

**Sample Abstracts from  
Posters on the Hill (in Washington, DC)  
National Conference for Undergraduate Research**

**BUSINESS**

The recent financial crisis pointed out the weakness in using diversification as a primary means of reducing risk. People possessing well-diversified portfolios still found themselves losing 20-40% of their wealth. Mebane Faber proposed a simple strategy to address this issue in his 2007 article "A Quantitative Approach to Tactical Asset Allocation" in the Journal of Wealth Management. While published prior to the crisis and as such not meant as a response to it, the paper proved prescient. Faber found that the strategy improved an investor's risk-adjusted returns in five common asset classes and in an overall portfolio, providing "equity-like returns with bond-like volatility and drawdown." The bond-like drawdown proved the most attractive feature—a simple yet remarkably effective way of addressing risk. We expand upon Faber's findings by testing the strategy on a broader set of asset classes. Our findings are consistent with Faber's, though we are able to generate higher returns and Sharpe ratios. Given trading and taxes, this method is best applied to a tax-advantaged account. We argue that this strategy is particularly attractive for endowments.

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This study was conducted to analyze if a store selling professional business attire would be successful in Kearney, Nebraska. Primary market research was conducted (via a survey, with N= 412), identifying products and services desired by the target market of college students and young professionals. Based on the needs identified, "Suits Me – A Market Feasibility Analysis for a Business Apparel Store" was created to provide the selection desired, exceptional customer service, and educate people about current professional business attire trends in the United States. This primary research data was supplemented by secondary market research to identify current market trends, industry characteristics, and employer expectations. Further, the secondary data was used to identify and analyze differences noted between national trends and the data gathered from the target market in Kearney. This feasibility study explores the product and service needs of the Kearney market region while analyzing the current national business trends, how the target market relates to national trends, what employers look for when hiring employees, expectations of those attending job fairs, and what prior research has demonstrated to be the most effective attire to wear to professional business activities such as interviews. Overall, the research indicated potential for the Kearney market to support a professional business attire store. Results suggest market need does exist for a retail store in central Nebraska that offers significant product selection, personalized customer service, and educates customers about current trends.

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**CREATIVE ARTS & DESIGN**

This is an art installation using video relating to nature. These images will be projected onto natural elements such as rocks, grass, wood and dirt. Examples of film include a young girl in a field of tall grass and ice flows in the Clark Fork River. This installation will highlight the relationships of people to nature. Tension and beauty are connected within the content of this art installation. Large-scale paintings of sky, water and land will be incorporated into the installations. These paintings will be coupled with the rocks, grasses and tree branches. The medium I paint with is cattle marker, which are oil paint sticks used by ranchers to mark sheep and cows. I like this medium because it lends a connection to my native Montana. Along with the video there will be a soundtrack of natural sounds and music. Examples include, water and wind. These artworks will be composed of native grasses, sod, and rocks collected locally. My artwork is about finding beauty in nature and in our relationship to the natural world. I am interested in

looking at ideas about nature, while also recognizing our encroachment on the land. This is our contemporary experience, and a friction exists, but there is also beauty within this relationship. This beauty is what I want to explore. This exhibition will engage the viewer through smell, sound, and living elements.

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“To be or not to be?” That is the famous question asked by the title character in Shakespeare’s “Hamlet.” As the scenic designer for the university’s production of the play, I instead asked, “How can I use my design aesthetic and knowledge to best represent Hamlet on stage?” Each member of the all-student design team worked closely with a faculty director to answer this question and to effectively bring Shakespeare’s work to life. The design concept for the show developed through extensive conversation and a variety of visual research, both evocative and practical. The director envisioned “Hamlet” as a marriage between Elizabethan England and James Dean’s rebellious 1955, and research was done in accordance with that vision. As the concept solidified I developed my final design for the set, which loosely represents the 1952 Nobel Prize-winning model for the DNA double helix. The set design also reflects the mood and themes of the play through carefully thought-out use of line, shape, texture and color. The marriage of the worlds requested by the director was achieved through researching mid-century modern furniture and Elizabethan textiles and designing combinations of the two for use at various points throughout the play. The build process, which was highly collaborative and called for strong, constant direction from the designer, allowed for the overall look of the set to remain modifiable. This greatly enhanced the resulting set, making it acutely functional, relevant and effective in representing the play.

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This creative thesis project is an original performance piece informed by a multidisciplinary approach from the fields of communication, theatre, art, and apparel design. The end result will be a one-hour performance composed of several monologues. Of particular interest is how performance functions as a response to contemporary political, social, and personal issues encountered in the undergraduate experience, exploring how the self is continually shaped through the constant processing and digestion of seemingly unrelated thoughts and experiences. Combining personal narrative and performance writing with scholarly research and critical theory, this piece challenges the author to express aspects of the self through the embodiment of others, while challenging the audience to respond both emotionally and critically. Two major influences evident in this work are Karen Finley, a performance artist who focuses on gender issues, and Cat Chow, a visual artist noted for her wearable art. Of central importance in this performance is how gender functions as an undercurrent in all that one does. This concept is a subject of analysis in each segment of the performance. Although the performance text is important, an equally important dimension is contributed by the costuming. Original costumes designed and constructed by the author will be worn by each character to further identify them, challenging the audience to think critically about how identities are expressed through the visual adornment of the body in a various contexts. In some cases, these costumes will work more as a contradictory force, raising deeper questions about the value of incongruity.

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Art museums provide access to the diversity of the world’s visual culture, both historical and contemporary, and an opportunity to experience the life-enhancing power of art which impacts the social, psychological and spirituality of an individual. Unfortunately for individuals who are blind and visually impaired, most museums do not allow visitors to touch artwork, which greatly limits the experience of these individuals. When museums adapt their policies, such as when the Milwaukee Art Museum allowed a group of individuals who were blind to touch sculptures, overwhelming emotional experiences may be provided for these individuals. However, despite the fact that paintings are a dominant and extensive form of art, they are still relatively inaccessible. Access is typically limited to auditory descriptions and tactile

diagrams that focus on the structural elements (i.e., objects and shapes). Perhaps, more important than the structural elements, particularly when considering the personal impact on an individual, is the style and expressiveness of a painting. We developed a refreshable tactile display which conveys the tactual equivalent of brushstroke, color and color contrast which expresses this information visually. The haptic display consists of: (1) a tactile component to provide texture information about the brushstrokes, (2) a thermal component to represent information about color through the cool-warm spectrum, and (3) a sensor to update current location within the painting in order to change the tactile and thermal feedback to create contrast.

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## **HUMANITIES**

A white Quaker abolitionist woman from Rochester, New York, and an escaped female slave who lived in an attic for years to avoid capture, were not likely to become friends during the Civil War. Racial inequality was just as rampant in the North as slavery was in the South. However, these two women, Julia Wilbur and Harriet Jacobs, befriended one another in Alexandria, Virginia where they both volunteered to work with "contrabands-of-war". More commonly known as fugitive slaves, these refugees needed shelter, medicine, food, clothes, and many other necessities of life as they continued toward true freedom. Julia and Harriet were allies who dedicated their lives to providing donated necessities, advocacy, schooling and hope for a brighter future. Through personal, intimate diaries and correspondence spanning over fifty years, the story of these two women; their friendship, hardships, successes, acquaintances and overall feistiness in the face of danger, moral inequality and established institutions is woven together in a unique, inspiring, unpublished story.

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There have been many scholars whose work is focused on the history of the western United States, specifically the period of westward expansion. The history that is told through the works of these scholars is extensive but also gender-specific. The history of traveling westward and of the West in general has been monopolized by men. Not only was that specific field of history monopolized by men but the sources used by these male scholars were also mostly sources from the male perspective. Through the use of trail diaries and letters written by women traveling along the Oregon and Santa Fe overland trails, this project seeks to broaden the perspective of the history of the westward expansion to include women and the perspectives of women who traveled westward to the Pacific Coast. By incorporating the existing scholarly work with primary and secondary source material concerning women, this project will not only fill a gap in the research done on women traveling on the Overland Trails but it will also take a critical look at how women interacted with nature and how nature and the environment affected their daily lives on the trail.

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This research project represents the first study analyzing primary source materials on East Asia from the Malcolm L. Rosholt Archival Collection held in the UWSP Library. From 1932-1937, Malcolm Rosholt covered the Japanese invasions of China as a journalist, publisher, and editor of an English-language newspaper in Shanghai. While in China, Rosholt focused on achieving a complex understanding of the Chinese language, and cultural history. During World War II, the Army Air Corps commissioned Rosholt to employ his linguistic and cultural training as a liaison officer for the elite "Flying Tigers," 1943-1945. Rosholt later became known for his works on local histories in Wisconsin including Portage County. As part of an initiative for original historical research on topics that connect East Asia and Central Wisconsin, we presented our preliminary research on the archives at the University of Wisconsin Stevens Point Undergraduate Research Symposium Spring 2011. Our poster presentation examined Rosholt's personal narratives on the Flying Tigers, his in-depth journal of Chinese to English translations, and visual artifacts from the "Four Great Masters" of the Yuan Dynasty (ca. 1271-1368). We plan to

continue our studies to address the following research questions: In what ways might the Rosholt archive challenge standard narratives of history and mainstream assumptions about the role of the U.S. in pre-WWII China? How might the study of the Rosholt archives help us to historicize foreign relations between the U.S. and East Asia in order to positively affect contemporary foreign policies and cultural strategies towards China, Japan, and Korea?

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Sociolinguistics has been a fractured area of study since its inception in the 1960s, with the focus falling between linguistic questions and anthropological questions. Recently, research shifted towards the variationist study of social meaning and identity. The early First Wave approach employed demographic categories to answer linguistic questions, often leaving aside what language variation meant for its speakers. Third Wave sociolinguistics instead addresses how language variation and social identity co-construct one another. This paper examines how compatible these approaches are to fulfilling the widest range of sociolinguistic goals. By re-examining a First Wave study of native Appalachians, this study assesses the feasibility of First Wave data for answering Third Wave questions, offering a critique of what data should be collected to provide for a better sociolinguistic analysis. Linguistic features significant to this study are aI ungliding (e.g., mine vs. mahn), was leveling (e.g., They were vs. They was), quotatives (e.g., He said vs. He was like), and G-dropping (walking vs. walkin'). By looking at the social meanings of individual variants and the interview contexts of their usage, First Wave data can yield benefit for Third Wave questions, but other questions encompassing how a speaker uses his or her style to construct their social identity go unanswered. This study argues that the data collected for First Wave studies are not sufficient for a Third Wave analysis. First Wave studies must supplement data with the day-to-day activity in which speakers regularly linguistically construct themselves in social scenarios.

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## SCIENCES

Seaside goldenrod (*Solidago sempervirens*), is a perennial plant that grows in sandy soils and salt marshes where it is exposed to either salt spray or salt water. This new world species has a patchy distribution along the Atlantic coast, the Gulf of Mexico and the Caribbean. Its distribution in the Mid Atlantic region includes the shores of the Chesapeake Bay and the Atlantic coast of the Delmarva Peninsula. The lack of appropriate habitat on the Peninsula prevents the establishment of inland populations. The exchange of genetic material among these populations can result from pollination and seed dispersal. Insect pollinators and seeds are unlikely to travel long distances. Thus, without geographically intervening populations it is likely the Bay and the Peninsula may limit gene flow between populations. Genetic differentiation among populations on different shorelines should occur if gene flow is limited. To test our hypothesis, we have sampled populations along the coasts of the Bay and the Peninsula and have conducted genetic analysis using microsatellites to measure genetic structure and estimate gene flow. Preliminary results show genetic differentiation between populations separated by the Peninsula but no such differences between populations separated by the Bay, indicating the Peninsula acts as a barrier to gene flow. Barriers to genetic exchange present challenges in conservation. In order to conserve a species the full genetic diversity in that species should be protected. The limited gene flow among populations, resulting in genetic differentiation may introduce the need to conserve multiple geographically separated populations.

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Previous NASA lunar missions have suggested the presence of ice on the moon's north and south poles. Unlike the earth, the moon has very little axial tilt, giving rise to cold regions called permanently shadowed regions (PSRs) which are located deep inside polar craters that never receive sunlight. NASA's Lunar Prospector mission detected areas of enriched hydrogen, thought to be due to ice, near the South Pole where it was believed that this ice was trapped in the many polar PSRs. Such ice deposits could be essential to future lunar missions that include human habitats or base stations for missions to Mars. We

have been analyzing new higher-resolution data from the Lunar Exploration Neutron Detector (LEND), a Russian instrument onboard NASA's Lunar Reconnaissance Orbiter (LRO). We have confirmed the presence of ice; but surprisingly we found that the locations of the ice deposits are not closely related to the PSRs. The scientific community is very interested in explaining this perplexing result of our research. We are developing one possible model to explain these observations that considers thermal variations due to solar heating and the lack of a lunar atmosphere. We are also examining other hydrogen deposition and migration models that may help explain our findings. Our research is evaluating these possibilities through statistical analysis of data from LEND's eight neutron detectors, which continue to collect data today as part of the ongoing LRO mission.

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With the advent of the fourth-generation network and increased mobile traffic, it is imperative that novel network models be used which exploit the topological factors that often occur within our communication networks. We introduce the idea of ranking cell towers via combinatorial Hodge theory for the prediction of high-volume traffic paths and patterns we believe are inherent in cellular traffic data throughout different time periods of the day. Modeling mobile user's movements in a network as edge flows in a graph, we are able to unravel ranking information from each edge to determine whether or not a global ranking of the traversed path is significant for a particular time period with respect to the overall network behavior. Knowledge of the ranking of cell towers in a network is directly applicable to load balancing issues and location-based services.

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Calibration is the process in analytical chemistry of forming a mathematical model to relate chemical and/or physical variables (analytes) to a measured instrument signal, such as at a near-infrared (NIR) wavelength. Multivariate calibration is when a model is formed using many different signals. Maintenance is the process of updating an existing model, to be able to predict samples that were measured in a new condition (such as at a different temperature). Multivariate calibration and maintenance has many applications to various industries. An example of this is using multivariate calibration and maintenance in the pharmaceutical industry to build a model with samples created in a laboratory, updating that model with samples from full production, and then using that model to predict samples in full production. Using multivariate calibration and maintenance to predict analytes typically requires many reference samples (measured in both conditions) in order to build the model. Obtaining these reference samples can be very time consuming and costly. Because of the problems involved with using reference samples it is desirable to develop a method where no reference samples are required, yet the model is still adequate to predict the analyte. This study focuses on developing a new method of multivariate calibration and maintenance using no reference samples and evaluating its effectiveness compared to multivariate calibration and maintenance with many reference samples.

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Plant blindness is a term introduced by Wandersee and Schussler in 1999 to describe "the inability to see or notice the plants in one's own environment, leading to the inability to recognize the importance of plants in the biosphere and in human affairs." The goal of this project was to develop a mobile application aimed toward increasing awareness and appreciation for plants in our environment. We have developed the mobile application entitled "Botanicam," which is a front-end for handheld mobile devices (e.g, mobile phones, PDAs, and tablets) used to interact with an autonomous plant recognizer located on an external server. The server is capable of identifying the genus, species, and common name of a plant that is sent back to the mobile device which then produces textual and visual results that are useful to the user. Once identified, all relevant plant information (genus, species, common name, a link to further information about the species, etc.) are displayed on the device's screen as the output of the application. This provides a convenient user interface that facilitates the process of image collection and annotation for botanists and enables amateur users to learn about the plants in their environment.

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Alzheimer's Disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline and memory loss in the elderly. The primary toxic species in AD is a protein called amyloid-beta ( $A\beta$ ) which comes together to form large clumps of protein in a process called aggregation. These clumps deposit in the brains of patients with AD and are known as senile plaques. In this paper, we investigate the interaction of a natural product called betulinic acid (BA) with  $A\beta$ . We were inspired by the use of BA-based herbal remedies to treat CNS disorders in ancient systems of medicine, including Ayurveda. Betulinic acid is also currently used in the treatment of brain cancer. We wanted to learn whether BA has any effect on  $A\beta$  aggregation. If it were to prevent aggregate formation, it could be useful as a therapeutic agent. Using a number of biochemical experiments, we determined that BA actually promotes rapid  $A\beta$  aggregation. This seems at first to negate the therapeutic potential of BA, but recent research shows that the most toxic forms of  $A\beta$  are smaller aggregates called oligomers, while larger forms are significantly less toxic. We found that BA causes  $A\beta$  to form larger aggregates at the cost of smaller aggregate such as oligomers, suggesting that it may be useful in preventing neuronal damage from AD. Based on our experiments, BA may have the potential to be used in medications or supplements to prevent the onset of AD symptoms.

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The subglacial eruption of the volcano Eyjafjallajökull in April and May of 2010 cost the global economy almost 5 billion dollars and impacted millions of travelers. Understanding geologic natural disasters such as volcanic eruptions is very difficult, and predicting the nature or timeline of the eruptions is even more tenuous. One way to understand the dynamics of volcanic eruptions similar to Eyjafjallajökull is to study an ancient proxy. The Sveifluhals ridge in Southwest Iceland is a subglacial pillow ridge that erupted in a similar manner to Eyjafjallajökull thousands of years ago. To piece together the sequence of magmatic events that occur during a subglacial eruption, an intensive mapping and geochemical study was undertaken at Undirhlithar quarry, which exposes the interior of Sveifluhals ridge. From field observations of the quarry walls, we know that subglacial eruptions consist of multiple extrusive events, which build up the basal pillow units and are marked by stratified layers of yellow, glassy hyaloclastite material. Extrusive pillow units are cut by intrusive dikes that are mineralogically and geochemically different from the pillows. Geochemical and field relationships of the units along the quarry walls suggest a complicated sequence of eruptive and intrusive events, including pauses between eruptions and lateral transport of magma. The relationships between intrusive and extrusive events in an ancient proxy, such as those exposed at Undirhlithar quarry, can be used to reconstruct the 3-D volcanic history of a subglacially-erupted pillow ridge and could eventually help us understand subglacial volcanic dynamics in a modern setting.

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## **SOCIAL SCIENCES**

Using a case study from rural Rajasthan, India, this research examines the impact of women's involvement in microfinance self-help groups run by nongovernmental organizations (NGO) on their economic status and social empowerment. Microfinance – a financial service small in size provided by financial institutions to the poor – has garnered immense popularity as a strategy for poor women in developing countries to become empowered and lift themselves out of poverty. However, there is disagreement as to whether microfinance programs achieve these dual aims. Although the concept of microfinance has seen immense popularity and microfinance programs have been funded abundantly, there has been neither widespread proof of its effectiveness nor many critiques of its implementation on the ground. Thus, the knowledge gained from this research could help inform the model of microfinance programs for women by illuminating what aspects of the self-help group model have and have not been effective in terms of poverty alleviation and women's empowerment. Conclusions from this study are

made from content analysis of interviews with twenty-four women participating in microfinance self-help groups, these groups' financial profiles, and the researcher's observations of how the NGO's workings impacted the program. Findings indicate that the women's participation did not cause them to make more money, but did allow them to accrue savings that they valued. Most women did not experience social empowerment from their participation. An analysis of this program's pitfalls will indicate broadly how women's microfinance programs can be better designed and implemented.

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Civic engagement is a key indicator of the health of democracy and has largely been deemed a responsibility of higher education. Despite civic engagement's importance, only volunteering has increased within the last 30 years amongst several forms of civic engagement in young adults with at least one year of college experience. The lack of civic engagement could help to illuminate low voting rates, overall disinterest in politics, growing social class divide, and the nonvoting population's dissatisfaction with government. There are gender dissimilarities in the levels of civic engagement which are echoed among the college-aged population. This study examined gender differences within civic engagement among college students attending a small, Liberal Arts College. A 33-item self-report questionnaire was used to measure civic, electoral, and political voice indicators. Results showed that no gender difference exists across civic, electoral, or political voice indicators. Two significant predictors were found for overall civic engagement: graduation year and news access. As participants progressed in their college education they were more likely to engage in civic engagement. While increased education also indicated increasing news access, participants were not more likely to engage in electoral or political voice indicators with more years of education. These results highlight equality within gender among college students and elements which encourage civic engagement. Understanding civic engagement among the college population could have a large impact on policy discussions, education, and the literacy of our nation.

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Growing research provides evidence that poor working memory abilities affect nearly 10% of children (Alloway, 2009). Working memory is a key factor of learning related to math, reading, and other cognitive tasks (Holmes, Gathercole, & Dunning, 2009; Alloway 2008). Early intervention is integral for academic progress and learning capacity. A strong foundation for learning allows children to thrive. Working memory is necessary for cognitive manipulations and learning connections to occur. This study was designed in an attempt to increase the working memory abilities of participants using cognitive training tasks. Participants were public elementary school children ages 7-9. The control group played low level educational games. The experimental group received a five week computerized working memory training intervention based upon a cognitive n-back task that elicits demands upon working memory (Jaeggi, Buschkuhl, Jonides, & Perrig, 2008). It required participants to recall visual and auditory stimuli presented 1, 2, or 3 times back at increased difficulty levels, and or in combination (dual-back). A 2 (experimental/ control) x 2 (pre/post) ANOVA design was used to assess the effects of training on working memory abilities. Results revealed that cognitive training significantly increased working memory abilities. In other words, spending just a few minutes each day on this task significantly increased the children's learning potential. This study makes it known that it is possible to improve the learning abilities of struggling children. A focus on strengthening the working memory foundation in children could lead to greater learning gains for the children of our nation.

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How are sexual identity biases processed in mind and brain? Does religious belief affect this processing? In this experiment we explored the priming effects of religiosity on Implicit Association Test (IAT) performance and attempted to identify specific neural correlates of implicit bias via event-related potentials (ERPs). Forty-five participants completed a version of the IAT in which images of heterosexual and homosexual couples were paired with positive and negative adjectives. Prior to each set of trials,

participants were primed with four verses of either benevolently themed scripture or persecutory scripture. All participants were exposed to all conditions in counterbalanced orders. Additionally, electroencephalographic (EEG) measurements were recorded during the experiment. Three post-experiment questionnaires were used to obtain personality measures of religious fundamentalism, quest, and explicit attitude towards homosexuality. The results revealed a statistically significant positive correlation ( $r = 0.41$ ) between fundamentalism and enhanced implicit bias, as well as a significant negative correlation ( $r = -0.42$ ) between enhanced bias and quest. As expected, there were significant differences between compatible and incompatible conditions for both benevolent ( $t = -6.27(44)$ ,  $p = .001$ ) and persecutory ( $t = -8.06(44)$ ,  $p = .001$ ) verses. ERPs are currently being extracted from the EEG data to determine whether both N400 and Late Positivity potentials were present during incompatible conditions, as shown in a recent experiment. Such results would lend support to semantic rather than familiarity explanations of IAT results. The possibility that the semantic explanation is partly religious is being investigated through correlations between ERPs and measures of fundamentalism.