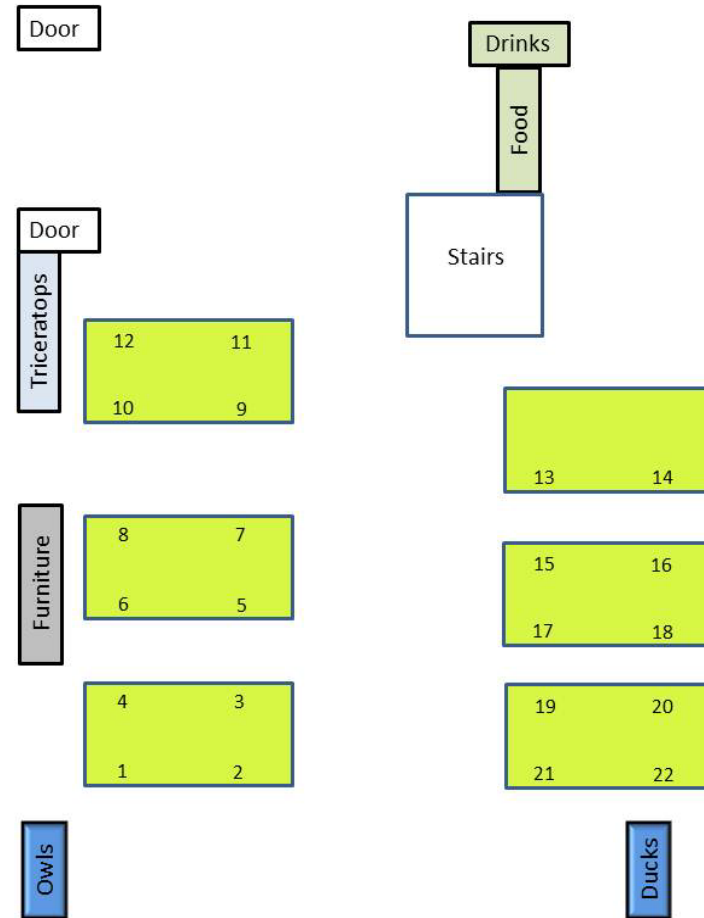
ORAL PRESENTATIONS
John Q. Imholte Hall, Room #s 101 and 109

Room #101

- 1:30 **Taryn Upmann** (English): **Teaching Scientific Writing: An Evaluation of Pedagogical Approaches through the Lens of Student Experience** (Adviser: Tisha Turk), abstract pg. 19
- 1:55 **Annie Morphew** (English): **Navigating the Borders of High School and College Composition** (Adviser: Tisha Turk), abstract pg. 12
- 2:20 **Sara Butterfass** (English): **Strengthening Students' Written Voice** (Adviser: Tisha Turk), abstract pg. #7
- 2:45 **Will Hanson and Fiona Biessener** (English): **Iconic and Realist Representations of Memory in Graphic Fiction** (Adviser: Brook Miller), abstract pg. 10
- 3:10 **Jessie Sherman** (English): **Using and Used by Mimicry and Signifyin(g): Minstrelsy in *Bamboozled* and *Mumbo Jumbo*** (Adviser: Becca Gercken), abstract pg. 16
- 3:35 **Caitlin Smith** (English): **Coyote Was Out Walking Around: Self-Aware Narrative and the New Trickster Discourse** (Adviser: Becca Gercken), abstract pg. 17

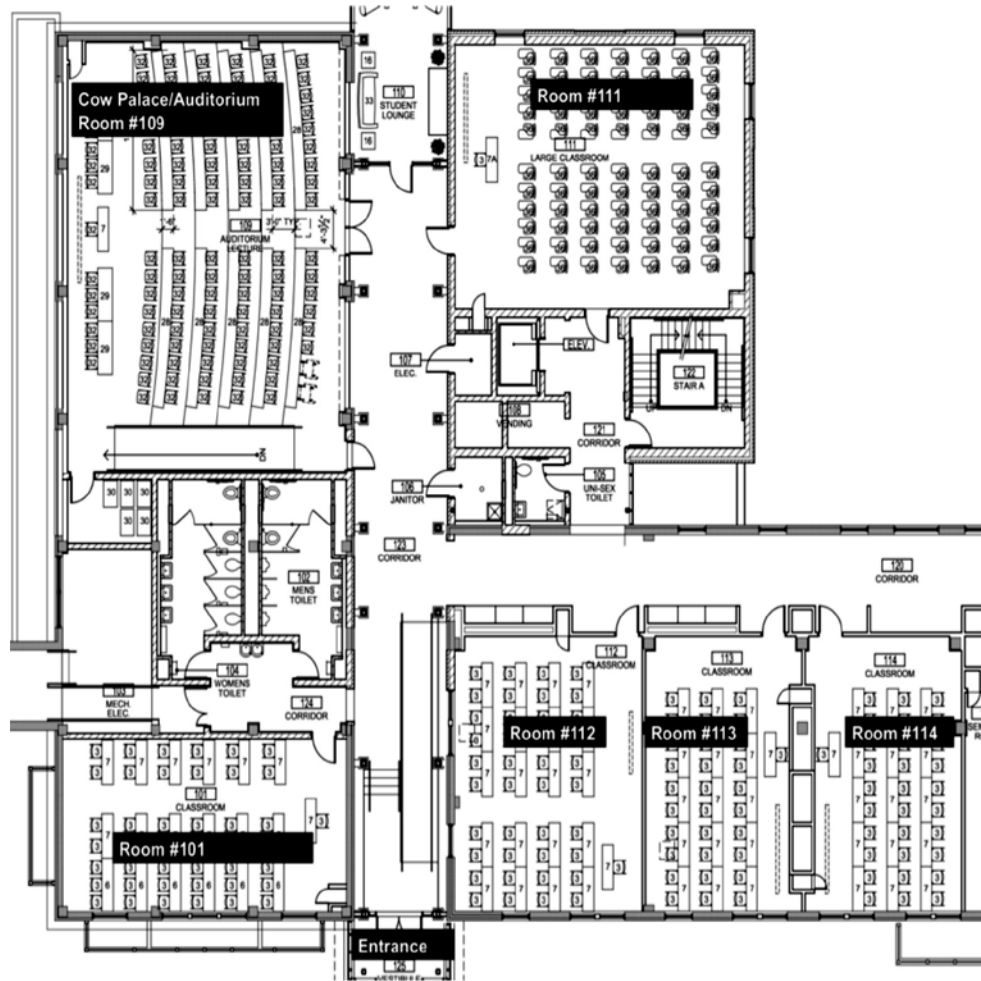
Room #109

- 1:30 **Mandi Berg** (Art History): **The Many Faces of Michelangelo in the *Last Judgment*** (Adviser: Julia Dabbs), abstract pg. 7
- 1:55 **Jennifer Riestenberg** (Art History): **Facing Beauty: Pre-Raphaelite Depictions of Women** (Adviser: Julia Dabbs), abstract pg. 14
- 2:20 **David Schilmoeller** (Art History): **Death and Dying in Ancient Greece** (Adviser: Jimmy Schryver), abstract pg. 15
- 2:45 **Hannah Schubloom** (Art History): **The Paradox of Coco Chanel: Contradictions and Connections Between her Lifestyle and Fashion Design** (Adviser: Julia Dabbs), abstract pg. 16
- 3:10 **Joshua Smith** (Art History): **Jenny Saville: Gazing at Paintings of Surgery** (Adviser: Julia Dabbs), abstract pg. 17
- 3:35 **Jacqueline Wersal** (Art History): **The Innovations of Lysippos** (Adviser: Jimmy Schryver), abstract pg. 19
- 4:00 **Clara Costello** (Theatre): **Inconstant Mirrors: Translating *The Juggler's Tale*** (Adviser: Siobhan Bremer), abstract pg. 9



Entrance

Science Atrium Layout



John Q. Imholte Hall, 1st Floor
Oral Presentations

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

Room #111

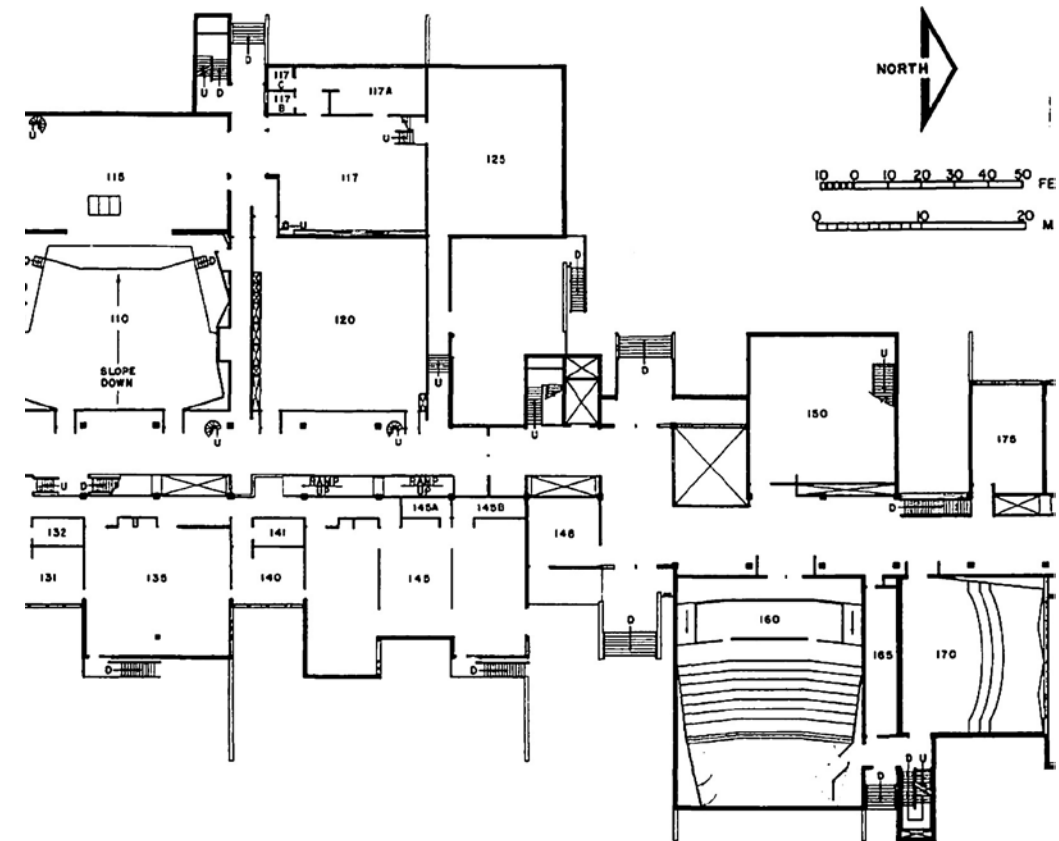
- 1:30 **Amanda Cornell** (Communication, Media, and Rhetoric; History): **Nellie Bly, Social Reform and Stunt Journalism** (Advisers: Barbara Burke and Roland Guyotte), abstract pg. 8
- 1:55 **Alissa Jacobsen** (History): **The Legacy of the West Central School of Agriculture; Conventional or Sustainable Agriculture?** (Adviser: Stephen Gross), abstract pg. 11
- 2:20 **Alexandra Myhal** (Biology): **Quantification of the Human SMN Spliced Variant by qPCR** (Adviser: Margaret Kuchenreuther), abstract pg. 13
- 2:45 **Colin Scheck** (Political Science): **The Decline of European Neutrality: A Neoliberal and Neofunctional Perspective** (Adviser: Seung-Ho Joo), abstract pg. 15
- 3:10 **Jessica Orth** (Statistics): **Understanding Directional Dependence through Angular Correlation** (Adviser: Engin Sungur), abstract pg. 13
- 3:35 **Amanda Cornell** (Communication, Media, and Rhetoric): **Are Youth Film Heroes Traditional Heroes?** (Adviser: Anthony Ocaña), abstract pg. 8
- 4:00 **Joe Hartmann** (Communication, Media, and Rhetoric): **Sustainable Development in the Digital Age: Open Source Appropriate Technology** (Adviser: Barbara Burke), abstract pg. 10

Room #112

- 1:30 **Alissa Hawks** (Honors): **Music Therapy and Autism Spectrum Disorder** (Adviser: Tammy Berberi), abstract pg. 11
- 1:55 **Erica Mumm** (Honors): **From Genealogy to Genetics: A Look at Lineage throughout History** (Adviser: Tammy Berberi), abstract pg. 12
- 2:20 **River Ostrow** (Honors): **Implications of the Dinner Plate: The Social Stratification of Food Across Class** (Adviser: Tammy Berberi), abstract pg. 14
- 2:45 **Anna Grachek** (Philosophy): **Yes, I Was a Fetus and I Have a Mind** (Adviser: Pieranna Garavaso), abstract pg. 9
- 3:10 **Miles Taylor** (Philosophy): **Artificial Life as a Methodological Tool for Philosophers** (Adviser: Dan Demetriou), abstract pg. 18
- 3:35 **Kevin Teeling** (Psychology): **Social Exclusion: Its Effects and Implications** (Adviser: Dennis Stewart), abstract pg. 18

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Science Atrium

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- #2 **Rachel Busko (Biology): The Constant Scale is the Dominant Outcome Measure Following Rotator Cuff Repair Surgery** (Adviser: Rich Hardy), abstract pg. 22
- #3 **Annie Hawkinson (Biology): Determining Color Vision in *T. sirtalis*: Can Red-sided Garter Snakes See the Difference between Red and Blue?** (Adviser: Heather Waye), abstract pg. 24
- #4 **Ruth Potter and Sonja Smidt (Biology): Impact of Climate on Growth of *Acer saccharum* (Sugar Maple) at the Prairie-Forest Border in Western Minnesota** (Adviser: Peter Wyckoff), abstract pg. 28
- #5 **Luciana Ranelli, Obsa Bokku, and Kelsey Scareshawk (Biology): Best Management Practices for Native Perennial Plants Grown as an Alternative Bioenergy Feedstock** (Adviser: Margaret Kuchenreuther), abstract pg. 28
- #6 **Luciana Ranelli and Pat Lienemann (Biology): Leaf Processing of Three Species in a Lentic and Lotic Environment** (Adviser: Tracey Anderson), abstract pg. 29
- #7 **Latysha Pankratz (Geology): Changes in Length and Ice Volume of Rabots glaciär, 2003-2011** (Adviser: Keith Brugger), abstract pg. 27
- #8 **Clay Fischer (Communication, Media, and Rhetoric; Center for Small Towns): Analysis of Lake Ida Homeowners' Knowledge of Invasive Species and Water Quality Issues** (Advisers: Barbara Burke and Jessica Beyer), abstract pg. 23
- #9 **Michael Rislow (Mathematics): Structural Properties for Bases of 3-Directed Hypergraphs** (Adviser: Peh Ng), abstract pg. 29
- #10 **Robert Smith (Physics): Dynamics of High Altitude Balloon Ascents** (Adviser: Gordon McIntosh), abstract pg. 30
- #11 **Xueyang Jiao and Jiachen Ning (Economics/Management and Statistics): The Effects of Obstructive Sleep Apnea on the Medical Costs of Commercial Truck Drivers** (Advisers: Stephen Burks and Jon Anderson), abstract pg. 25



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- #13 **Laura Katovich** (Psychology): **The Impact of Dorsal and Ventral Systems on the Visual Perception of Optical Illusions** (Adviser: Albert Yonas), abstract pg. 25
- #14 **Jordan Berg** and **Ben Shabb** (Sport Studies and Athletics): **The Rowe Scale is the Dominant Outcome Measure of Bankart Lesion Repairs** (Adviser: Rich Hardy), abstract pg. 21
- #15 **Lauren Rae Bailey** (Chemistry): **Fatty Acid Composition of *Camelina Sativa* and *Calendula Officinalis* Oil using HPLC with UV Detection** (Adviser: Nancy Carpenter), abstract pg. 20
- #16 **Spencer Gardeen** and **Denise Casemore** (Chemistry): **Conventional Microwave One-pot Solventless Microscale Synthesis Reactions for Undergraduate Labs** (Adviser: Ted Pappenfus), abstract pg. 23
- #17 **Amanda Granaas** (Chemistry): **Active Living Interventions for Rural School-aged Children in Western Minnesota** (Adviser: Nancy Carpenter), abstract pg. 24
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- #19 **Stephen Adams** (Computer Science): **Interoperability between the Clojure and Java Programming Languages** (Adviser: Elena Machkasova), abstract pg. 20
- #20 **Dan Seidenkranz** and **Matthew Lovander** (Chemistry): **Electronic Properties of Benzodithiophene Derivatives** (Adviser: Ted Pappenfus), abstract pg. 30
- #21 **Lucas Ellgren** (Computer Science): **Applying Dynamic Geography to Cellular Evolutionary Algorithms** (Adviser: Nic McPhee), abstract pg. 22
- #22 **Jeffrey Dale Lindblom** and **Seth Sorenson** (Computer Science): **Methodology for Detecting Optimizations of Function Calls** (Adviser: Elena Machkasova), abstract pg. 26
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Featured Presentation
HFA Recital Hall #160
1:30 pm

Presenter: Anika Kildegaard

Project Adviser: Ann Duhamel (Music)

Title: *“Do You Want To Be Like God?”: An Analysis of Context and Text Painting in Jake Heggie’s Eve-Song*

Type of Presentation: Performance

Abstract:

Jake Heggie’s song cycle *Eve-Song*, for soprano and piano, is an exploratory work documenting the maturation of Eve during her time in the Garden of Eden. Throughout the cycle she progresses from innocence at birth, to delight and wonder at exploring her surroundings, through feelings of disgusted amazement at the discovery of the forbidden knowledge, to pain and harsh reality, and finally reflective and peaceful acceptance. Heggie, with text painting, (a compositional technique in which the music reflects the meaning of the words,) harmony, and stylized writing, uses his music to further the poetic setting of Eve’s story. By means of a lecture recital, I will present selections from the cycle, breaking down the components of the music as a way to compliment the aesthetic enjoyment of the pieces. I will explore the representation of Eve’s character in the music, in particular the presence of her femininity, and the difference in style and characterization from her voice to the voice of temptation: the snake. After the lecture I will sing the pieces, in collaboration with an accompanist.

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

Presenters: Dan Seidenkranz and Matthew Lovander
Project Adviser: Ted Pappenfus (Chemistry)
Title: **Electronic Properties of Benzodithiophene Derivatives**
Type of Presentation: Poster #20

Abstract:

Alternative energy resources have been popularized within the past decade as the supply of fossil fuels continues to decrease while the demand for energy increases. A current area of renewable energy research is solar energy, specifically, the use of organic solar cells to capture light emitted by the sun. In our research we aimed to synthesize a variety of new molecules with promising electronic properties displaying more efficient light absorption and energy conversion. A multitude of techniques were used to analyze the electronic properties exhibited. The techniques included the use of in-house instrumentation, namely, UV-Vis spectroscopy and electrochemical analysis. Our study resulted in the successful syntheses and electronic refinements of small molecules for potential use in organic solar cells. As a result of our study, a deeper understanding of the electronic behavior of small, organic, semi-conducting molecules was gained. The deeper understanding may be utilized for the development of more efficient, light capturing molecules to be used in organic solar cells. Funding for this project was provided by University of Minnesota Initiative for Renewable Energy and the Environment (IREE).

Presenter: Robert Smith
Project Adviser: Gordon McIntosh (Physics)
Title: **Dynamics of High Altitude Balloon Ascents**
Type of Presentation: Poster #10

Abstract:

The goal of this research project was to further understand and quantify the ascent dynamics of high altitude balloons. Creating a mathematical model that accurately reflects experimental results allows for a better understanding of the physical processes that take place as well as improve flight path prediction. The drag and gravitational forces acting on the balloon were equated to the buoyancy force. This equation was then solved for the velocity. It was possible to find all variables as a function of altitude for the velocity except for the drag coefficient. Three different models of increasing complexity were created that avoid computing the drag coefficient as a function of altitude. After analyzing the balloon data from three separate balloon launches, there is agreement among the three models and data at lower altitudes (up to approximately 10,000 meters). The models have varying degrees of success at higher altitudes. This project was supported by a MAP and a UROP.

Presenter: Mandi Berg
Project Adviser: Julia Dabbs (Art History)
Title: **The Many Faces of Michelangelo in the *Last Judgment***
Type of Presentation: Oral
 John Q. Imholte Hall, Room #109, 1:30 p.m.

Abstract:

The *Last Judgment* in the Sistine Chapel by Michelangelo Buonarroti has been a source of controversy since the time of its creation in 1541. More recently the arguments regarding the evidence of Michelangelo's self-portraits within this fresco have been scrutinized and criticized by many scholars, with the result that only one of the four potential self-portraits is widely accepted as an image of the artist. My research digs more deeply into this problem by examining the reasons Michelangelo would have had to portray himself in his works, in general through iconography. The presentation will also suggest that by broadening the focus to Michelangelo's use of self-portraits in all of his works, it is possible to move beyond the controversies currently surrounding the self-portraits in the *Last Judgment*. Through visual analysis I will examine the possible reasons behind Michelangelo's choice to portray himself in his works and his choice to do so in unflattering and unusual ways. I argue that these self-portraits tell us vital personal information about this Renaissance artist.

Presenter: Sara Butterfass
Project Adviser: Tisha Turk (English)
Title: **Strengthening Students' Written Voice**
Type of Presentation: Oral
 John Q. Imholte Hall, Room #101, 2:20 p.m.

Abstract:

Some scholars in composition studies argue that written voice expresses a single, authentic self; others contend that written voice synthesizes multiple aspects of the writer's self, including cultural values, home discourse, school discourse (and possibly any number of interactions), into a coherent whole. Some scholars view this synthesis as a sign of a skilled writer because of the writer's flexibility to convey thoughts differently through different styles and yet still accurately express their individual self. In my presentation, I will argue that this vocal flexibility is something that students should practice because it would enable them to better combine their personal experiences (thus their personality, their voice) and the academic discourse which they learn as undergraduates. Increasing the frequency of teaching grammar rhetorically, or stylistically, would be the primary method of achieving written vocal flexibility. If students are made consciously aware of how to manipulate grammatical rules (which often work against them to constrain their writing) to their advantage, they will begin to build a written flexibility of voice – one that combines their cultural influences and personal experiences and produces a clear voice behind their writing. If students are taught that voice is built out of the language they use every day and with the grammatical rules they know (both consciously and unconsciously) they will become more skilled writers because of their ability to combine styles and produce one that expresses their own vocal plurality.

Presenter: Amanda Cornell

Project Advisers: Barbara Burke and Roland Guyotte (Communication, Media, and Rhetoric; History)

Title: Nellie Bly, Social Reform and Stunt Journalism

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 1:30 p.m.

Abstract:

Nellie Bly's activities in the late 1800s affected both the practices of investigative journalism and the understanding of feminist ideals in her era. Bly was a "stunt journalist" who used her undercover style of investigative journalism to advance social reform and fight for justice. In an era entranced with popular journalism, Bly's attention-grabbing stunts included getting herself committed to an insane asylum in order to expose and report on the true conditions of mental institutions. She also gained significant attention by replicating Jules Verne's fictional 80-day trip around the world (actually completing the trip in 72 days). Drawing from an assortment of primary and secondary sources, including Bly's original books and articles that chronicle her adventures, I found Bly distinguished herself from other women of her era. Throughout her adventures and globetrotting, Bly supplied a regular stream of well-written articles, which helped her New York newspaper gain an advantage in the competition for circulation, and also helped her establish the idea that a woman could be a capable reporter. Despite Bly's important role in media and gender history, she receives little recognition for her accomplishments. To remedy this situation, this project asserts that Bly deserves greater attention by scholars interested in changes in the practices and values of journalism and in changes in career opportunities for women.

Presenter: Amanda Cornell

Project Adviser: Anthony Ocaña (Communication, Media, and Rhetoric)

Title: Are Youth Film Heroes Traditional Heroes?

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 3:35 p.m.

Abstract:

In this era, children spend countless hours viewing films. Children learn about the adult world from the images they see in mass media, therefore children are hypothesized to use the content of films not only for entertainment value, but also for guidance towards their own personal behavior and interaction cues. A content analysis can show a systematic, detailed description of film content. To learn about traditional characteristics of heroes and protagonists in movies that feature children as the lead characters, I did a content analysis of 51 American book-based family films from the 2000s and 1990s. These films' main characters and sidekick/assistants were then studied and evaluated for manifest and latent demonstrations of 22 identified characteristics. After interpretation and calculation of intercoder reliability, findings indicate differences by decade and by gender by protagonist. These findings are important because the lead characters of their favorite movies sometimes influence children's behaviors and ideas about the adult world.

Presenters: Luciana Ranelli and Pat Lienemann

Project Adviser: Tracey Anderson (Biology)

Title: Leaf Processing of Three Species in a Lentic and Lotic Environment

Type of Presentation: Poster #6

Abstract:

Energy and nutrients for aquatic food webs come from autochthonous (originating in the water) and allochthonous (originating outside of the water) sources. Allochthonous inputs, such as leaves, are a critical source of nutrients in the aquatic food web, but there is limited research comparing how they are broken down, processed, and used in lentic (standing water) versus lotic (flowing water) habitats. Leaf processing was measured for cattail (*Typha latifolia*), cottonwood (*Populus deltoides*), and bur oak (*Quercus macrocarpa*) leaves in the Pomme de Terre River for 33 days. Mesh bags with leaves representing each species were placed in two different sites of the river; the lentic environment formed by the mill dam embankment and below the dam in the lotic reach. Leaf processing rates were measured semiweekly and reported as weight loss over time, and percent remaining was calculated at the end of the study. There were no differences in the leaf processing rates between the lentic and lotic environments ($P > 0.1$). Statistically the cottonwood and cattail leaves processed at the same rate (slopes = -1.3×10^{-4} and -1.43×10^{-4}) and bur oak did not change during the course of the study (slope = 3.3×10^{-5}). The rates observed during this study suggest that for this system, leaf processing rate depends more on the plant material itself than the physical environment in which it is placed.

Presenter: Michael Rislow

Project Adviser: Peh Ng (Mathematics)

Title: Structural Properties for Bases of 3-Directed Hypergraphs

Type of Presentation: Poster #9

Abstract:

A conventional directed graph is a network model that is used to describe the flow of information from one location to one other. We can generalize this network model to include the case where connections can be made to link three locations, as well as two, with a structure called a 3-directed hypergraph (3-DH). This model will have a set of vertices, V , representing the network's locations, and a set of hyperarcs, H , which represent a subset of V that are directly connected to one another, and will be denoted as $G = (V, H)$. The direction imparted on a hyperarc is then a representation of how information flows among the vertices. In previous research, we studied subgraphs of 3-DH called *circuits* in an attempt to establish some structural similarities among graphs. More recently, our analysis has been focused on discovering features of a *basis* of a 3-DH. This research has pointed us to a conjecture requiring the existence of a special structure called a *doublecycle* or a vertex of one degree in any basis of a 3-DH. In the process of a proof, we constructed numerous empirical examples, which allowed for the discovery of some interesting properties such as the fact that a basis for a 3-DH need not have any odd degree vertex. This research is of interest since it may enable us to solve the optimization problem $\{\max \mathbf{cx} : \mathbf{Ax}, \mathbf{x} \geq \mathbf{0}\}$ in certain cases, where \mathbf{A} is the vertex-hyperarc incidence matrix of the 3-DH.

Presenters: Ruth Potter and Sonja Smidt

Project Adviser: Peter Wyckoff (Biology)

Title: Impact of Climate on Growth of *Acer saccharum* (Sugar Maple) at the Prairie-Forest Border in Western Minnesota

Type of Presentation: Poster #4

Abstract:

Performance of *Acer saccharum* at the edge of its current range may be predictive of the species' response to near-term climate change. We used tree rings to establish growth patterns for *A. saccharum* at three sites along a SW-NE transect spanning the historical prairie-forest border in western Minnesota. Our study sites span a moisture and temperature gradient approximately equal to predicted climate change for the state during the remainder of the 21st century. Sampled *A. saccharum* populations were established in the 1850s at the time of European settlement. We specifically asked how *A. saccharum* growth responds to drought and whether this drought-growth relationship might also be changing with time. Sampled *A. saccharum* showed a strong response to summer drought at all three sites since 1900, and the strength of that response increased with time. Based on raw ring widths, growth since 2000 at our hottest, driest site has been less than 60% of growth for similar sized trees at our wettest site. To expand our comparisons, we used recently published chronologies from the central portions of Minnesota to extend our transect further to the NW and more firmly into the range of *A. saccharum*. There is a clear pattern of increasing drought sensitivity from the NE to the SW ends of the expanded transect. Given established links between slow growth and increased mortality risk, the results we report here suggest that *A. saccharum* populations at the current prairie-forest ecotone may be increasingly vulnerable to climate-mediated dieback. Funding: NSF/DEB Grant # 1019451.

Presenters: Luciana Ranelli, Obsa Bokku, and Kelsey Scareshawk

Project Adviser: Margaret Kuchenreuther (Biology)

Title: Best Management Practices for Native Perennial Plants Grown as an Alternative Bioenergy Feedstock

Type of Presentation: Poster #5

Abstract:

Native perennial plants are emerging as an alternative bioenergy feedstock. However, best management practices to promote a diverse, healthy and productive stand have yet to be determined. In the second year of a five-year project we evaluated the influence of four fertilizer (full recommended nitrogen, half recommended nitrogen, manure, none) and two harvest (harvest, no harvest) treatments on a stand of ten native species planted on land previously devoted to row crops. Plant cover, frequency, and total biomass (keeping legumes separated from other plants) were measured in 2010 before applying treatments, and in 2011 after the first harvest (fall 2010) and fertilizer application (early summer 2011). Grass cover increased in all treatments from 2010-11, with the greatest increases occurring in plots that received the most nitrogen. Harvest produced no consistent effect on grass cover. Treatments had no consistent effect on native legume cover; however, cover of non-native sweet clover increased dramatically between years, especially in harvested plots. The frequency of annual weeds decreased between 2010-11, while native grasses increased in frequency. Total biomass increased significantly from 2010-11 across all treatments. Increased legume biomass was observed in harvested plots and was attributable to the presence of sweet clover. Maturation of the stand was likely responsible for most of the patterns observed. Fertilizer and harvest treatments interacted in a complex fashion, and their influence should become clearer with time. Therefore, definitive management recommendations are premature at present. We thank LSAMP, UMM MAP, and the USDA-ARS for their support.

Presenter: Clara Costello

Project Adviser: Siobhan Bremer (Theatre)

Title: Inconstant Mirrors: Translating *The Juggler's Tale*

Type of Presentation: Oral

John Q. Imholte Hall, Room #109, 4:00 p.m.

Abstract:

French scholar and translator M nage once claimed that translations can be either beautiful or faithful, but not both.

My process of translating Michael Ende's 1982 verse play *The Juggler's Tale* from German into English was a constant struggle between those two ideals. I wanted to convey the beauty and wit of Ende's verse, but also to tell his story in an understandable and coherent manner. In order to accomplish this task, I began with a direct translation, making it as accurate as possible, consulting a German logophile on idioms and obscure words. I then versified the text by slowly building off the skeleton I had laid out in the technical translation, gradually transforming my first draft into a fully developed translation of Ende's elegant writing. Over the months, this project has led me to explore the world of German folklore and children's literature in which the play is deeply rooted and has given me a new understanding and respect for the role of the translator in the world of literature. This presentation will include a description of the translation process as well as a synopsis of the play.

Presenter: Anna Grachek

Project Adviser: Pieranna Garavaso (Philosophy)

Title: Yes, I Was a Fetus and I Have a Mind

Type of Presentation: Oral

John Q. Imholte Hall, Room #112, 2:45 p.m.

Abstract:

A majority of analytic philosophers believe in the psychological approach to personal identity; this is the view that person A at time1 is identical to person B at time2 if and only if B at time2 is psychologically continuous with A at time1 (Parfit 1971 and 1984, Noonan 1989, Shoemaker 1984). A is psychologically continuous with B if and only if there is continuity of character traits, beliefs, values, and experiences between A and B. A minority of philosophers, among whom Bernard Williams (1973) and Richard Swinburne (1984), support a bodily criterion of personal identity according to which person A at time1 is identical to person B at time2 if and only if A and B have the same body. A recent and preferable approach is defended by Eric Olson (1997). According to this biological approach, person A at time1 is identical to person B at time2 if and only if both A and B are the same living organism. I think the psychological and biological functions of a person are important to maintain a singular identity over time. However, these approaches are incompatible since, in the same thought experiment, i.e., the Transplant case, the psychological approach identifies the original person with the one inheriting the psychology while the biological identifies the person with the original organism. I breach the gap between the two approaches by arguing that continuity of the biological human organism is necessary and jointly sufficient with psychological continuity, but psychological continuity is not necessary for personal identity.

Presenters: Will Hanson and Fiona Biessener

Project Adviser: Brook Miller (English)

Title: Iconic and Realist Representations of Memory in Graphic Fiction

Type of Presentation: Oral

John Q. Imholte Hall, Room #101, 2:45 p.m.

Abstract:

We tend to think of comics as a medium exclusive to superheroes and adventure stories. However, recently there has been a great proliferation of graphic novel memoirs which tend to be the more critically acclaimed works in graphic fiction. As graphic memoir continues to play a bigger role in the contemporary literary canon, visual culture theorists like Scott McCloud are beginning to assess the formal conventions of the genre. We propose to analyze a divergence between two dominant visual styles, the iconic and the realist, in the graphic memoir. The primary examples we will use as representatives are Art Spiegelman's *Maus* and Alison Bechdel's *Fun Home* for the iconic and realist styles, respectively. We argue that while the medium of graphic fiction itself allows for a more nuanced and fractured approach to the subject of memory, there is a divergence in how the text is experienced by the reader due to these different visual styles. Within the realist visual style the narrative is implicitly presented as more objective, reliable, and thus more focused on events within memories and less on how those memories are experienced in the present. In contrast, the iconic visual style allows for a more subjective and less reliable narrative whose expressionistic focus is instead upon how the events within the narrative are experienced as memory. Overall, we will assess the visual strategies and intertextuality of these graphic memoirs as new methods of representing the nature of the individual's life story.

Presenter: Joe Hartmann

Project Adviser: Barbara Burke (Communication, Media, and Rhetoric)

Title: Sustainable Development in the Digital Age: Open Source Appropriate Technology

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 4:00 p.m.

Abstract:

The ability to adapt and the emphasis on the Do-It-Yourself sensibilities of the Whole Earth Catalogue are values championed by "hackers" advocating for Open Source Software (OSS). Now, a new movement called Open Source Appropriate Technology (OSAT) has emerged to combine the OSS movement of internet hackers like Richard Stallman with the soft-energy path of appropriate technology praised by counter-culturist Stewart Brand to create a new and alternative strategy for facilitating sustainable development. In this project, applying the theories of Murray Bookchin regarding a post-scarcity society, I answer how OSAT could overcome the issues of implementing sustainable development. To do this, I researched and synthesized a variety of arguments from various fields, including political theory, environmental studies, and history. My findings suggest the potential for OSAT to be a tool for sustainable development has yet to be realized, but when further-advanced this new field may be able to redefine the meaning of appropriate technology.

Presenter: Kenna Nelson

Project Advisers: Stephen Burks and Jon Anderson (Economics/Management and Statistics)

Title: Cognitive Skills, Screening for Job Matches, and a Competing Risks Model of Quits versus Discharges among Truckers

Type of Presentation: Poster #12

Abstract:

Until the recent recession, large firms in the truck load segment of the trucking industry experienced average annual driver turnover rates over 100 percent. The Truckers & Turnover Project studied a panel of new drivers at a cooperating trucking firm over a two year period to identify factors associated with driver retention. Drivers sign a training contract that obligates them either to complete one year of work or pay back the commercial value of the training they receive. We measured several different characteristics of these new drivers while they were still in training, including cognitive skills, demographic factors, a personality inventory, and their economic preferences (e.g., risk aversion in small gambles). We use a competing risks survival model to simultaneously estimate predictor effects on quitting voluntarily versus being discharged by the firm during the first year of work, when the training contract has not yet been satisfied. Holding other factors constant, we find that cognitive skills are the biggest single predictor of completing the training contract year, but that the effects on the two forms of exit are different in an intuitive manner: higher cognitive skills are associated with lower quitting and lower cognitive skills with a higher risk of discharge.

Presenter: Latysha Pankratz

Project Adviser: Keith Brugger (Geology)

Title: Changes in Length and Ice Volume of Rabots glaciär, 2003-2011

Type of Presentation: Poster #7

Abstract:

Rabots glaciär in northern Sweden advanced early in the 20th century during the culmination of the Little Ice Age and then subsequently retreated in response to a ~ 1 °C warming. Historical records, photographs, maps, and measurements document the glacier's behavior in response to that warming. The glacier retreated ~ 773.6 m between 1910 and 2003 and total volume loss during this interval was $\sim 153.2 \times 10^6 \text{ m}^3$. During the summer of 2011 ice surface elevations were measured using differential GPS in order to further document changes in the glacier's geometry. Glacier retreat since 2003 has been ~ 105 m, corresponding to a rate of $\sim 13 \text{ m a}^{-1}$. Preliminary results suggest the corresponding in volume loss was $\sim 27 \times 10^6 \text{ m}^3$, or $\sim 3.3 \times 10^6 \text{ m}^3 \text{ a}^{-1}$. Rates of ice retreat and volume loss appear to be comparable to those of the last several decades. This research project was funded through UROP.

Presenter: Matthew Kroonblawd

Project Advisers: Thomas Sewell and Sylke Boyd (Physics)

Title: Computer Study of Thermal Energy Transfer in Crystalline TATB

Type of Presentation: Poster #18

Abstract:

The insensitive high explosive 1,3,5-triamino-2,4,6-trinitrobenzene (TATB) has a highly anisotropic triclinic crystal structure consisting of graphitic-like layers stacked along the *c* crystal direction. Interactions within those layers include significant inter- and intra-molecular hydrogen bonding whereas interactions between layers are limited to van der Waals forces. We used molecular dynamics (MD) simulations to better understand the effects of crystal anisotropy on thermal energy transfer. A three-dimensionally periodic supercell containing 1000 molecules with lattice basis dimensions $10a \times 10b \times 5c$ was simulated using the force field developed by Bedrov *et al.* Initial conditions for the simulations were designed to probe possible differences between intraplane *versus* interplane energy transfer (*i.e.*, net energy transfer parallel to the *a* and *c* crystal directions, respectively). The results suggest that thermal conduction in TATB is anisotropic. Spatial and temporal profiles of temperature and heat flux illustrate differences in energy transfer properties: intraplane heating was found to be slower and less spatially homogeneous than interplane heating. We are currently working to understand the underlying physical explanation for the observed anisotropic energy transfer behavior. Funding for this project was provided by a Stevens' Fellowship grant from the University of Missouri – Columbia and the Defense Threat Reduction Agency (DTRA).

Presenters: Jeffrey Dale Lindblom and Seth Sorensen

Project Adviser: Elena Machkasova (Computer Science)

Title: Methodology for Detecting Optimizations of Function Calls

Type of Presentation: Poster #22

Abstract:

Java is a widely-used modern programming language. To maximize program speed, Java programs are run concurrently with another program, known as the Just-in-Time compiler, or JIT, that monitors, analyzes, and modifies Java program code throughout its execution. These modifications lead to significant increases in program speed. Some of these modifications are geared toward decreasing the overhead of function calls in a program. Programs consist of multiple functions that perform individual tasks adding up to the overall functionality of the program. When a function's task is required for execution, that function is called. Function calls incur speed overhead. One way JIT modifications decrease this overhead is by inlining a function that is being called. This process consists of replacing the instruction for the function call with the function itself, which is analogous to directly pasting the function's code over the call. The JIT can perform multiple modifications at the same time. The interactions between these modifications are unpredictable, and may lead to different execution times when the same Java program is repeatedly run under the same conditions. Our project focuses on determining the role of function call modifications in this instability. In this effort, we explore various methods of detecting JIT modifications, including studying operation records produced by the JIT and separate tools for monitoring program behavior. This research contributes to better understanding of function optimization patterns in Java, and develops methodology for better optimization detection. This project was sponsored by UROP and MAP.

Presenter: Alissa Hawks

Project Adviser: Tammy Berberi (Honors)

Title: Music Therapy and Autism Spectrum Disorder

Type of Presentation: Oral

John Q. Imholte Hall, Room #112, 1:30 p.m.

Abstract:

Individuals with autism spectrum disorders (ASD) have been found to have a unique relationship with music. People with ASD often struggle with language and social skills, but these issues appear to be less prevalent in their ability to respond to and reproduce music. It has been suggested that people with ASD may benefit from music therapy. The present research project, which I am completing as my Honors capstone, reviews the literature regarding music, music therapy, and autism. This study combines work in the fields of clinical, cognitive, and developmental psychology, music and music therapy to explore the relationship between music and autism. The focus will be on why individuals with ASD react and respond to music differently than people without ASD, and how these differences can be utilized to increase social, cognitive, and emotional functioning in people with ASD. Understanding how and why music therapy is an effective treatment for people with ASD is important to further increase the benefits people with ASD gain from music therapy. Approximately one in every one hundred and ten children has ASD, so improving music therapy can have a major impact on many individuals.

Presenter: Alissa Jacobsen

Project Adviser: Stephen Gross (History)

Title: The Legacy of the West Central School of Agriculture; Conventional or Sustainable Agriculture?

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 1:55 p.m.

Abstract:

When the University of Minnesota, Morris was an agricultural high school, the methods taught there created a path that led to the agricultural techniques that are widely practiced today. However, the nature of the impact the West Central School of Agriculture had upon farming practices is yet unclear, partially due to a lack of previous research. By looking through yearbooks, class descriptions and school newspapers, I endeavored to discover if the West Central School of Agriculture imparted an understanding of sustainable agriculture or if it left behind a foundation for conventional agriculture. I found that the institution promoted both philosophies of farming through different means. Despite the reality that conventional farming is the dominant method of producing food today, there is a forgotten legacy of sustainable agriculture that is waiting to be reclaimed.

Presenter: Annie Morpew

Project Adviser: Tisha Turk (English)

Title: Navigating the Borders of High School and College Composition

Type of Presentation: Oral

John Q. Imholte Hall, Room #101, 1:55 p.m.

Abstract:

Attempts to define what “college-level” writing actually is have sparked considerable debate about what aspects of student writing are the most important, what types of writing tasks should be emphasized, and whether or not current incoming freshman are appropriately prepared for college writing. However, the conversation concerning “college-level” writing is problematic because of important voices not being heard in this debate: the voices of secondary school teachers. In this presentation, I analyze current articles about standards for “college-level” writing and argue that the label itself is inherently exclusive and is a cause of the problem. This label draws the boundary of the discussion at the college door. It implies that the writing done by students at other educational levels is fundamentally different and that the standards for these other kinds of writing are unrelated to a discussion of college-level writing standards. In reality, the conversation about standards should be expanded and reformatted as a K-16 conversation. The borders between secondary schools and colleges in particular should be broken down and consistent communication established. Postsecondary credit options for secondary school students already exist that demonstrate the possibilities for communication between college composition instructors and secondary English teachers. I suggest that these programs can become the foundation for a valuable conversation spanning institutional boundaries. Communication between institutions is important for the development of writing standards and better writers. Writing education does not begin in college nor does it end in high school. Discussions about writing education should reflect this reality.

Presenter: Erica Mumm

Project Adviser: Tammy Berberi (Honors)

Title: From Genealogy to Genetics: A Look at Lineage throughout History

Type of Presentation: Oral

John Q. Imholte Hall, Room #112, 1:55 p.m.

Abstract:

The purpose of this research was to look at the changing concepts of lineage and genetics throughout history. It was conducted as a part of the Honors course *Traditions in Human Thought*, and utilizes secondary sources in addition to reviewing literature about the development of genetics and the ethical questions that arose with the development of genetic testing. It first focuses on the hemophilia gene’s effect on the European royal succession in the 19th century, and then examines the evolution of the modern idea of genetics, leading to the relatively new field of genetic counseling. This study found that convoluted notions of genetics led to problems with inbreeding and finding appropriate successors in the royal families. It also highlights the importance of the many ethical implications that need to be taken into consideration with genetic counseling as the field continues to grow. As notions of genetics developed, other concerns arose associated with knowing too much, rather than too little.

Presenters: Xueyang Jiao and Jiachen Ning

Project Advisers: Stephen Burks and Jon Anderson (Economics/Management and Statistics)

Title: The Effects of Obstructive Sleep Apnea on the Medical Costs of Commercial Truck Drivers

Type of Presentation: Poster #11

Abstract:

The Institute of Medicine (IOM) has identified chronic sleep disorders, such as obstructive sleep apnea (OSA), as a major public health problem in the United States. OSA is a condition in which the individual's airway repeatedly closes during sleep and the brain must become partly alert to re-open it, preventing the sufferer from ever getting fully restful sleep. OSA may lower one’s immune function and is associated with much co-morbidity, such as heart disease. Among 14 million US commercial driver license (CDL) holders, 2.4-3.9 million (12-28%) may have OSA, making it the most common medical cause of excessive daytime sleepiness in this population. The Truckers and Turnover Project (T&T) has studied drivers from Schneider National, Inc. (SNI), a large (15,000 drivers) motor carrier which has a unique and industry-leading pilot program to screen, diagnose, and treat its employee drivers for OSA. Using data obtained from the firm and its health care service providers over a five-year period, we analyze the relationship between OSA and medical costs during the study period, using a case-control analysis due to the high turnover among the driver population. Our initial work examines per-member per-month costs (and implicitly, member health) and we find statistically different medical costs between cases and controls and also differences among cases according to treatment success. This analysis is intended ultimately to influence the public policy debate on the nature of prospective regulatory requirements for OSA screening in commercial drivers. Sponsors include the Truckers and Turnover Project and SNI.

Presenter: Laura Katovich

Project Adviser: Albert Yonas (Psychology)

Title: The Impact of Dorsal and Ventral Systems on the Visual Perception of Optical Illusions

Type of Presentation: Poster #13

Abstract:

This research project sought to evaluate how humans perceive motion and process visual information. One leading theory in the area of visual perception states that the human brain uses two pathways, the dorsal and ventral system, to perceive visual information and movement. To test this theory, study participants viewed an Ames trapezoidal window (which produced the illusion of depth, although the window itself is actually flat) and were told to reach out and touch the sides of the window as quickly and accurately as they could, without being able to see their hands. The study found that participants in the binocular condition were more accurate at determining the actual location of the window’s edges than participants in the monocular condition. The fact that participants were more accurate when viewing the window with two eyes lends support to the theory of the two-pathway system for visual perception, and helps explain the relationship between the mind’s perception of an object and the body’s movement toward it. The Undergraduate Research Opportunities Program (UROP) sponsored this study, and it was conducted at the University of Minnesota’s Institute of Child Development in Dr. Albert Yonas’s Visual Perception Lab.

2012 Undergraduate Research Symposium

Presenter: Amanda Granaas

Project Adviser: Nancy Carpenter (Chemistry)

Title: Active Living Interventions for Rural School-aged Children in Western Minnesota

Type of Presentation: Poster #17

Abstract:

The Statewide Health Improvement Program (SHIP), an integral part of Minnesota's innovative 2008 health reform law, provided funding to counties to prevent chronic disease by reducing tobacco use and increasing healthy eating and physical activity behaviors among residents. A qualitative evaluation of eight SHIP-funded school-based physical activity interventions was conducted among participating schools in Morrison, Todd, and Wadena counties in central Minnesota. The purpose of this evaluation was to document the breadth of active living interventions implemented in these high-need areas, assess participation rates, and identify strategies employed to sustain the most successful initiatives. Through on-site interviews, researchers observed the physical settings of the interventions, including equipment or modifications to facilities, and the activity levels of participants. Analysis of interview transcripts and key themes identified critical capacity issues and considerations for future interventions. A total of 1,314 school-aged children from eight schools participated in SHIP-funded physical activity interventions. Participants were from all grade levels and engaged in a breadth of activities including winter snowshoeing, gardening, weight lifting, open gym, revised circuit-style physical education class curriculum, and a before-school walking program. The reported benefits of these interventions included providing effective additional opportunities for school-aged children to participate in physical activities, enhancing community participation and social capital, and leveraging resources and support from various organizations to sustain these initiatives. These results highlight the need for future research to investigate the benefits of state-wide programs that allow small, rural communities to implement active living interventions.

Presenter: Annie Hawkinson

Project Adviser: Heather Waye (Biology)

Title: Determining Color Vision in *T. sirtalis*: Can Red-sided Garter Snakes See the Difference between Red and Blue?

Type of Presentation: Poster #3

Abstract:

The objective of this research was to test whether or not *Thamnophis sirtalis*, the red-sided garter snake, could be trained to associate red or blue in an environment with undesirable conditions. Previous research has found red and blue cone receptors within the eye of this species, but no behavioral follow-up tests have been done. Nineteen snakes were tested in two subsets. One subset was trained to associate a red enclosure with an undesirable environment and the other was trained to associate a blue enclosure with an undesirable environment. These environments were made undesirable for *T. sirtalis* by maintaining the enclosure at an uncomfortable (but not fatal) temperature, and the enclosure lacked bedding or texture on the glass bottom so that it was difficult for the subject to move. In addition, an experimenter was constantly touching or bothering the snake. Snakes were individually placed in the undesirable enclosure 3 times before being tested in a large control enclosure, where half was blue and half was red. The subject's initial direction, final side occupied, overall time spent on each side, and number of crosses between the sides were then recorded. This research will be a significant contribution to our understanding of *T. sirtalis*, because behavioral research on color vision in animals is often the best way to understand how intensely (or whether) an animal sees a color. This project has been sponsored by UROP.

2012 Undergraduate Research Symposium

Presenter: Alexandra Myhal

Project Adviser: Margaret Kuchenreuther (Biology)

Title: Quantification of the Human SMN Spliced Variant by qPCR

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 2:20 p.m.

Abstract:

This experiment was undertaken to determine the relative abundance of several splicing variants of the survival motor neuron (SMN) gene. We focused on the variant produced by the skipping of the DNA sequence, exon 7, which produces a damaged protein and is associated with spinal muscular atrophy (SMA). The SMN gene is present in two copies, SMN1 and SMN2, which are differentially processed (spliced) after transcription. SMA occurs when SMN2 is the only gene present, as it cannot compensate for the loss of SMN1 due to increased skipping of exon 7. Splicing variants were studied in nerve cells treated with PBS (control) or cells treated with paraquat, an herbicide. Previous research has shown that cells exposed to paraquat can be damaged by reactive oxygen molecules (show oxidative stress). We isolated the RNA from each of the cell types and conducted tests using it as a template. Each test used a specific primer set designed to anneal to particular variants. We performed reverse transcriptions polymerase chain reaction (RT-PCR) to estimate quantity of different variants. We ran multiple quantitative PCR tests for each variant and determined the relative quantity and absolute quantity of each. Results showed increased skipping of exon 7, as well as exon 5, and exons 5 and 7 together under conditions of oxidative stress. Our findings underscore a possible correlation between exon 5 and exon 7, as these were more susceptible to co-skipping under oxidative stress.

Presenter: Jessica Orth

Project Adviser: Engin Sungur (Statistics)

Title: Understanding Directional Dependence through Angular Correlation

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 3:10 p.m.

Abstract:

Understanding and modeling multivariate dependence structures depending upon the direction or 'way' that the data are looked at is a challenging task but an interest of both theoretical and applied researchers. In this research we follow ideas from spatial statistics and introduce a way of looking at directional dependence by using a direction parameter expressed as an angle. This construction helps us to understand some hidden dependence information and allows us to model and measure directional dependence in a meaningful way with informative dependence plots. We attempted to form a general framework by using rotations and projections that allow us to obtain different perspectives on dependence structures by using the different angles of observance. This allows us to determine the direction of the maximum extreme angular correlation between three random variables. When dealing with data in two-dimensions, the relationship of the correlation between the variables is straightforward, as there is only one possible combination of variables to consider. When dealing with data in 3-dimensions, more combinations of variables arise, which we address using special correlation cases to determine the set-up that yields the maximum correlation and the angle at which it is attained. The developed approach to directional dependence is applied to a data set consisting of three variables for 87 Minnesota counties; total population, unemployment rate, and education level. This application has allowed us to put into perspective the ideas mentioned above, giving clear evidence that the dependence structure depends on the way that the data have been examined.

2012 Undergraduate Research Symposium

Presenter: River Ostrow

Project Adviser: Tammy Berberi (Honors)

Title: Implications of the Dinner Plate: The Social Stratification of Food Across Class

Type of Presentation: Oral

John Q. Imholte Hall, Room #112, 2:20 p.m.

Abstract:

As cultural studies of food have shown, people of a given culture are united not only by a shared dependency on food, but also by the cultural values they attach to food. Historical surveys show that the cultural value we attach to food can shift dramatically in a short period of time, based on changing political, economic, and social factors. My presentation, based on research in the Honors course *Traditions in Human Thought* will examine what cultural critic Harvey Levenstein called ‘food stratification’ during three discreet time periods: The Middle Ages, Post World War II, and the present day. Whether people were eating fetal rabbits or frozen foods, their reasons for selecting these foods were the same: the psychological drive to emulate a diet associated with cultural notions of affluence. The status of a food is determined by three factors: 1) the dominant authority or leadership of the time, 2) the authority’s influence on the food system, and 3) the perceived nutritional and economic value of the specific food. This cultural studies approach to analyzing what we eat and why draws upon psychology, history, economics, food surveys, and popular reference sources. Although historically based, this research creates a foundation for understanding the food choices we are making today. Recent critiques of mass food production compel us to question what we value and why. These ideals are reshaping the American diet and could unite or divide our attitudes towards food.

Presenter: Jennifer Riestenberg

Project Adviser: Julia Dabbs (Art History)

Title: Facing Beauty: Pre-Raphaelite Depictions of Women

Type of Presentation: Oral

John Q. Imholte Hall, Room #109, 1:55 p.m.

Abstract:

What makes a woman beautiful? Some believe that bleached hair and a dark tan make one beautiful. For others, beauty is indicated by pale skin or thick makeup. The concept of beauty has transformed often throughout history, and one can readily see these changes depicted in female portraiture. Yet, while these developments in notions of the ideal feminine beauty may have occurred through subtle changes in society, few have been as deliberate as the change instigated by the Pre-Raphaelite Brotherhood. This group of mainly male artists in Victorian England sought to paint as truthfully as possible, which in portraits of women meant that none would be idealized. However, possibly because these painfully real portraits were not accepted initially by the British Royal Academy, their depictions of women evolved to create in portraiture a new ideal beauty. Research on the standards of female beauty within artists of the Brotherhood is limited; thus, I intend to shed some light on the topic. Through investigating Pre-Raphaelite aesthetic theory and visually analyzing portraits of women by John Everett Millais, Dante Gabriel Rossetti, and Edward Burne-Jones I will show how the Pre-Raphaelites’ dogma of truth in visual art is very different from that of contemporary Victorian portraitists, what social factors initially made their art so unusual, and how this vision of beauty would later develop into, ironically, an idealized type of female portrait.

2012 Undergraduate Research Symposium

Presenter: Clay Fischer

Project Advisers: Barbara Burke and Jessica Beyer (Communication, Media, and Rhetoric; Center for Small Towns)

Title: Analysis of Lake Ida Homeowners’ Knowledge of Invasive Species and Water Quality Issues

Type of Presentation: Poster #8

Abstract:

In recent years, the threat of invasive species has been growing in Douglas County. Zebra mussels, curly-leafed pondweed, and many others impact the diversity and well-being in the area known as “lake country.” To learn more about how Lake Ida residents communicate and perceive information regarding water quality and invasive species, I conducted a survey. Out of 727 mailed surveys, I received 238 responses. Results showed that over 63% of respondents thought information regarding invasive species could be easier to understand, and over 71% wished for more information about invasive species. Less than 17% of respondents said they were “very confident” they could identify a zebra mussel, while only 32% knew how long a zebra mussel survives in the wild. Over 77% of respondents said that Lake Ida needed more information at local boat landings, while 86% said information at boat landings is helpful and worth investing in. Effective communication is lacking between homeowners and the informative tools regarding water quality and invasive species. It is difficult to expect water quality and invasive species issues to subside if homeowners unfamiliar with these problems remain so. This presentation will show more results of the survey, as well as make some recommendations highlighting effective communication strategies for lake associations.

Presenters: Spencer Gardeen and Denise Casemore

Project Adviser: Ted Pappenfus (Chemistry)

Title: Conventional Microwave One-pot Solventless Microscale Synthesis Reactions for Undergraduate Labs

Type of Presentation: Poster #16

Abstract:

To promote green chemistry in the undergraduate lab setting, small scale microwave reactions were designed for use in the laboratory curriculum of the University of Minnesota, Morris. Experiments were developed that use a conventional microwave to synthesize compounds that are then purified and characterized. Compounds successfully produced include the following: copper(II)phthalocyanine, benzoxazinone, 1-(4-ethoxyphenyl)-2,5-dimethylpyrrole, and 1,4-dimethylcarbazole. These experiments are meant to educate UMM students on the growing area and benefits of green and sustainable chemistry. Microwave chemistry offers benefits such as reducing byproducts and using environmentally friendly chemicals. Through these labs, students gain the skills necessary to obtain and analyze raw data from various instruments commonly used in the chemistry laboratory. By introducing microwave chemistry into the curriculum, awareness is generated of rapidly emerging areas in green chemistry. Funding for this research was provided by the Course, Curriculum, and Laboratory Improvement (CCLI) program of the National Science Foundation.

Presenter: Rachel Busko

Project Adviser: Rich Hardy (Biology)

Title: The Constant Scale is the Dominant Outcome Measure Following Rotator Cuff Repair Surgery

Type of Presentation: Poster #2

Abstract:

The purpose of this study was to determine which rotator cuff assessment after surgery was the most frequently used and whether it varies by continent. One hundred studies, published between 2005 and 2011, were randomly chosen from the pubmed.com database using key words Rotator Cuff Tear and Supraspinatus Tear. We documented the continent and the scale(s) used for each publication. Of the 100 studies, 38 were published from Europe, 37 from North America, 21 from Asia, 2 from Africa, and 2 from Australia. Following Rotator Cuff reconstructive surgery, the Constant Scale was the most commonly used outcome measure. The Constant Score is determined through assessment of two subjective and two objective variables; the subjective variables being pain and activity of daily living and the objective variables being range of motion and strength. Pain is assessed on a scale from 0 (severe pain) to 15 (no pain). Activity of daily living ranges from 0 (severe inhibition of daily life by shoulder injury) to 20 (no inhibition). Range of motion assesses forward flexion, abduction, external rotation, and internal rotation on scales from 0 (severe inhibition) to 10 (no inhibition). Strength is measured using a spring balance to achieve resisted elevation at 90 degrees (for a maximum of 25 points).

Presenter: Lucas Ellgren

Project Adviser: Nic McPhee (Computer Science)

Title: Applying Dynamic Geography to Cellular Evolutionary Algorithms

Type of Presentation: Poster #21

Abstract:

Evolutionary Computation (EC) is a field of Computer Science that utilizes the basic principles of biological evolution in order to find optimal or near-optimal solutions to problems. Evolutionary algorithms (EAs) represent potential solutions to a problem as individuals, who are then evaluated based on how well they solve the problem. The EA keeps the individuals that solve the problem well, while discarding the individuals that do not. As the program runs, better and better solutions are found through this evolutionary process. Our research in particular looks at cellular EAs, in which individuals are placed into cells on a grid and allowed to move around. We then add geography to the grid, which adds requirements for certain individuals to live in a grid space. Requirements are sub-problems of the main problem, which individuals must satisfy in order to survive. Individuals must change and adapt to these new environments in order to continue spreading. This allows for a greater diversity of solutions and increased selection pressure for good solutions. We also look at dynamic geography, in which the requirements of the cells change over time. We experiment with different ways of changing the cell requirements in order to increase diversity and the overall effectiveness of the algorithm. We then compare dynamic geography, static geography and standard cellular evolutionary algorithms in order to determine the approach that is most effective.

Presenter: Colin Scheck

Project Adviser: Seung-Ho Joo (Political Science)

Title: The Decline of European Neutrality: A Neoliberal and Neofunctional Perspective

Type of Presentation: Oral

John Q. Imholte Hall, Room #111, 2:45 p.m.

Abstract:

The purposes of this research project are to discuss the theoretical origins of political and military neutrality of Sweden, Finland, and Austria and to examine the rationale behind the diminishment of their commitment to neutrality as members of the European Union in the post-Cold War environment. This paper highlights the importance of EU security integration and its implications for the NATO alliance and the future of European defense. In this comparative study of the security policies of Sweden, Finland, and Austria, I argue that neo-realism offers the best explanation to why each country initially adopted neutrality but neo-liberalism and neo-functionalism provide a theoretical framework as to why each redefined and modified neutrality as its security policy attaching less value to it. I argue against state-level constructivist theories of neutrality by analyzing the behavior of the political elite in each country in order to demonstrate how all three states have uniformly and rationally redefined neutrality as a means of maximizing key economic interests in the growing global economy. I find that neutrality has been retained for its worth as a source of international prestige and as a useful tool to mobilize the electorate in domestic elections. I conclude that the need to remain economically viable in the global economy has usurped the importance of security and compelled Sweden, Finland, and Austria to sacrifice their neutrality (and the sovereignty it signifies) in favor of sustained growth.

Presenter: David Schilmoeller

Project Adviser: Jimmy Schryver (Art History)

Title: Death and Dying in Ancient Greece

Type of Presentation: Oral

John Q. Imholte Hall, Room #109, 2:20 p.m.

Abstract:

Funerary and burial traditions are a constant feature of human societies; for ancient cultures, such as the Greeks, the dead and their relics form a large portion of the evidence modern historians possess on the subject. By analyzing the funerary practices of the ancient Athenian Greeks, and then comparing and contrasting them with what is known of the contemporary culture, my research offers both an explanation of the forms ancient burial ceremonies took and why they changed throughout Athens' "Golden Age" (the 5th century BCE). My research focused on physical remains, such as pottery and other physical objects, found in or near graves, as well as contemporary writing, plays, and speeches on the subject of death. The cultural debt owed to Ancient Greece by the modern West is well known, and insight into this important part of the human experience is intellectually rewarding and significant for anyone interested in the different views ancient cultures held about dying, the psychological impact of death on individuals and society, or how Athenians in particular thought of the subject--particularly in light of their intense focus on civic pride and duty. My presentation will offer my conclusions about the particular forms Athenian funeral practices took, why they did so, and how these changes fit into the contemporary culture at large.

Presenter: Hannah Schubloom

Project Adviser: Julia Dabbs (Art History)

Title: *The Paradox of Coco Chanel: Contradictions and Connections Between her Lifestyle and Fashion Design*

Type of Presentation: Oral

John Q. Imholte Hall, Room #109, 2:45 p.m.

Abstract:

Gabrielle “Coco” Chanel’s timelessly sleek and simple style of fashion design has remained prevalent for almost a century. Throughout her highly successful career she empowered women by dressing them in shapes and fabrics traditionally reserved for men. Stylistic contributions such as the Little Black Dress, Chanel Suit and Chanel Sweater became the uniform for well-to-do women in a wave of cultural change from the 1910s until her death in 1971. It is seemingly impossible to study the evolution of women’s fashion devoid of Coco Chanel. Despite having a style that epitomized the feminine revolution, Chanel’s private life was marked by a constant dependence on wealthy, influential men. The summation of her private life represents the antithesis of what made her and her designs stylistically and artistically iconic. While numerous researchers have detailed her love life, there is little literature linking her romances to her inspired fashions. Through biographical review and visual analysis of her work, I will explore the interweaving of Chanel’s personal and professional lives, and demonstrate that the two were very much interconnected.

Presenter: Jessie Sherman

Project Adviser: Becca Gercken (English)

Title: *Using and Used by Mimicry and Signifyin(g): Minstrelsy in Bamboozled and Mumbo Jumbo*

Type of Presentation: Oral

John Q. Imholte Hall, Room #101, 3:10 p.m.

Abstract:

In my presentation, I will examine Ishmael Reed’s use of minstrelsy in his postmodern novel *Mumbo Jumbo* as well as the novel’s place in the larger critical discussion about the subversive power of imitation applying post-colonial, linguistic, and post-modern literary criticism to the novel and by comparing the novel to Spike Lee’s film *Bamboozled*. Theorists Homi K. Bhabha and Henry Louis Gates argue for imitation’s positive potential. Spike Lee, on the other side of the theoretical debate, depicts imitation as destructive. Reed places his novel in the middle of the debate, exploring imitation’s power *and* its danger. This debate extends beyond the confines of the academic and theoretical, and beyond novels and films touched on by those fields. Throughout contemporary pop-culture, whether in verbal sparring matches between Spike Lee and Tyler Perry or in rap albums, such as Little Brother’s *The Minstrel Show*, these questions about the power and effect of imitation on racial identity are an important part of our cultural landscape. In such an oppositional and ubiquitous conversation, it is useful to be reminded of the middle ground. Reed, as a typical postmodernist, affirms and problematizes both perspectives, encouraging critical engagement with the conversation rather than immediate acceptance or rejection.

Presenters: Darren Baun and Drew Schield

Project Adviser: Heather Waye (Biology)

Title: *Habituation of Anti-predator Response and Development of Positive Feeding Response to an Otherwise Negative Stimulus in *Ambystoma tigrinum**

Type of Presentation: Poster #1

Abstract:

Habituation, a form of adaptive learning by which a distinctive behavior is lost over time due to a repeated, harmless stimulus, is likely widespread in animals. Though this phenomenon has been described in several diverse taxa, it has not been widely examined in others, including fish, reptiles, and amphibians. We studied the defensive and predatory behaviors of the tiger salamander (*Ambystoma tigrinum*), an abundant amphibian species in the Prairie Pothole Region of west-central Minnesota. Eleven salamanders were collected from wetlands in Stevens Co., MN, and brought into the laboratory where they were housed individually in glass aquaria. The salamanders were fed according to one of two separate treatments: 1) fed crickets by hand; or 2) the crickets dropped into enclosure through a tube, minimizing the animal’s exposure to humans. We tested for change in each salamander’s response to a human predator-analog in a series of experimental trials. In salamanders that were hand-fed, a majority exhibited a change in behavior that suggests two things: 1) habituation of defensive behavior toward a predatory stimulus; and 2) development of predatory behaviors toward the same stimulus. Our study represents a significant avenue for the study of animal behavior, in that habituation is an important form of learning, but is little understood. Our study also has implications for the study of animal behavior in a laboratory setting. Our research was funded by a UROP grant awarded to the primary presenter and was advised by Dr. Heather Waye.

Presenters: Jordan Berg and Ben Shabb

Project Adviser: Rich Hardy (Sport Studies and Athletics)

Title: *The Rowe Scale is the Dominant Outcome Measure of Bankart Lesion Repairs*

Type of Presentation: Poster #14

Abstract:

More clinicians and academic practitioners use outcome measures or scales to evaluate patient response to Bankart Lesion Repairs. A Bankart Lesion is characterized by an injury to the glenoid labrum of the shoulder due to repeated shoulder dislocations. The purpose of this study was to determine which scale was the most frequently used and whether it varied by continent. In order to determine which tests were used, one hundred studies were chosen from pubmed.com. The studies focused on the shoulder functionality after a Bankart Lesion Repair. The continent and scale(s) used for each publication were documented. The tests such as ROWE or American Shoulder and Elbow Surgeons score (ASES) are questionnaires that are given to patients to judge the success of the surgery. Of the one hundred studies, each was broken down by continent and type of score. It was determined that the ROWE score was the most commonly used score across the world except North America where the ASES was the dominant outcome measure. These results show that there is a preferred score across the world, and the health industry would benefit from a consistent universal outcome measurement.

Poster Presentations
Science Atrium
10:00 a.m. – 12:15 p.m.

Presenter: Stephen Adams

Project Adviser: Elena Machkasova (Computer Science)

Title: Interoperability between the Clojure and Java Programming Languages

Type of Presentation: Poster #19

Abstract:

Clojure is a programming language first introduced 2007. Clojure is built on top of the Java programming language. This means that the two languages are run by the same system, and a programmer can use fragments of one language in the other. When combining two languages there are several challenges to doing it well, especially when the languages are as different as Clojure and Java. Java as an object-oriented language and primarily works with objects. Objects in programming languages model real life entities such as a car or an employee in a database. Clojure is a functional language which means that its element is a function. Functions in a programming language can just be mathematical functions such as a square root, or they can be more general such as a function that takes a list of shapes and draws them on the screen. Clojure provides a variety of functions that make working with collections of data very easy. Good interaction between these two languages is not easy to do well due to their differences. This project develops examples of good interactions that address common software design problems. Solutions are evaluated using common approaches such as code length and complexity. Developing effective patterns of interaction between Java and Clojure provides examples of how to leverage both of these languages' strengths, which benefits the software development community. This project is sponsored by UMN UROP.

Presenter: Lauren Rae Bailey

Project Adviser: Nancy Carpenter (Chemistry)

Title: Fatty Acid Composition of *Camelina Sativa* and *Calendula Officinalis* Oil using HPLC with UV

Detection

Type of Presentation: Poster #15

Abstract:

Camelina Sativa and *Calendula Officinalis* are two seed oils that have a high fatty acid content, which potentially makes them a good option for biodiesel fuel. Since the fatty acids present in the seed oil will partly determine the oilseed's quality as a biodiesel fuel, the fatty acid composition of these two seeds oils needs to be determined. HPLC is a useful technique for detecting fatty acids, but in order for fatty acids to be quantified with a UV detector, they must be attached to a UV-absorbable chromophore. A method for determining the fatty acid composition in soybean oils using a naphthacyl ester tag was successfully developed. In this project, we use this method to determine the fatty acid composition of these two oilseeds. Here we report the fatty acids present in *Calendula Officinalis* and the fatty acid composition of *Camelina Sativa*. Future work in this area will also be discussed. This project was supported by the University of Minnesota's Undergraduate Research Opportunities Program.

Presenter: Caitlin Smith

Project Adviser: Becca Gercken (English)

Title: Coyote Was Out Walking Around: Self-Aware Narrative and the New Trickster Discourse

Type of Presentation: Oral

John Q. Imholte Hall, Room #101, 3:35 p.m.

Abstract:

Many Native American authors can be classified as what Patricia Linton calls "scholar narrators." These authors write from a highly educated position that combines complex historicism with a deep awareness of both dominant and Native cultures. Scholar narrators create work that is academically and culturally dense, requiring historical and traditional proficiency to assure the full understanding of texts that are, for the untrained reader, unapologetically obscure. My essay analyzes what role the narrative itself plays in modern Native literature, specifically exploring a key trait of modern trickster discourse: the emergence of a self-aware, self-motivated narrative. This style, which I refer to as a Coyote narrative, is most evident in Thomas King's *Green Grass, Running Water*, the text on which I will focus my analysis. *Green Grass* is stylistically unique from the Western canon; rather than the narrative being reflective of the author's motivations, the narrative is aware of itself and acts under its own agency. In other words, the story knows it is a story and becomes an active character, one that is metatextually cognizant of other narrative threads and storylines. This distinctly Native narrative structure, combined with the scholar narrator's unwillingness to meet the reader halfway, works against simple understandings of the text and, through this technique, actively resists mainstream assimilating forces.

Presenter: Joshua Smith

Project Adviser: Julia Dabbs (Art History)

Title: Jenny Saville: Gazing at Paintings of Surgery

Type of Presentation: Oral

John Q. Imholte Hall, Room #109, 3:10 p.m.

Abstract:

The relationship between gender and art is one that has been increasingly examined with the advent of feminism, demonstrating that the arts embody distinct traditions that reflect gender ideologies. Contemporary British painter Jenny Saville reacts to these traditions through her project of pushing the boundaries of women's represented experiences. By examining her works, I identify a subgroup of paintings portraying surgically modified bodies, such as those having undergone liposuction or sex reassignment. Using feminist theories of representation and visual analysis, I argue that these paintings of surgery confront and challenge normative visual representations of gender and medical discourses that surround gender. Specifically, Saville represents these figures in such a way that the male gaze and the clinical gaze, which can be understood as medical regulations defining "normal" bodies, converge. The artist thereby denies these figures the agency associated with gender affirmation and transgression. These paintings ultimately illuminate Saville's project of expanding gender identities in ways unique from her other works: they demonstrate the need for broader cultural avenues of gender transformation outside of the problematic sphere of medical intervention.

Presenter: Miles Taylor
Project Adviser: Dan Demetriou (Philosophy)
Title: **Artificial Life as a Methodological Tool for Philosophers**
Type of Presentation: Oral
John Q. Imholte Hall, Room #112, 3:10 p.m.

Abstract:

In this essay I briefly characterize Artificial Life, present an example of a Genetic Algorithm (a type of Artificial Life), apply the algorithm to the Anthropic Teleological Argument, and demonstrate further applications of Genetic Algorithms and Artificial Life that will be of use to Philosophers. *Artificial Life* is the study of biological processes using computational models and robotics. *Genetic Algorithms* are programs that replicate according to a set of rules; they are evolutionary models. *The Anthropic Teleological Argument* states that since the universe has so many precise physical constants and if any one of them were different from what the currently are, we would not expect to see the universe as we do. Further, because we can choose either a random process or an intelligent creator as the progenitor of these constants it follows that whichever had the greater likelihood of creating the constants is our creator. Genetic Algorithms could carry out the calculations necessary to determine what the likelihood is of the universe coming about from random processes. *Further Applications* of Artificial Life and Genetic algorithms are helping the construction of artificial brains, informing scientists on the mechanisms of evolution, and modeling the process of emergence.

Presenter: Kevin Teeling
Project Adviser: Dennis Stewart (Psychology)
Title: **Social Exclusion: Its Effects and Implications**
Type of Presentation: Oral
John Q. Imholte Hall, Room #112, 3:35 p.m.

Abstract:

There are numerous variables associated with social exclusion. Such variables include context effects, individualistic factors effects, and other related variables (e.g., social power). The major focus is social ostracism's deleterious influences on an individual. The goal is to showcase how people are affected on a primarily micro-scale. In other words, this presentation elucidates how social ostracism causes social pain. In addition, understanding the often overlooked topic of social rejection more thoroughly is important. By increasing one's comprehension regarding the previously listed issue, this increase in awareness will increase sensitivity toward excommunication (i.e., ostracism); ideally, this effect will cause people to treat the aforementioned subject more seriously. Understanding the severity of social exclusion and how psychologically damaging it can be is significant; emotional and mental damage does engender overall noteworthy harm (including physiological) to an individual. Lastly, this presentation will exemplify why comprehending social exclusion is noteworthy. It will illuminate why the following information is significant in regard to improving humans' life quality; additionally, it will showcase how to implement positive interpersonal behavioral changes.

Presenter: Taryn Upmann
Project Adviser: Tisha Turk (English)
Title: **Teaching Scientific Writing: An Evaluation of Pedagogical Approaches through the Lens of Student Experience**
Type of Presentation: Oral
John Q. Imholte Hall, Room #101, 1:30 p.m.

Abstract:

Instruction of scientific writing currently relies on the repetition of practice to train students. I researched different techniques which are used to teach scientific writing, in particular the laboratory report, and conducted a survey of science students on the UMM campus. Lack of student and faculty time as well as a dedication to efficiency can lead to problems such as ignoring structural technique in favor of grammatical perfection; under-utilizing writing resources, peer editing, and the drafting process; and failing to understand writing as an analytical tool. In my presentation I will describe some of the current problems in scientific writing curricula, such as those mentioned above, and offer potential options to assist students with creating successful documents. For instructors, restraints on the ability to grade large quantities of writing can decrease the total number of chances students have to practice technical lab writing. I argue that by distributing sections of the writing curriculum throughout the biology program students can be more prepared to manage and craft large scale lab reports in upper level classes. Furthermore, by training additional peer tutors (ideally science tutors) to examine documents like writing room consultants do, we can create more assistance opportunities for struggling students. These suggestions do not necessarily call for the creation of new tutoring facilities, but rather an influx of tutors trained in writing or further advertising of current writing resources to science students.

Presenter: Jacqueline Wersal
Project Adviser: Jimmy Schryver (Art History)
Title: **The Innovations of Lysippos**
Type of Presentation: Oral
John Q. Imholte Hall, Room #109, 3:35 p.m.

Abstract:

The Late Classical [400-323 BCE] sculptor Lysippos has always been considered one of the most prominent sculptors of the Graeco-Roman world. My presentation attempts to answer the question of why Lysippos is considered so important not only for the Late Classical period, but also the Hellenistic period [323-331 BCE] which follows. An examination of both primary and secondary sources reveals that Lysippos' importance was not due to the quantity or even the quality of the sculptures he created during his lifetime. Instead, my research indicates that we need to look at what had been done in the previous High Classical period [450-400 BCE] and just how Lysippos modified the idealistic style of this period. Another methodology that was used in my research is visual analysis. Using visual analysis I was able to compare and contrast the effectiveness of Lysippos' change in proportions, modifications in portraiture to include character traits, and his addition of three dimensionality – or multiple viewpoints – to free standing sculpture. Comparing and contrasting Lysippos' works with both High Classical and Hellenistic works shows how his works functioned to bridge the gap between the High Classical and Hellenistic periods.
