UNDERGRAD
Research & Artistry Day

Tuesday, April 22, 2014
Holmes Student Center
Duke Ellington Ballroom
Letter from the Office of Student Engagement & Experiential Learning

Welcome to the 5th annual Undergraduate Research and Artistry Day! From research that searches for the cure to cancer to artistry projects on the visual depiction of psychological and personality disorders, NIU students have the ability to engage in hands-on meaningful activities that bring to life the world around them.

We believe NIU’s undergraduate research programs like Huskie Research Rookies, USOAR, URA, URAP, EURA, UARAP, SROP, McKearn Fellows, the Undergraduate Travel Scholarship, and Undergraduate Research & Artistry Day will challenge students to define their passions, academic and professional goals, and ultimately their contributions to society.

Moreover, participating in the breadth of undergraduate research opportunities at NIU can have a profound impact on a student’s academic journey. It is our hope that students will explore these exciting programs and begin to realize their full potential as they move toward their degree at Northern Illinois University.

Our goal through this event is to provide students with a venue to showcase their academic work. We know you will be as impressed with the caliber of NIU’s undergraduate students as we are!

Julia Spears, Ph.D.                                   Stephanie Zobac
Assistant Vice Provost for Engaged Learning           Assistant Director
Letter From the Executive Vice President & Provost

At Northern Illinois University, we strive to provide all of our undergraduate students with opportunities to engage in hands-on learning, both in and out of the classroom, to promote their academic and career success. Undergraduate Research and Artistry Day is a celebration of our students’ original intellectual and creative contributions to their disciplines.

The undergraduate students participating in this event have worked closely with talented members of NIU’s faculty and staff to develop critical thinking skills, to solve complex problems, and to create new knowledge. I am proud of their accomplishments as scholars, scientists, engineers, artists and inventors. I am confident that they will become life-long learners, as well as empowered, informed, responsible citizens.

Thank you for attending our students’ presentations. Explore. Ask questions. Learn. And, please join me in acknowledging the effort and accomplishments of both the students and their mentors. NIU is grateful for your interest and support.

Lisa Freeman

Letter From the President

Since last June, I have talked a great deal about making student career success our primary focus. Today, at Undergraduate Research and Artistry Day, you have an opportunity to meet hundreds of students and faculty who provide excellent examples of what can be accomplished when we embrace that concept.

All of these students have embraced opportunities to learn and grow outside of traditional classroom situations. They also have benefitted tremendously from working under the mentorship of some of our top faculty and researchers. In doing so, they are participating in the highest forms of learning – not just memorizing or synthesizing information from lectures and textbooks, but contributing new ideas and new works of art to the existing body of knowledge and culture.

They are having the sort of transformational learning experiences that not only help them stand out among their peers on campus, but which also provide them with the tools to succeed throughout their lives.

So, as you walk the aisles today, I encourage you to interact with these students. Ask them questions not only about their projects, but also about how the work has enriched their education and helped them grow in exciting and unexpected ways. Then join me in working to build such experiences into the education of every student who enrolls at NIU.

Doug Baker

Doug Baker
Huskie Research Rookies links students with faculty mentors in their major or area of interest to conduct a small-scale research project.

As a Research Rookie, students will:
• Learn what research looks like in their field of study
• Learn how to write a formal research proposal
• Gain experience working alongside talented faculty
• Attend professional and academic enrichment activities
• Present their work at the annual Undergraduate Research and Artistry Day
• Receive a $500 stipend at the completion of the program

Huskie Research Rookies must be:
• An incoming Freshman, Sophomore, or Transfer student with less than 60 credits
• Committed to 5-10 hours of work per week
• Committed to participate in the program for two semesters (Fall 2014 & Spring 2015)
• Strongly committed to an intended major or area of interest

Applications are now online at www.niu.edu/researchrookies.
For more information email ugresearch@niu.edu or call (815) 753-8154.
Awards

The Following Awards Will Be Given To The Winning Project In Each Category:

STEM: Science, Technology, Engineering, Math

AEHHSS: Arts, Education, Health, Humanities, and Social Sciences

• First - $200
• Second - $150
• Third - $100
• Honorable Mention - $50
• People's Choice - $50 (The audience will have the opportunity to select their favorite poster in each category)

Schedule of Events

Viewing of Projects 9:00 AM-2:30 PM
(Presenters will rotate throughout the event)

Judging Session 1 9:00 AM-10:15 AM
Judging Session 2 10:15 AM-11:30 AM
Judging Session 3 11:30 AM-12:45 PM
Judging Session 4 12:45 PM-2:00 PM

Open Session 2:00 PM-2:30 PM
(Evaluation sheets will be reviewed and winners selected)

Awards Ceremony 2:30 PM-3:00 PM
(All participants are encouraged to attend)
Judges

*Retiree and/or Alumni

Adler, Marc - Department of Chemistry & Biochemistry
Agusdinat, Buyung - Department of Industrial & Systems Engineering
Anderson, Eden - Department of Psychology
Andrew, Anita - Department of History
Azad, Abul - Department of Technology
Barber, Larissa - Department of Psychology
Barrett, Sheila - Department of Family, Consumer & Nutrition Sciences
Bode, Barrie - Department of Biological Sciences
Bostwick, Wendy - Department of Nursing & Health Studies
Britt, Anne - Department of Psychology
Carnahan, Jon - Department of Chemistry & Biochemistry
Carpenter, Paul - Department of Kinesiology & Physical Education
Castle, Nancy - Director of NGOLD
Chakraborty, Dhiman - Department of Physics
Crowley, Lara - Department of English
Dabrowski, Bogdan - Department of Physics
Damodaran, Purushothaman - Department of Industrial & Systems Engineering
Eads, Michael - Department of Physics
Elsawa, Sherine - Department of Biological Sciences
Ezell, Michael - Department of Sociology
Gaillard, Elizabeth - Department of Chemistry & Biochemistry
Garver, Valerie - Department of History
Gilbert, Thomas - Department of Chemistry & Biochemistry
Goldblum, David - Department of Geography
Hellyer Heinz, Cindy - Department of Art
Henry, Beverly - Department of Family, Consumer & Nutrition Sciences
Horn, Jim - Department of Chemistry & Biochemistry
Jbara, Mohammed - Department of Electrical Engineering
Johnson, Timothy - Department of Electrical Engineering
Jones, Holly - Department of Biological Sciences
Kim, Jay - Department of Industrial & Systems Engineering
Lichtman, Karen - Department of Foreign Languages & Literatures
Littauer, Amanda - Department of History & Women's Studies
Lurio, Laurence - Department of Physics
Matuszewich, Leslie - Department of Psychology
McCarthy, Randy - Department of Psychology
Miller, Kirk - Department of Sociology
Mirman, Cliff - Department of Technology
Mounts, Nina - Department of Psychology
Muthuswamy, Shanthi - Department of Technology
Parker, Chris - Department of Psychology
Pierce, Tim - Department of Communication
Pingel, Thomas - Department of Geography
Piot, Philippe - Department of Physics
Pohlman, Nicholas - Department of Mechanical Engineering
Ramisch, Julie - Department of Family, Consumer & Nutrition Sciences
Reynolds, Jeff - Department of Economics
Ryu, Ji-Chul - Department of Mechanical Engineering
Samonds, Karen - Department of Biological Sciences
Schatteman, Alicia - Department of Public Administration
Schmidt, Jim - Department of History
Schraufnagel, Scott - Department of Political Science
Shokrani, Masih - Department of Allied Health & Communicative Disorders
Stafstrom, Joel - Department of Biological Sciences
Streb, Matt - Department of Political Science
Tatara, Robert - Department of Technology
Van Dijk, Ann - Department of Art
Vanýsek, Petr - Department of Chemistry & Biochemistry
Vilaseca, Stephen - Department of Foreign Languages & Literatures
Waas, Greg - Department of Psychology
Wallace, Douglas - Department of Psychology
Wallace, Patty - Department of Psychology
Wardell, Brandon - Department of Theatre & Dance
Wolter, Moke Chee* - Department of Art
Wolter, Jim* - Department of Biological Sciences
Zhou, Jie - Department of Computer Science
Zinger, Donald - Department of Electrical Engineering
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### College of Liberal Arts & Sciences

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### College of Engineering & Engineering Technology

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ABSTRACTS

POSTERS

PLEASE NOTE: CONTENTS OF THE ABSTRACTS WERE PRINTED AS SUBMITTED BY THE PROJECT PARTICIPANTS AND ARE REPRESENTED IN THE COLLEGE OF THE STUDENT’S RESEARCH.

Northern Illinois University

H denotes University Honors student
M denotes McKearn Fellow
R denotes current Research Rookie
S denotes University Honors Summer Scholar
1 Muhammad Irawan

The Use and Reliance of Spreadsheets in Organizational Decision Making

Authors: Muhammad Irawan, Ann Dzuranin
Department: Accountancy
Faculty Mentor: Ann Dzuranin
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

The purpose of this research project is to explore the extent to which spreadsheets are used in organizations to make business decisions. A spreadsheet, such as Microsoft Excel, is a computer program that allows entry and manipulation of text, figures, and equations electronically. Organizations frequently use spreadsheets to perform daily tasks and to make decisions for both internal and external purposes. While spreadsheets help employees to do their jobs more efficiently, there is a risk that there may be a mistake in a spreadsheet. One simple undetected error on a spreadsheet can have a big impact on the organization’s decision-making. The impact to the organization can be disastrous and costly. The existence of errors on spreadsheets is very common yet there is a lack of research examining the extent of spreadsheet use for decision-making. There is no research we are aware of that examines the types of decisions made using spreadsheet calculations or the frequency of use. This research project seeks to fill this gap in the literature by surveying professionals that use spreadsheets as part of their job function. The survey was developed using existing literature examining the use of information technology. The results of this study will help to inform organizations about potential risks to which they might be exposed. Understanding those risks can help to improve business decisions and risk management and therefore benefit their investors and employees. Finally, this study will lay the groundwork for future research in this area.

2 Lauren Anglin

Munchkins Matter: The Effects of CEO Parental Status on Profitability, Value, and Investment

Authors: Lauren Anglin
Department: Finance
Faculty Mentor: Adam Yore & Gina Nicolosi
Research Category: Science, Technology, Engineering, Math
Judging Time: 10:15-11:30 AM

This study examines the effects of CEO parental status on corporate policy. We focus our research on how CEOs with children manage their firms compared to their childless counterparts. The relationship between corporate policy and CEO characteristics is important because it provides insight to future firm performance and the efficient allocation of scarce capital in our economy to their most productive outlets. Prior research has suggested that personal characteristics such as marital status, age, and education influence the ways in which CEOs run their firms. Therefore, we hypothesize that parenthood will be another influential characteristic that will affect how CEOs manage their firms in dimensions such as profitability, value, and investment. We also focus our research on founder CEOs and family firm CEOs with and without children given the inherent long-term view that such family firms have as compared to their professionally managed counterparts. Our research suggests that founder CEOs with children invest more in research and development and advertising, leaving a legacy for their children. We also find that the previously documented outperformance of family firms noted in the literature is driven solely by those family firms where the CEO has a child as these firms are more profitable and enjoy higher valuations.

3 Jeffrey Kamholz

Building a Nonprofit Fundraising Model in the Community of DeKalb

Authors: Jeffrey Kamholz
Department: Marketing
Faculty Mentor: Emily Cronauer
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

The goal of this project is to create an efficient business model to raise money in a not-for-profit setting. Conventional ideas of marketing were explored and combined with newer strategies that are becoming increasingly popular with the rise of social media. The research began by investigating current nonprofit fundraising models and discovering their strengths and weaknesses. Nonprofit organizations were then interviewed to gauge a sampling of the status of fundraising for nonprofit causes. Local businesses were asked about their charitable giving practices to determine the effectiveness of corporate fundraising and sponsorships. All of this research was then combined to build the nonprofit fundraising model. Although the community of DeKalb, IL is used as a case study, this research will ultimately be used to create a template for any nonprofit cause. Keywords: nonprofit, fundraising, nonprofit fundraising model.
This study investigates the influences of work and non-work related factors on faculty commitment and retention in the NIU College of Business. The methodology consisted of qualitative data collected from eight tenured and tenure-track faculty in the College of Business, and surveys administered to all business faculty members. Qualitative interviews with faculty indicated several common themes connected to commitment and retention. These common themes were combined with a review of literature to design a 28-item survey with three additional demographic items (department, tenure, experience) and two open ended questions. This survey was administered to 50 tenured and tenure-track faculty using an online survey in mid-March. Findings from the survey provide insights into the types of work and non-work related factors affecting faculty commitment and intentions to remain with the college.

Context: The NATA position statement for Emergency Action Planning has been in place for over 10 years. The implementation of emergency action plans is a mainstay for various other position statements (eg, preventing sudden death in sports). Objective: Survey Athletic Trainers in order to: 1) examine the extent to which Sport-related EAPs are implemented in secondary schools, 2) identify which recommendations from the NATA position statement is commonly missing, and 3) determine the perceived barriers to implementing EAPs. Design: Cross sectional. Setting: Secondary school. Patients or Other Participants: 954 ATs of which 485 (50.8%) were female and 457(47.9%) were male (12 (1.3%) undisclosed) aged 36.7±11.2 years with 10.9±9.3 years of experience in the secondary school setting. Interventions: Data were collected with an online instrument adapted from the NATA position statement on EAPs and was created specifically for this study. Main Outcome Measures: Descriptive statistics, specifically frequencies and percentages, were calculated to determine the extent to which EAPs are implemented and whether all components were addressed Results: 854 (89.5%) ATs reported having an EAP in place, while 100 (10.5%) indicated not having an EAP in place. Of those with EAPs in place, only 33 (3.9%) had EAPs that addressed all of the position statement guidelines. The themes pertaining to barriers to creating EAPs were: 1) lack of personnel cooperation, and 2) facility challenges. Conclusion: Not all secondary schools have implemented a full EAP. The lack of cooperation between all personnel involved with the organization is concerning and needs to be addressed to prevent sudden death in sport. Clinical Application: Easily accessible resources should be made available to ATs and school administrators to facilitate the creation of EAPs.

Context: Various taping techniques exist for the application of elastic, therapeutic kinesiology-type tape (eg, KinesioTape®, KTtape®) for the treatment of ankle instability. Despite its popularity, a paucity of evidence exists regarding the efficacy of these techniques in subjects with functional ankle instability (FAI). Objective: To determine the effects of an ankle instability elastic therapeutic tape application on balance performance with a population of subjects with FAI. Design: Crossover design. Subjects: 10 participants (3 female, 7 male), mean age: 22.5±3.1. Intervention: The independent variable was KinesioTape® application using an ankle instability protocol. The dependent variable was the Star Excursion Balance Test (SEBT). Main Outcome Measures: A within subjects 2 x 2 (time,treatment) repeated measures ANOVA was performed. An a priori α level of P=<0.05 was used for the analysis. Results: The mean (± SD) SEBT reach for the control pre-test and post-test were 235.94 ± 13...
The mean (± SD) SEBT reach for the intervention pre-test and post-test were 237.57 ± 27.24 and 241.69 ± 27.59, respectively. There was no time by test interaction (F1,9=.257, MSE=64.1, P=.625). Results showed that there was no significant difference between the tape and control condition (F1=.281, P=.61). Conclusions: The use of the ankle instability elastic therapeutic tape procedure was not shown to improve the balance performance of these participant. Further research should examine the effects of a period of time between tape application and SEBT to see if the length of time the tape is on before testing makes a difference.

7 Delroy Folkes

Examining the Relationship between On-ice Performance and Physiological Conditioning Levels of University Club Hockey Players

Authors: Delroy Folkes, Brogan Bennett & Craig E. Broeder
Department: Kinesiology and Physical Education
Faculty Mentor: Amanda Salacinski & Steven Howell
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

Ice hockey is a sport that is fast-paced and both highly anaerobic and aerobic. The relationship between a player’s on-the-ice performance and levels of conditioning is limited. PURPOSE: To determine the relationship between a university ice hockey player’s blood lactate, aerobic fitness, anaerobic power, and body mass index (BMI) to their total minutes played (Tmin) and points scored (TP) during a season. METHODS: Seven male university club hockey athletes (mean height 181.4±5.1 cm; mean weight 81.9±14.5 kg) completed a lactate threshold (LT), maximal oxygen uptake (VO2max) test on a cycle ergometer, and three consecutive 30-second Wingate Anaerobic Tests (WAnT) for peak power (W), where 5% of the athlete’s body weight (kgs) was used as resistance. Average peak blood lactate levels were analyzed using the YSI 2300. RESULTS: Pearson correlations were calculated to determine the relationship between conditioning levels and on-the-ice performance. LT (p=.55), VO2max (W) (p=.70), VO2max in L/min (p=.43), VO2max in mL/kg/min (p=.77), peak average power (p=.53), peak power (p=.49), time to peak (p=.58), average power (p=.12), average W/kg (p=.51), and BMI (p=.28) were not significantly related to TP. OBLA (p=.73), VO2max (W) (p=.74), VO2max (L/min) (p=.78), VO2max (mL/kg/min) (p=.48), peak average power (p=.98), peak power (p=.17), time to peak (p=.54), average power (p=.34), average W/kg (p=.62), and BMI (p=.73) were not significantly related to Tmin. CONCLUSION: The findings demonstrate no significant relationships between level of conditioning and on-the-ice performance. From an applied perspective, coaching staffs could leverage this information to establish individualized fitness regimens to maximize on-the-ice efficiency.

8 Elaine Rodriguez

The Access of Physical Therapy Services to Predominately Latino Communities

Authors: Elaine Rodriguez
Department: Allied Health & Communicative Disorders
Faculty Mentor: Prisca Collins
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

The objective of this study is to examine utilization and compliance with physical therapy care by Latinos. Various factors such as socioeconomic status, health insurance status, education levels, and age have been shown to affect ability of a population to access health care (McCallum, 2010). Physical therapy is considered a specialty service that many individuals who are medically underserved may not have access to. Underserved populations include individuals who are minorities, low-income, or reside in rural areas where access to health care is scarce. Barriers exist for underserved populations who are in the need of physical therapy services. These barriers include the absence of physical therapy practitioners to provide services, insufficient knowledge of the full scope of physical therapy practice, and inadequate screening programs to identify functional mobility problems within the population. Physical therapist can play a major role in meeting the needs of underserved communities. This is a retrospective study where charts of patients who self-identified as Latino are reviewed to examine patterns of attendance to therapy sessions and compliance with prescribed treatment.

9 Brittany Warner

A Literature Review on Transcranial Brain Stimulation for the Treatment of Aphasia

Authors: Brittany Warner
Department: Allied Health & Communicative Disorders
Faculty Mentor: Jamie Mayer
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM
Brain stimulation, such as Transcranial Magnetic Stimulation (TMS) and Transcranial Direct Current Stimulation (tDCS), is a topic of research that has been gaining traction in the field of medicine. TMS and tDCS have been shown to be safe and noninvasive techniques, which could potentially be effective therapies for a number of neurological disorders. In current studies of brain stimulation it seems that TMS and tDCS could potentially be significant forms of treatment for aphasia as well. Due to the renewed interest in brain stimulation this review provides rationale for further research of brain stimulation through answering clinical questions such as: 1. Why should brain stimulation (TMS & tDCS) be researched further? 2. How do tDCS and TMS work? 3. What are the differences between TMS and tDCS? 4. What are the advantages and disadvantages of invasive brain stimulation and non-invasive brain stimulation? In addition to providing further rationale for further research of brain stimulation, this literature review gives clinicians a better understanding of the current knowledge of brain stimulation and its potential effect it may have on the treatment for aphasia.

Validation of Photography as a Data Collection Tool

Authors: Ashley Kyle
Department: Family, Consumer and Nutrition Sciences
Faculty Mentor: Sheila Barrett
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

The nutritional quality of the National School Lunch Program (NSLP) meals has received much criticism. Past research indicated that the NSLP contributes significantly to the childhood obesity problem in the United States. Because so many children depend on this program, much research is needed. The proposed research study is essential for improving the health and well-being of children across the United States who participate in the NSLP. The objectives of this research are to estimate the actual food intake of high school students using photography, evaluate the macronutrient contribution of the NSLP’s lunches and compare this data to meals consumed outside of school, assess the students’ risk for obesity, and determine if the school is adhering to nutritional guidelines. Researchers will be visiting a high school in Illinois and measuring the actual amount of food consumed by the students using photographs of before and after food trays. Students will complete a demographic/physical activity questionnaire and a three day food record. Researchers will compare these records to the amount of food consumed during one lunch period. Researchers will also use this data to validate photography as a way to measure food consumption. This research will provide information on the nutritional composition of the NSLP’s lunches and determine if there is a correlation between the students’ Body Mass Index and the nutritional quality of the lunch. This research will also determine where the majority of the calories students consume are coming from and determine if photography is a reliable data collection tool.

Spiritual Experiences, Social Support, and Optimism Among Nursing Students

Authors: Quy Tran
Department: Nursing & Health Studies
Faculty Mentor: Mary Koren
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

This study assessed the relationship of spiritual experiences with social support and optimism among nursing students. The workload in nursing school is demanding and challenging. Nursing students are under a great amount of stress in order to maintain enrollment status and complete the program. Shores (2010) suggests there is a link between spiritual practices and level of stress among nursing students. A pilot study was conducted of Northern Illinois University undergraduate nursing students, who were enrolled in nursing research course NURS 312 during Spring, 2014 semester. The students answered a series of question consisting of three demographic questions and three questionnaires about spiritual experiences, social support and optimism.

Management Strategies of Nurses with Stressful Work Situations

Authors: Gagandeep Singh
Department: Nursing & Health Studies
Faculty Mentor: Jie Chen
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Background: Recent research suggests that nurses with excessive workload tend to have a high risk of medication errors and workplace injuries. A preliminary finding shows that simultaneous demands, medication-related conflicts, delayed shift-
transition, and fatigue could be the contextual factors that influence nurses’ perception of workload level. However, little is known about the specific strategies that staff nurses have been applying to manage various stressful work situations.

Objectives: This study aimed to identify the common strategies that hospital nurses used to handle their stressful situations during a 12-hour shift. Methods: This was a qualitative, descriptive study design. One hundred and fifty-one hospital nurses completed a survey including an open-ended question regarding how nurses handled their stressful situations during the shifts. Using thematic analysis method we examined the nurses’ responses by generalizing major themes regarding nurses’ stress management strategies. Results: Four major themes emerged from the data analysis. First, stress reduction techniques such as staying calm and reprioritizing tasks was used to help manage simultaneous demands. Second, effective communications with patient’s family members and health care providers was used to help solve medication discrepancies and patient-provider conflicts. Third, teamwork, such as delegating tasks to nursing assistants and coworkers was used to accomplish time-consuming tasks. Fourth, taking-in and passing-on were used to make it through the tasks. Conclusion and significance: These commonly used stress management strategies need to be further examined regarding their effectiveness in reducing negative impacts of excessive workload on patient safety outcomes.

13 Lauren Nale

Mixed Methods Study on Treatments/Services for Children with Autism Spectrum Disorder

Authors: Lauren Nale
Department: Nursing & Health Studies
Faculty Mentor: Lucy Bilaver
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Autism Spectrum Disorder (ASD) is a developmental brain disorder that results in communication deficits, impairments in social skills, and repetitive behaviors. Children are typically diagnosed around two or three years of age, and there are a wide array of services available to these children to help improve their developmental delays. The purpose of this study is to investigate the facilitators and barriers to effective services for young children with ASD. Four services that are commonly provided to children with ASD are examined in this study and include occupational therapy, speech therapy, behavioral therapy, and special education. To identify the facilitators and barriers, qualitative and quantitative methods are both utilized. The qualitative component consists of twelve key informant interviews with professionals who provide services to children with ASD. Interviews were thematically coded and analyzed for interpretation. The quantitative research utilizes a portion of the Pre-Elementary Education Longitudinal Study (PEELS) data to complete a secondary analysis. A logistic regression is used to estimate the adjusted odds of receiving different types of services. Independent variables such as household income, school district size and wealth, demographics of the child, parent education level, and more were analyzed. The results of this study are hypothesized to correlate with but also elaborate on previous research. The results of the study are expected to impact the practice and policy decisions of health care professionals, school systems, and families.

14 Jesslyn Truesdale

Grief and Bereavement Curriculum Development for Direct Support Professionals

Authors: Jesslyn Truesdale
Department: Nursing and Health Studies
Faculty Mentor: Jennifer Gray
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

As individuals with intellectual and developmental disabilities (I/DD) live longer lives, the chances of them having to face a personal loss are becoming greater. Staff who work with this population have the opportunity to play a significant role through the grief and bereavement process. Currently however, staff find themselves ill-equipped to help individuals with I/DD through this process. As a result, individuals with I/DD are receiving inadequate information about death and may not be able to grieve adequately. With proper training, there may be an opportunity to improve the grief and bereavement process for both the staff and the service users. The aim of this study is to create a grief and bereavement curriculum using a classical Delphi technique. The Delphi study panel includes 16 experts in areas such as disability service provision and advocacy, family caregiving, hospice, nursing, and relevant governmental agencies. These panel members responded to a series of 3 online surveys that focus on content and delivery methods. Panel members guided the curriculum development process by indicating priority topics to be: (1) service user reactions to loss; (2) how staff can facilitate service users’ healing from loss; and (3) how staff can support service users to move on post loss. The intended outcome of this study will result in a curriculum that may be adopted in training programs at the state level for staff serving individuals with intellectual and developmental disabilities.

15 Michelle Renee Campbell

Intake of Cinnamon Supplements and Hemoglobin A1c Levels
Cinnamon has long been classified as a natural insulin sensitizer. This pilot study aimed to investigate the blood glucose lowering properties of cinnamon taken as a dietary supplement. Participants in the test group were given 2 grams of cinnamon in a supplement form; control groups received no cinnamon supplements. Hemoglobin A1c (HbA1c) levels were measured as an indication of blood glucose levels at the onset and again at the end of a 4-week study to assess changes due to cinnamon supplements. The measurements were made using DCA 2000 Hemoglobin A1c analyzers available in the Northern Illinois University Medical Laboratory Science Program laboratory. There were no differences in HbA1c levels between groups based on cinnamon intake. Larger studies of longer duration are indicated for the future.

Sarah Greer

Overlooked by Art History: Avant-Garde Artists of Modern Japan

Most survey textbooks on the history of modern art mention the influence of Japanese art on Western artists, but very few (if any) take note of the reverse – the influence of Western artists on the history of modern art in Japan. When Japan opened their ports to the West, Japanese technology, culture, and art were affected. In being introduced to the West, Japan was introduced to the idea of avant-garde Art and many Japanese sought to become a part of this remarkable international art movement. This era in Japanese history, known as the Taisho Period, generated famous modernist painters such as Koide Narashige, Kishida Ryusei, and Yorozu Tetsugoro. The Westernization of Japan forced the country to accept many changes and to create institutions to study these changes that impacted Japan’s own art history. Westernization led to Japan’s desire to join the avant-garde art movement, which resulted in a conjoining of aspects of both Western and traditional Japanese art in an attempt to create a presence for Japan in the international avant-garde. Yet this attempt has largely been ignored by Western art historians who remain in awe of traditional Japanese art exclusively. This project argues that artists from Japan proved themselves capable of contributing to the history of avant-garde art as defined by the West; therefore they should not be rejected by the history of modern art.

Lindsey Sheehan

Northern Illinois University’s Otto Ege Leaf

The Rare Books & Special Collections Department of the Northern Illinois University Libraries has acquired a Medieval Manuscripts collection from across Europe, dating from the 11th century to the 16th century. The collection is used as a teaching tool and visual aid in the Rare Books department. One of the manuscript leaves has a unique background because it was once owned by the late Otto F. Ege, the eccentric medieval manuscript collector. Ege is remembered by art historians and book scholars as a “biblioclast,” one who carves up books for fun and profit. By his own admission, book-breaking was Ege’s hobby and he justified it as his way of sharing the beauty of the medieval book with a wide audience. Though he has been dead for sixty years, a debate continues between those who are unforgiving of his unconventional methods and those who call him an accomplished advocate of populist art education. Renowned scholars have gone on record in support of Ege. I argue in this paper that physical access to fully bound manuscripts is often restricted, but the tradition of fragment dealing has made possible the dissemination of leaves which offer unique opportunities for research and learning. Through his career, Ege willfully removed hundreds of pages from his considerable collection of manuscripts with the intention of selling the fragmented pages individually or in structured portfolios. The case is made that these opportunities served to provide the kind of hands-on learning experience of medieval technique for which Otto Ege intended all along.
Jennifer Wegmann-Gabb

Who's that Girl? Ecclesia and the NIU Paris Bible Leaf

Authors: Jennifer Wegmann-Gabb
Department: Art History
Faculty Mentor: Ann van Dijk
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Special Collections at Founder's Memorial Library has an excellent example of a leaf from a thirteenth century Paris study bible. The study bible developed in Paris for the burgeoning universities of late medieval Paris as a textbook. These books represented a new style of manuscript and combined biblical texts into one easily portable volume. Due to their functions as textbooks, surviving manuscripts follow strikingly similar patterns in terms of content, book organization, and ornamentation. One feature of many manuscripts is historiated letters, which are letters incorporating decorations and images. In Paris Bibles the historiated letter most often appear at the beginning of books to help identify the biblical book. While these bibles can vary dramatically in terms of their level of illuminations, if historiated letters are present then they seem to follow patterns in terms of which figure or scene is depicted with particular books. The NIU Paris bible leaf is no exception. The NIU leaf is from the opening page of the Book of Ecclesiasticus. The information accompanying the leaf identifies the figure within the historiated letter at the beginning of this book as Solomon. However, after reviewing the text and examining other historiated letters at the beginning of Ecclesiasticus, this identification is wrong. Instead, the figure should be identified as Ecclesia, or a personification of the church.

Melissa Woodall

Visualizing Psychological and Personality Disorders

Authors: Melissa Woodall
Department: Art
Faculty Mentor: Cynthia Hellyer-Heinz
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 10:15-11:30 AM

My research involved an investigation into rare psychological and personality disorders, such as multiple personality disorder, schizoid personality disorder, and bipolar disorder, on an anatomical and physiological level. My research focused on how the body and brain function under these types of disorders. I conducted my research by reading and analyzing literature related to anatomy, physiology, psychology, and psychopathology. As a result, I created a set of pieces of artwork that visually reflects and comments on my research into this topic. For each illustration, I visually described the symptoms of the disorder and how the brain and body functions under the disorder. There were many purposes for my project. First, I sought to enhance our understanding about these disorders by combining research and artistry to offer a visual avenue for learning. Second, I wanted to spread awareness about the connection between research and artistry, and illustrate the significance of visual communication. Research and artistry are not mutually exclusive.

Linnea Scherer

Disjointed: A Video Game Concept Featuring the Positive Portrayal of a Female Protagonist

Authors: Linnea Scherer
Department: Art
Faculty Mentor: Bart Woodstrup
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

My project involves the depiction of women in mass media, specifically video games. Women in video games are often depicted as damsels in distress or sexual objects. I am trying to combat this by designing a game that depicts a willful, independent, and morally strong female character. We need characters like these to begin to change female roles in video games and create an equal environment for both men and women in the video game community. This issue is important to me because I have an interest in video games, but I also see the way that women are represented in the video games that I play. These representations can be harmful to the attitudes towards women in the video game community. With this project I hope to show how games can represent women in a positive light, while still being marketable to both men and women.
Some of Us Just Like to Read: Lady Gaga's Pastiche and the Rhizome

Authors: Anthony Amettis
Department: Art History
Faculty Mentor: Barbara Jaffee
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 10:15-11:30 AM

Since the release of her first studio album in 2008—and thanks in large part to her proclivity for elaborate stage performances, wildly eccentric fashion choices, rock-infused pop music, and her embrace of social media as a way to maintain a network of exchange with her legions of fans, the iconic artist “Lady Gaga” has proven herself an impressive force in the realm of popular culture. As a devotee of provocation, she has also attracted a wide variety of criticism. Most pointedly, Gaga is accused of being bereft of significant artistic value. Close readings of statements both sympathetic and dismissive reveal that, at the center of these accusations, is the widely-held notion that “originality” is the primary measure of artistic value; as Gaga mobilizes a vast, preexisting visual and conceptual economy in the construction of her image, critics are troubled by the degree to which she remains unashamed of these cultural borrowings. This project entertains the radical idea that Lady Gaga’s cultural value lies not in her ability (or lack thereof) to be adequately original, but rather in the distinctive character of her productive strategies, which we can understand as being similar to the concept of pastiche: a configuration of seemingly disparate elements into a unified, imitative whole. Reflecting the theoretical structure of the current cultural moment, which assumes a material form as the Internet, Lady Gaga projects a particular type of pastiched image and thus encourages multifaceted reactions to her music, fashion, and performances.

The Geography of Art: The Importance of Paris, Networking, and Culture

Authors: Gabriela Crespo
Department: Art History
Faculty Mentor: Barbara Jaffee
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

In the early twentieth century Paris was the capital of art, and its citizens were established as modern artists, a community that heightened Joan Miró as an artist with its essential network. The importance of Miró’s move to Paris became instrumental in his introduction into the artworld. In 1919 the Spanish artist visited Paris and became acquainted with Pablo Picasso, a connection that convinced Miró to move to Paris. In the Surrealist and Cubist Parisan groups he found motivation, with Paris’ influence present in the cafés of the city, a hotbed of virtuosity. Why should his art be worthy of recognition? There is no right answer, only the evidence of his trajectory. Miró was in the right place at the right time, or perhaps the wrong times – such as a yearlong convalescence stopping him from touching a canvas, a failed first Parisian exhibition— that pointed him toward the right mindset, style, and part of Paris and its subcultures for him to profit from, to hone and exploit. He was on his own right an emerging artist in Barcelona. He had begun a path that signaled his creative contribution to the artworld, yet in Paris he found the launching pad necessary to remain a member of it, producing significant associations that would tie him to the history of art, to the Paris of the turn of the century with its Dadaists, Cubists, and Surrealists, all in a way borrowing ideas from each other, all part of Joan Miró, but none defining him completely.

Pottery Production at San Marcos Pueblo

Authors: Lindsey Komes
Department: Anthropology
Faculty Mentor: Winifred Creamer
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Laser ablation – inductively coupled plasma mass spectrometry will be used to analyze the clay used to make pottery at San Marcos Pueblo and a sample of clay from a nearby source. San Marcos Pueblo is an archaeological site in the Galisteo Basin, New Mexico, near Santa Fe. Rio Grande Glaze Ware is a pottery tradition common in the Galisteo Basin. This tradition involves painting bowls and jars with black, lead glaze. Warren (1979) stated that San Marcos was a production center for Rio Grande Glaze C pottery. By testing the various elements present in the clay of sherds from the site and comparing them with the clay sample, I can determine whether the clay from the glaze C ceramics matches the clay source sample, confirming Warren’s view. Testing samples of all glaze ware present at the site (A-E) will make it possible to see whether ceramics are likely to have been produced at San Marcos during all periods of occupation, or only during Glaze C times, AD 1425 to 1500. These results complement existing analyses of Rio Grande glaze wares (Eckert 2006).
The project entitled "A Cultural Model of Nature in Northern Illinois" served not only to test a new methodology of data collection, but also to confirm the cultural model of nature held by the population of the northern Illinois area. Data was gathered through semi-structured interviews, and analyzed using metaphor analysis, gist analysis, keyword analysis, and reasoning analysis. The cultural model of nature demonstrated by the interview subjects held a common result that: man and nature are separate entities, and that man can interact with nature either through noninterference, stewardship, or mastery. The results thereby confirmed the existence of the cultural model, and also the validity of the data collection methodology.

Recent studies targeting the microenvironment of carcinomas have discovered that toll-like receptors can induce cytokines from immune cells and inhibit tumor growth. Toll-like receptors (TLR) are pattern recognition receptors (PPR) that play a key role in the innate immune system. To date, ten functional TLRs in humans have been identified. TLRs are of significance because new studies propose that these receptors play a pivotal role in chronic inflammatory conditions. They are expressed in various malignancies and aid in tumor progression. Our lab investigates cancer-associated inflammation and the role of the tumor microenvironment. We concentrate on understanding how inflammation promotes the proliferation of cancer cells. For my project, I am researching Hepatocellular Carcinoma (HCC), a disease characterized by the transition of cells from an epithelial phenotype (cells lining the tissue) to mesenchymal phenotype (aggressive stem cells that differentiate into a variety of stem cells). My project investigates the expression of TLR 1-10 on the two groups of HCC cells, epithelial (group 1) and mesenchymal (group 2). We found a difference in TLR expression patterns between the epithelial and mesenchymal groups. TLR 3, TLR 6, and TLR 9 expression were higher in group 2 compared to group 1. This difference in TLR expression between groups 1 and 2 suggests these receptors may play a role in pathogenesis of HCC. Therefore, understanding the biological role of these receptors in HCC will provide insight into the biology of this malignancy. Future experiments are aimed at understanding the functional roles of these TLRs in HCC.

In today's world, alternatives to petroleum fuels are being closely followed and researched by many scientists. This is due to the increasing demand for cheaper oil due to the growing world population. Algae are being developed as a cost-effective alternative biofuel, as they can be grown in waste water, and do not compete for agricultural resources with food crops. When algae are grown in open cultures, there is tendency for multiple species to grow as a consortium, and for other fungi and bacteria to contaminate the cuulture. But in order to use algae for biofuel, it is important for one specific species to be isolated, ours being Monoraphidium. In order to isolate more pure colonies of Monoraphidium from an environmental isolate, spread plating was performed on two different types of agar, one being undefined media of effluent water taken from the local (DeKalb) water plant. Another is defined media which is made in the lab. During the course of the experiment, the media that produces the purer form of Monoraphidium will be determined, and should help to isolate monocultures of the Monoraphidium sp. An aeration rate study was also performed in order to determine optimal introduction rates of CO2 and O2 in an 8L algae culture for algal growth. The results should give information on the potential of liquid algal cultures to absorb gaseous CO2 during photosynthesis, and allow their potential use as a means of absorbing CO2 in flue gas produced from industrial processes.
The harmful byproducts of burning traditional fossil based fuels has created an urgency to procure a new source of oil for fuel production. Microalgae are promising candidates for biofuel feedstocks because of their high lipid content to overall mass ratio, and ability to grow quickly in great abundance in waste water. Their widespread use would be cleaner and more sustainable, but production on a large scale must be economically viable in comparison to petroleum. Due to the remarkably small size of the algae, harvesting them efficiently for biofuel production is still a challenge that needs to be overcome. To investigate this problem, I am using a flocculation method involving adding a range of potassium hydroxide (KOH) concentrations to small algae cultures in the lab, and mesocosm size algae pools in the greenhouse. The addition of this basic solution changes the electronegativity of the cells outer surface causing the individual algae to become attracted to each other leading to the formation of weak bonds between the cells. This amassing “floc” facilitates collecting the algae through filtration by creating clumps of algae that can be physically separated by a forty-five micrometer nylon mesh. This method avoids the co-production of Fe(OH)3 which occurs when FeCl3 is used to flocculate algae. The main objective is to determine the most efficient concentration of KOH flocculent that can increase the yield of harvestable algae, while minimizing excess flocculent use when the process is eventually scaled up to industrial size volumes.

Willie Carter

Engineering pH-Dependent Anti-Hapten Antibodies: Exploring Function/Stability Trade-Offs

The Horn research group is interested in the developing novel protein affinity reagents. Antibodies, one of the most prevalent affinity reagents, show great potential for therapeutic and diagnostic use. Our engineering efforts aim to modulate the binding and stability of a unique heavy-chain only antibody, called VHH. To generate a pH-dependent antibody interaction, a histidine substitution was introduced within the anti-methotrexate interface. A consequence of the newly engineered pH-dependent VHH antibody was a modest decrease in methotrexate binding affinity at the permissive pH, as well as a loss in conformational stability. Here we explore whether an engineered disulfide bond within the VHH scaffolding may help counter these energetic penalties. Our findings reveal that the relationship between engineering new function and loss of old function/stability is likely to be a common phenomenon.

Jordon Mitzelfelt

Human Liver Cancer Cells with Targeted Knockdown of Amino Acid Transporters ASCT2 and LAT1 Exhibit Enhanced Reliance on Autophagy for Three-dimensional Growth

Cancer cells have been shown to use autophagy – the regulated breakdown of cellular molecules in vesicles – to recycle nutrients as an alternative energy source and survival mechanism especially during avascular three-dimensional growth. Autophagy is, in part, regulated by the kinase, mammalian target of rapamycin complex 1 (mTORC1) which in turn is regulated by the amino acid transporters ASCT2 and LAT1. In previous work, Sloan-Kettering Hepatoma-1 (SKHep-1) cells stably repressed for ASCT2 and LAT1 expression were created. The suppression of these two transporters reduces cytoplasmic glutamine and essential amino acids, which normally activate mTORC1 and suppress autophagy. We therefore hypothesized that the transporter suppressed cells rely more heavily on autophagy especially during three-dimensional growth and likewise will be more sensitive to autophagy inhibitors. To test this hypothesis, we examined the growth of control and transporter knockdown cancer cells in soft agar in the absence or presence of the autophagy inhibitors chloroquine and 3-methyladenine (3MA). Chloroquine and 3MA each decreased the size (diameter), but not the number of colonies in soft agar in all SKHep1 control and transporter knockdown cells.
The reduction in colony diameter by autophagy inhibitors was more profound in the most transporter-repressed lines relative to controls and modestly repressed cells, suggesting that ASCT2 and LAT1 suppression may enhance reliance on autophagy for anchorage-independent growth (tumorigenesis) in cancer cells. The next step is to determine whether LAT1 and ASCT2-repressed cells are able to form tumors in vivo as we continue to assess their value as therapeutic targets for hepatocellular carcinoma.

30  Evan Wittke*

*Targeting Human Hepatocellular Carcinoma with Syncytin-Conjugated Liposomes*

Authors: Evan Wittke  
Department: Biological Sciences  
Faculty Mentor: Barrie Bode  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

Human hepatocellular carcinoma (HCC) is the fifth most common cancer in the world, accounting for an estimated half million deaths annually. This cancer has high incidences in Asia and Sub-Saharan Africa; furthermore, new cases of HCC are increasing in the United States. Treatment modalities for HCC are limited to liver resection, chemoembolization of chemotherapy agents, and oral ingestion of sorafenib, the only FDA-approved medication for HCC treatment. Previous investigations in the Bode lab have evaluated the expression of the amino acid transporter ASCT2 in a panel of HCC cell lines. This expression information is vital to a novel liposome-mediated drug delivery system, which utilizes ASCT2 expression in HCC cell and a syncytin-conjugated liposome. Syncytin is a protein essential for the formation and maintenance of the placenta. It has been shown that syncytin forms placental structural attachments by binding to the ASCT2 protein. Upon binding to ASCT2-bearing cells, syncytin-positive cells fuse to form the syncytiotrophoblast. Using the binding relationship between ASCT2 and syncytin-1, our laboratory has constructed syncytin-conjugated liposomes, which are carrier molecules, to target ASCT2-positive HCC cell lines. Liposomes were constructed with chemotherapy agents to assess the efficacy of the targeting system at killing the HCC cells. Fluorescent dye was used in order to assess the ability of the targeting system to discriminate between ASCT2-positive and negative cells. The results of this study indicate that this novel targeting system has potential as a targeted drug delivery system against HCC.

31  Bailey Rhoads*

*Toll-Like Receptor-Mediated Regulation of GLI Proteins*

Authors: Bailey Rhoads  
Department: Biological Sciences  
Faculty Mentor: Sherine Elsawa  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:15-11:30 AM

The goal of my research project is to better understand the role of GLI proteins in regulating proinflammatory cytokine production. This study is based on previous research that has shown that GLI transcription factors can act in a hedgehog-independent pathway. Our lab has shown that GLI2 modulates the proinflammatory cytokine IL-6 in the tumor microenvironment, suggesting its potential role in regulating other inflammatory cytokines. To address this, we used lipopolysaccharide (LPS) to mimic bacterial infections, which induces an inflammatory response by infected cells in vitro. As expected, we found an increase in IL-6 expression in response to LPS stimulation. Interestingly, we also found an increase in GLI3 expression in response to LPS stimulation. Whether an increase in GLI3 in response to LPS is unique to TLR4 signaling or a general response to TLR-mediated signaling is unknown. Therefore, we stimulated cells with ligands for two additional TLRs, specifically TLR3 and TLR9, and determined their effects on GLI expression. We found that stimulation of TLR3 with the ligand polyI:C induced GLI3 mRNA expression. Ongoing experiments will address the role of TLR9 signaling using the ligand CpG.

32  Irina Yatsyk*
The Course Transformation Project (CTP) and Northern Illinois University seeks to redesign large general education courses (70+ students) in order to expand upon the efforts of raising student engagement and eliminating common areas of misconception. CTP does also, in turn, speak to the issue of the value-added learning that occurs among undergraduates in the areas of critical thinking, communication, and creativity as well as the quality and strength of the general education program at Northern Illinois University. One of these target courses was a general education biology course for non-majors. The design of the course followed a constructivism approach, fostering students’ metacognitive abilities driven by identification of gaps in thinking and circumventing those gaps with new skill development. Integration of these principles and tools gave students a unique perspective and understanding of the material that was presented to them in the classroom.

33  Afreen Papa

**Aligning Gene Expression to Function: Intracellular and Cell Surface Protein levels using Cell Surface Biotinylation in 14 Human Hepatocellular Carcinoma Lines**

Authors: Afreen Papa  
Department: Biological Sciences  
Faculty Mentor: Barrie Bode  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:15-11:30 AM

Amino acid transporters ASCT2 and LAT1 exhibit coordinately enhanced expression and activity in hepatocellular carcinoma (HCC) compared to normal liver where these transporters are nearly undetectable. These two transporters associate in the plasma membrane where they work together to activate mTOR signaling and cell growth. Recent studies from our lab indicated that both transporters were universally expressed in both epithelial and mesenchymal human HCC cells, but total cellular protein levels of each transporter did not correlate well with their measured transport activities. We hypothesized that differential rates of transporter trafficking to the plasma membrane from the total cellular pool in each HCC cell line underlies disparities in cellular transporter expression and measured activities. To test this hypothesis, cell surface proteins were covalently labeled with biotin, isolated with neutravidin beads and plasma membrane ASCT2 and LAT1 protein measured via western blot (antibody-based) analysis in 14 human HCC lines. The results indicated a wide range of ASCT2 and LAT1 abundance on the plasma membrane of specific HCC cells, some of which explained disparities in activity and total cellular transporter content. However, in some cases relative ASCT2 and LAT1 plasma membrane protein abundance could not account for their measured activities, reflecting the fact that several factors contribute to transport rates in addition to transporter abundance, including transmembrane electrochemical and substrate gradients. As metabolic and physiological targets in cancer therapy are being developed, including ASCT2 and LAT1, such studies are important to connect gene expression to actual function.

34  Andra Dobbel

**Screening for mRNA Expression of all Ten Toll-like Receptors in Pancreatic Cancer Cells**

Authors: Andra Dobbel  
Department: Biological Sciences  
Faculty Mentor: Sherine Elsawa  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

Pancreatic cancer is the fourth leading cause of cancer death in the United States and is associated with a poor prognosis (Wiener et.al 2012). Due to its’ high mortality rate alongside its inability to be directly diagnosed and prognosis being so poor, pancreatic cancer has drawn the attention of many oncologists and immunologists. The importance of compiling a greater biological understanding of this malignancy continues to grow and is fundamental to the development of better tools for early detection and better therapies. Toll-like receptors (TLRs) are expressed by cells of the innate immune system such as neutrophils, macrophages and dendritic cells and are utilized to discriminate between pathogens (non-self) and self. Each receptor recognizes a set of different molecular patterns found on microbes and, when stimulated, trigger the immediate innate immune response. There are some reports that pancreatic cancer cells express TLRs. These have been shown to have characterized roles in both the innate immune response and in carcinogenesis. However, a screening for the expression of all TLRs in pancreatic cancer has not been conducted. The goal of my project is to screen for the mRNA expression of all ten of the observed TLRs in seven pancreatic cell lines with the objective of adding to the understanding of the pathways that are potentially implicated in pancreatic cancer pathogenesis. This knowledge may also help in the development of markers that are indicative of cancer development, specifically pancreatic cancer, allowing for earlier diagnosis.
Grasses, which make up a family of 11,000 plant species, are important in the human diet and make up approximately half of our caloric intake. Familiar grasses include corn, sorghum, and sugar cane. Understanding the relationships between the grass species can help improve management of cereal crops, improve food security, and increase agricultural sustainability. Evolutionary relationships are well studied using gene sequences in all organisms. In our project, we used mitochondrial sequences, like those used in animal studies and compared them to those relationships found using chloroplast sequences. We used next generation DNA sequencing data from 17 grasses and sequences of eight mitochondrial loci were assembled using bioinformatics techniques. Mitochondrial loci included one coding sequence and seven intron regions. These were analyzed with mitochondrial loci from two previously published grasses to infer evolutionary trees and compared against trees from complete chloroplast genomes (plastomes) from the same species. The mitochondrial gene tree we assembled recovered four expected subfamily groups for which there were two or more included species. Mitochondrial genes in plants often show evidence of recombination, horizontal gene transfer and lineage sorting making mitochondrial trees potentially different from species trees. However, in our project, the mitochondrial and plastome trees were fully congruent and so likely reflect species relationships. Since these grasses are important to human food security, this discovery can be used to better understand how to properly attain new hybrid cereal crops for animal and human consumption produced in a sustainable manner.

Basic life history information is often lacking in species that exhibit secretive behavior, even when the species is common and widespread. For many reptiles, reproductive maturity is size-dependent rather than age-dependent, and the proportion of animals large enough to reproduce strongly influences population growth rates. In order to better understand size and age of sexual maturity in snakes, we studied Dekay's Brownsnake, Common Gartersnake, and Redbellied Snake populations using capture-mark-recapture methods at Potawatomi Woods Forest Preserve in DeKalb County and Nachusa Grasslands in Lee and Ogle Counties in Illinois. As an indication of sexual maturity, we palpated females for the presence of enlarged follicles and examined cloacal smears from males to detect the presence of sperm. These data were used to identify the minimum snout-vent length (SVL) at sexual maturity for these grassland snakes. Age at reproductive maturity was inferred from growth trajectories of neonates prior to hibernation and juveniles following emergence from first hibernation. Rapid neonatal and juvenile growth resulted in some individuals reaching size of reproductive maturity in one year. These results demonstrated the importance of neonatal growth rate on age of sexual maturity and on population growth rates.

Metabolically induced autophagy as an effector mechanism of senescence was investigated because of potential tumor suppressive affects of senescence. Two validation methods were used to assay for autophagy; staining with acridine orange (AO) and transmission electron microscopy (TEM). Human brain cancer cells were starved with Hank's balanced saline solution (HBSS) for 30 minutes to induce autophagy +/- 10 Gy γ-radiation. Autophagy increased with increasing time post-treatment and was induced at the highest level in the combination treatment. To test the hypothesis Rho-kinase inhibitor, Y27632, was chosen to inhibit autophagy and then senescence was assayed for. Rho-kinase inhibition lead to a decrease in autophagy and a corresponding decrease in senescence associated-β-galactosidase staining, confirming my hypothesis. Additional radiation
Human impacts on the environment have reached everywhere on earth. Various environmental assessments have shown ecosystem damage reducing the ability for ecosystem services to promote human wellbeing. This ability will only decline faster with the continually rising human population and increasing demands for food and energy. Two key questions to ask are how well can nature and ecosystems recover from damage and human impacts, and how can we adjust to prevent further damage? We are undertaking a systematic examination of case studies of recovery though active restoration and passively letting the ecosystem recover. Specifically for this project, we are focusing on ecosystem recovery after agriculture. Agriculture is one of the largest threats to species and ecosystem degradation. Our project will evaluate recovery rates and recovery outcomes after small- versus large-scale agriculture activities. We are asking whether actively restoring previously cultivated lands enhances the ability to recover or increases the chance of full recovery when compared to passively letting the ecosystem recover. We are looking at a variety of response variables including plant and animal abundance and diversity, nutrient cycling, and soil and water characteristics. We hope to use these results to determine the type of role scale has on the recovery of previously cultivated land and identify the key variables that drive ecosystem recovery following agriculture.

Most plants are consumed by herbivorous animals and have mechanisms to defend themselves against attacks from these antagonists. However, different environments may alter the ability of a plant to defend against herbivores, including other organisms with which the plant interacts, such as arbuscular mycorrhizal fungi (AMF). Along with environmental factors, there may be genetic variation within a population that makes certain individuals better adapted to prevent or reduce the effects of herbivory. Peroxidase (POD) is a defensive protein found in plants that creates free radicals that interfere with insect digestion of plant tissues. POD production is induced following herbivore wounding by the plant hormone jasmonic acid (JA). This response can also be triggered by applying JA to the exterior of the plant. POD levels can be affected by the presence AMF, which also influence the jasmonic acid pathway. We examined POD production and response to JA application in the presence and absence of AMF using five different maternal families of Solanum dulcamara (Solanaceae). We found that the effect of AMF on plant response to JA application varied among populations, indicating that plants may be experiencing different selective pressures even within a limited geographic area.

Parasitic wasps and pesticides are both commonly used to control populations of filth flies, such as house flies, but little is known about the effects of pesticides on the wasps. These experiments looked at the effects of fly baits containing pesticides on the behavior and mortality of the parasitic wasps Spalangia endius and Urolepis rufipes. Individual female wasps were exposed to one of three granular baits (containing Methomyl, Imidacloprid, or Dinotefuran) or to a control (sand). Observations included the number of times the female 1) contacted any granule, 2) groomed, and 3) fed or attempted to feed. Both species of wasps contacted the baits significantly less often than the control. S. endius groomed a greater number of times when exposed to
Methomyl or Imidacloprid than when exposed to Dinotefuran or the control. *U. rufipes* only groomed significantly more often when exposed to Methomyl in comparison to the control. *S. endius* and *U. rufipes* both ate Methomyl and Dinotefuran, but neither ate Imidacloprid or the control. Although these pesticides can be deadly for these wasps, our results suggest that the wasps’ avoidance of the baits may lessen their exposure. The baits contain sugar, which wasps eat. The baits also contain a fly pheromone. Future experiments will examine wasps’ response to this pheromone. Understanding how fly enemies respond to pesticides and their components can facilitate the integration of multiple methods of control, and in the process may reduce the amount of pesticide needed, which would have environmental and economic benefits.

41 **Katie Skar**

*Thermoregulatory Behavior of Gestating Dekay's Brownsnakes Under Different Shade Treatments*

Authors: Katie Skar, Lisa Raimondi, Tanya Obrien, Rich King  
Department: Biological Sciences  
Faculty Mentor: Richard King  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:15-11:30 AM

Viviparous snakes like Dekay’s Brownsnakes have the ability to influence the thermal environment of developing embryos through thermoregulation, which can directly affect offspring fitness. We tested the effect of shading on thermoregulatory behavior of gestating Dekay’s Brownsnakes using 24 enclosures divided equally between sun and shade treatments. Behavior was recorded using programmable cameras and daily observations. Paired comparisons indicated that during July, snakes in the shade treatment were visible more frequently than snakes in the sun treatment during both daylight hours and at night. Furthermore, repeated measures analysis demonstrated that behavior changed from July to August, such that snakes in the sun treatment increased in the frequency that they were visible as embryonic development progressed. These results suggest females may alter thermoregulatory behavior by actively seeking out different thermal habitats depending on reproductive state.

42 **Kathryn Olson**

*Microbial Diversity of the Calumet Wetlands*

Authors: Kathryn Olson, Marie Kroeger, Lori Lovell  
Department: Biological Sciences  
Faculty Mentors: Wesley Swingley & Melissa Lenczewski  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

The Calumet Wetlands (N 41°40' W 87°35') are heavy-metal rich alkaline environments located along the southern tip of Lake Michigan. Nearly a century of use as a steel slag dumping site and decades of mineral weathering, especially of calcium silicates, has resulted in an unprecedented alkaline pH exceeding 13 (Roadcap et al., 2005). Additional industry deposits including heavy metals Fe, Zn, Sr, and Pb act as additional stresses to the aerobic and anaerobic microorganisms that survive in this extreme environment (Roadcap et al., 2006). Study of the microbial communities inhabiting the waters and soils of Calumet is essential to advancing understanding of the on-going biogeochemical processes at this and other hazardous waste sites similar to Calumet. This project addresses microbial diversity in the region by linking geochemical elemental analysis with microbial culturing and sequencing efforts.

43 **Amanda Cox**

*Induction of Autophagy as a Consequence of the Unfolded Protein Response in Human Brain Cancer Cells*

Authors: Amanda Cox, Miranda Foster  
Department: Biological Sciences  
Faculty Mentor: Linda Yasui  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

The unfolded protein response (UPR) is a survival pathway used by the cell to remove misfolded proteins. Cisplatin is a chemotherapeutic drug that is a known cross-linker capable of creating protein aggregates or misfolded proteins. In order to understand the role of the UPR in autophagy, TEM images of U251 cells were analyzed to determine if ER stress was present in cells treated with 1μM cisplatin, 10 Gy γ-radiation, and a combination of both. These images identified an increase in ER stress with time and with severity of the treatment. In order to visualize the cell response to ER stress, Premo BacMam p62-GFP constructs were used to highlight the accumulation of protein aggregates and autophagosomes by imaging p62 puncta in U251
cells. On days 1, 2, and 3 post-treatment, cells were imaged using a Zeiss LSM 5 confocal microscope. These images depicted an increase in the amount of p62 in the cell with treatment and perinuclear aggregation of autophagosomes. The early formation of p62 puncta indicates that autophagy is initiated as a response to ER stress in addition to the UPR.

44 Zachary Howard

Assessment of Biochemical Inhibitors of Nutrient Uptake and Metabolic Signaling in Human Hepatocellular Cancer Cell Growth

Authors: Zachary Howard, Barrie Bode, Evan Wittke
Department: Biological Sciences
Faculty Mentor: Barrie Bode
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

Hepatocellular Carcinoma (HCC), a type of devastating liver cancer, affects people around the world and currently there are only limited and temporary treatment options. One drug, sorafenib, is the only FDA-approved pharmaceutical option in HCC. Among avenues being explored are metabolic derangements in HCC, including enhanced amino acid uptake and metabolism that might be harnessed for therapy. The purpose of this study was to compare the amino acid transport inhibitors GPNA, MeAIB, and BCH (each targeting a different family of transporters) to sorafenib and two other drugs targeting metabolic signaling implicated in cancer: rapamycin and metformin. Fifteen different HCC cell lines representing primary and metastatic cancer cells were employed in the study to assess the differential effects of each inhibitor on the growth of different types of HCC. The results indicated that sorafenib and metformin were the most effective growth inhibitors in both epithelial (primary carcinoma) and mesenchymal (metastatic) HCC cells, where each reduced growth by 40%-80%. Rapamycin, a specific inhibitor of the amino acid-regulated protein kinase complex mTORC1 was the next most effective growth inhibitor, reducing growth up to 75% in HCC cells. Amino acid transport inhibitors reduced growth more marginally, up to maximum of 40%-65%, depending on the inhibitor. Sorafenib tended to be more effective in epithelial cancer cells whereas the transporter inhibitors MeAIB and BCH reduced growth more effectively in mesenchymal cancer cells. The remainder of the inhibitors exhibited no obvious pattern of differential growth inhibition in both HCC groups. The results indicate that inhibitor cocktails targeting nutrient transporters and associated signaling pathways, and informed by gene expression profiling, might hold promise as future therapies in HCC.

45 Alex Ekstrom

PlantCAZyme: A Database for Plant Carbohydrate-Active Enzymes

Authors: Alex Ekstrom, Rahil Taujale, Nathan McGinn, Yanbin Yin
Department: Biological Sciences
Faculty Mentor: Yanbin Yin
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

PlantCAZyme, built upon dbCAN (database for automated carbohydrate active enzyme annotation), aims to provide pre-computed sequence and annotation data of carbohydrate active enzymes (CAZymes) to plant carbohydrate and bioenergy research communities. The current version contains data of 58085 CAZymes of 266 protein families from 35 plants (including angiosperms, gymnosperms, lycophyte and bryophyte mosses) and chlorophyte algae with fully sequenced genomes. Useful features of the database include: 1) a BLAST server and a HMMER server that allow users to search against our pre-computed sequence data for annotation purpose, 2) a download page to allow batch downloading data of a specific protein family or species, and 3) protein browse pages to provide an easy access to the most comprehensive sequence and annotation data.

46 Hector Alvarado

Lipid Extraction from Microalgae for Conversion to Biofuel

Authors: Hector Alvarado
Department: Biological Sciences
Faculty Mentor: Gabriel Holbrook
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Developing alternatives to petroleum based fuels has created an interest in sustainable sources of biofuel. Microalgae produce lipids that can be converted to biodiesel, and can be used simultaneously to treat waste water. The challenges include lipid extraction from cells and removal of impurities from triacylglycerols before they are transesterified to fatty acid methyl esters
used as biodiesel. Oil extraction from Monoraphidium algae was performed using various solvent mixtures including hexane, chloroform, and methanol to see which provided the best yield of lipids. Thin Layer Chromatography was used to analyze samples and monitor purity. Silica gel was included as a purification step in some of the extractions, to test its efficacy as an insoluble reagent and “scavenger” for contaminants such as monoglycerides and pigment molecules including chlorophyll. Removal of these impurities prior to the transesterification step is predicted to increase the efficiency of biodiesel production.

47  Keith Murrell

*Pooids, The Mystery Under our Feet*

Authors: Keith Murrell, Bill Wysocki
Department: Biological Sciences
Faculty Mentor: Melvin Duvall
Research Category: Science, Technology, Engineering, and Math
Judging Time: 9:00-10:15 AM

Understanding the origin and relationships (phylogeny) of plants is crucial for efforts ranging from better GMO production to conservation efforts in biodiversity. Cereal crops like wheat, oats, and barley make up nearly 50% of human caloric intake. Lawn grasses like the Bluegrass or Fescues dot our urban landscapes. These grasses belong to the same subfamily, Pooidae, which is one of 12 true grass subfamilies. As common as these pooids are, their evolutionary relationships are poorly understood. However “phylogenomics,” which is the study of the evolutionary relationships using complete genomes, can provide robust and confident results. In this project, using next-generation DNA data from an ongoing study in the Duvall lab, 21 pooid chloroplast genomes were assembled into complete chromosomes and annotated using bioinformatic techniques. As a result 21 new Pooidae species have had their chloroplast DNA completely assembled and annotated. These plastomes will be banked into a national registry called the NCBI so others can use the plastome DNA for further research. These and seven previously published species of grasses were aligned and a preliminary phylogenetic tree of the evolutionary relationships was inferred to determine broad patterns of relations. Major subgroups of Pooidae were retrieved. However, in two cases unexpected support was found for new evolutionary associations. One of these concerned the early diverging species in the subfamily, which contradicted traditional taxonomic ideas. The second involved the relatives of Antarctic hair grass, which is a moss-like species native to the Antarctic. Continuing phylogenomic studies will resolve these and other relationships among these familiar and important grasses.

48  Michael Montelongo

*Development of a Functionalized Carborane Delivery Agent for Boron Neutron Capture Therapy (BNCT)*

Authors: Michael Montelongo
Department: Chemistry
Faculty Mentor: Narayan Hosmane
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

Modern cancer therapies have proven effective in curing many types of cancer. However, contemporary techniques are not sufficient for the treatment of tumors in certain tissues that cannot afford the damage incurred by procedures such as chemotherapy, surgery, or current radiation therapies. Boron Neutron Capture Therapy (BNCT) shows promise as a radiation treatment that is highly selective in the destruction of target cancer cells, greatly reducing damage to the healthy cells of such a vital tissue as the brain. BNCT relies on the selective accumulation of functionalized carborane nanostructures in target cells. When these molecules are subject to a beam of low energy neutrons originating from an external source, the boron-10 atoms of the cage undergo fission into high energy lithium-7 and alpha particles. The crucial aspect of this decay is that the combined range in which these particles release the energy capable of destroying the target cell is within the average diameter of a cell, thus containing the destruction within the affected cells. The purpose of our research is to synthesize a novel carborane delivery agent that is likely to be permeable to the cell membrane. Specifically, the focus of this research is to maximize the efficiency of the synthesis reactions by varying reaction conditions, such as solvents, temperature, and reagents. The molecule under development is a carborane di-substituted 1,3,4-thiadiazole-2,5-dithiol derivative. Once the efficiency of the synthesis is acceptable, other researchers in the field will be invited to investigate target cell permeability and selectivity of this novel agent.

49  Paul Bierdeman

*Statistical Analysis of Undergraduate Performance of Unit Conversions Common to the Public Health Sector*
We have hypothesized that differences in general chemistry background play a major role in predicting a student's ability to perform unit conversions essential to the public health and other applied sectors. To test the hypothesis, data were gathered from normal program assessments of a series of unit conversion problems given to Northern Illinois University juniors and seniors primarily within the College of Health and Human Sciences. Student assessment data were organized into three subgroups based on general chemistry background from unofficial transcripts. Subgroups consisted of students with CHEM 110 (general chemistry for non-science majors), students with CHEM 210 (general chemistry I for science and engineering majors), and students with CHEM 210 and CHEM 211 (general chemistry I and II). All unit conversion problems were focused on the concentration concept in general chemistry and scaled to the CHEM 110 level. Error rates for each subgroup were comparatively graphed using pivot charts to assess subgroup trends. Preliminary analysis has shown mean error rates of 86, 64, and 67% for the CHEM 110 (N=184), 210 (N=47), and 210/211(N=120) subgroups, respectively, providing partial support for the hypothesis. Although statistical analysis indicated that the CHEM 110 subgroup showed lower performance than the other two subgroups, all subgroups exhibited low performance. These results suggest a strong need for articulated curricular revision across program and grade levels to address unit conversion literacy. In moving forward, the program assessment data will continue to be gathered as part of an IRB application to open the way for research and partnerships aimed at new undergraduate engagement strategies.

50 Kayla Carstens

Biomarkers for Early Diagnosis of Diabetes Mellitus

Authors: Kayla Carstens
Department: Chemistry
Faculty Mentor: Elizabeth Gaillard
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

Diabetes mellitus is an endocrinual metabolic disorder characterized by high blood sugar levels which gives rise to complications in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the hemoglobin turnover, which is faster in case of diabetics and hence is a major disadvantage for diagnosing the patients in their early stages. Detection and intervention of diabetes in early stages can prolong the onset of diabetes. Alpha Crystallin, an ocular lens protein is a small heat shock protein with no protein turnover and hence acts as an archive for post-translational modifications especially glycation which forms advanced glycation end-products (AGEs). These glycation end-products have a characteristic fluorescence which can be measured as an indication for diabetes. We have used steady state and time resolved fluorescence measurements to study the spectroscopic changes in alpha crystallin with increase in time of glycation. Overall, this study will help us to establish a diagnostic tool for early detection of diabetes mellitus.

51 Juliane Totzke

A Comparison of the Gender Distribution in STEM Fields at NIU

Authors: Juliane Totzke
Department: Chemistry
Faculty Mentor: Courtney Gallaher
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Data from the National Science Foundation paints a clear picture of women's representation in Science, Technology, Engineering and Math (STEM fields). Women are usually overrepresented in sciences such as psychology and biology, but are severely underrepresented in other fields, such as physics and chemistry. In this project, we analyzed the representation of men and women in biology, physics, and chemistry at Northern Illinois University (NIU) compared this to the national average representation. Data from undergraduate and graduate students in the respective fields was acquired from departmental graduation records. We found that the general gender distributions within biology, chemistry and physics at NIU were similar to the national average. Interestingly, the gender distributions at NIU were even more accentuated and call for different recruitment strategies in the analyzed fields.
James Gorman

**Discovery of Novel Inhibitors of IspD as Potential Treatment Options for Malaria and Tuberculosis**

Authors: James Gorman, Joy Blain  
Department: Chemistry  
Faculty Mentor: James Horn  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

The MEP pathway, which is involved in isoprenoid biosynthesis, is an essential metabolic component in the life cycles of various eubacteria, protists, and plants, such as *P. falciparum* (malaria) and *M. tuberculosis* (tuberculosis). Consequently, inhibition of this pathway is an area of therapeutic interest, but only timid progress has been made in the design of enzymatic inhibitors as of yet. For its unique function and properties in this pathway, the enzyme IspD has been the subject of this research, and the function of novel inhibitors has been assayed using differential scanning fluorimetry (DSF), isothermal titration calorimetry (ITC), and computational methods for establishing possible new inhibitors.

Flor Navarro

**Identification of METAP2 Inhibitors Using Fluorescence Based Enzymatic Assay**

Authors: Flor Navarro,  
Department: Chemistry  
Faculty Mentor: Timothy Hagen  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM

METAP2 (Methionine Amino Peptidase 2) is an enzyme present in *P. falciparum* which is the organism that causes Malaria. In this research project we are testing several possible inhibitors for this enzyme that could be used as treatments for the disease. The enzyme is first expressed using E.coli cultures and purified by using affinity and size exclusion column chromatography. Then, fluorescence based activity assays are used to observe the effect of the inhibitor on the enzyme's activity. Out of 400 different compounds tested, 22 showed higher than 50% inhibition when tested at 10 millimolar. Right now we are working on obtaining the full profile of these 22 compounds.

Julio Sanchez

**Synthesis of Phenothiazine Derived Boron Neutron Capture Therapy (BNCT) Agents**

Authors: Julio Sanchez, Timothy Westergren, Christopher Clark  
Department: Chemistry  
Faculty Mentor: Narayan Hosmane  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

In an ongoing effort to synthesize potential boron neutron capture therapy (BNCT) delivery agents, the current focus is centered on phenothiazine as a potential carrier of boron atoms. The prime aspect of this project is to develop and characterize a novel boron-containing carborane appended drug system based on phenothiazine (S(C6H4)2NH) which is being used in pharmacology in antipsychotic and antihistamine drugs. Phenothiazine reacts with propargyl bromide in the presence of potassium tertbutoxide followed by cage formation via addition of decaborane. The final product will be characterized using FTIR, NMR and UV-Vis spectroscopy. Finally, bio distribution studies will be conducted to analyze the efficacy of the products and their feasibility as a potential BNCT agent.

Kyle Mondron

**Designing an Inverse pH-Switch Anti-Methotrexate VHH Antibody**

Authors: Kyle Mondron  
Department: Chemistry  
Faculty Mentor: James Horn  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:00-11:30 AM

The Camelidae family, including llamas and camels, possess heavy-chain only (VHH) antibodies. When compared to
conventional human antibodies, these minimalist VHH antibodies provide several advantages for applications such as diagnostics, biosensors, and therapeutics. Their use in such applications often involves some level of engineering to enhance the antibody’s properties. Here we explore a relatively new area of protein engineering: the generation of pH switches. This new function is analogous to a light switch, where binding can be either enhanced or weakened with only small shifts in pH. Using an anti-methotrexate VHH antibody as a model, we introduced two different ionisable residues acidic residues (aspartic acid and glutamic acid) independently, deep within the methotrexate binding site. It was hypothesised that this would result in an inverse “pH switch” wherein the binding of the VHH antibody to its target methotrexate (a drug used to fight some cancers) would be strong at low pH and weak at higher pH levels. The strength of the binding activity was assessed by Isothermal Titration Calorimetry (ITC). Despite being in its folded, native state, both antibody variants had minimal binding at both pH 4.0 and 7.4, suggesting the acidic residues disrupted the methotrexate binding interface. Although the desired pH dependent switch was not produced, unlike previous studies using histidine residues, the protein’s ability to remain folded and soluble could prove to be of interest for the development of a universal antibody switch, where binding is controlled indirectly through protein stability.

56  **Sterling Pollard**

*Fragment Based Drug Discovery Analog Activity with respect to the MEP Pathway*

Authors: Sterling Pollard  
Department: Chemistry  
Faculty Mentor: Timothy Hagen  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM

Methyl Erythritol Isoprenoid (MEP) pathway is a non-mevalonate isoprenoid biosynthetic pathway, is essential for certain bacteria and other infectious disease organisms. There are seven enzymes in the MEP pathway. Fragment Based Drug Discovery (FBDD)has yielded compounds that bind to three closely related MEP enzymes, IspD, IspE and IspF. FOL7425 binds to IspD, IspE and IspF as determined by NMR. In this poster we will present the synthesis of analogs of FOL7425. The affinity for the Isp enzymes will be presented. In addition compounds have been submitted to collaborators for antibacterial activity.

57  **Juliane Totzke**

*Reversible Conformational Change of Chalcones and Flavonones as molecular switch*

Authors: Juliane Totzke  
Department: Chemistry  
Faculty Mentor: Marc Adler  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

Reversible conformational changes between chalcones and flavonones can occur under different conditions, such as pH change. Controlling these conformational changes allows using these molecules as molecular switches. The goal of this project is to implement these functional molecules into acrylate polymers and investigate their behavior under mechanical stress. Different dihydroxyacetophenones and hydroxyaldehydes were used as starting materials for the synthesis. The final implementation of the chalcones/flavonones into the polymers is in progress.

58  **Benjamin Nagy**

*Improving Target Recognition of a Homodimeric Anti-Caffeine Single Domain VHH Antibody Using a Peptide Linker*

Authors: Benjamin Nagy and Chris Smith  
Department: Chemistry  
Faculty Mentor: James Horn  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:15-11:30 AM

Antibodies play a large role in a number of applications in biomedical science, including therapeutics and diagnostics due to their ability to recognize their target molecule with high affinity and specificity. Consequently, there is a great interest in methods to improve the affinity of an antibody for its target molecule. Here we investigate a heavy-chain only camelid antibody fragment (VHH) that possesses an unconventional method of target recognition. As opposed to conventional VHH antibodies, we have identified an anti-caffeine VHH antibody that uses two identical heavy-chain domains to recognize the target molecule. Specifically, we explore how a polypeptide linking the two VHH domains may increase target recognition, as well as increase
antibody stability. Several anti-caffeine VHH antibody variants have been produced which possess different polypeptide linker lengths of the repeating sequence (SGGGG)n, where n is 2.5, 4, 5, and 6. Size exclusion chromatography was used to determine how each variant's linker length affected target recognition in solution. Isothermal titration calorimetry (ITC) was used to determine the caffeine binding affinities for the different variants. Thermal stability was also examined by differential scanning fluorometry (DSF) and circular dichroism (CD).

59 Zach Hicks

*Transition States for the Collision-Induced Dissociation of the Hypervalent Anion PCl6-*

Authors: Zach Hicks  
Department: Chemistry  
Faculty Mentor: Lee Sunderlin  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

Experimental evidence shows that the hypervalent anion PCl6-, upon collision with other particles, dissociates into several smaller anions and molecules including PCl5- + Cl-, PCl4- + Cl2, and PCl3 + Cl3-. Because of the relative inadequacy of the computational chemistry software, as well as the inferiority of computers in general, of 10 years ago, a theoretical basis for these dissociations, especially an idea of what the transition states look like, is lacking. It is the goal of this semester's research, by using larger basis sets, to find these transition states. So far the transition state between PCl5- and PCl4- has been identified, and the transition state between PCl4- and PCl3- is still trying to be determined.

60 Anthony Reporto and Chris Potocki

*Boron and Magnetic Nanoparticle Silica Nanoparticles*

Authors: Anthony Reporto and Chris Potocki  
Department: Chemistry  
Faculty Mentor: Hosmane Narayan  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM

This project consists of the formation of boron doped silica nanoparticles and magnetic doped silica nanoparticles. The research consists of coating boron and magnetic nanoparticles in silica for use in Boron Neutron Capture Therapy (or BNCT). The research also consists of functionalizing these silica nanoparticles with glucose as tumor specific vehicles. The idea is that a cancer cell will consume this silica coated nanoparticle by either magnetism or glucose. Once the molecule is inside the cancer cell, low energy neutrons are emitted to excite the boron from boron-10 to excited boron-10 which is radioactive and emits an alpha particle that travels about the distance of the cell hopefully killing the cancer cell.

61 Jeffrey Moore & Theodore J. Litberg

*Total Synthesis of Rottlerin*

Authors: Jeffrey Moore, Marc J. Adley & Theodore J. Litberg  
Department: Chemistry & Biochemistry  
Faculty Mentor: Marc Adler  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:15-11:30 AM

The goal of this research project is to synthesize rottlerin, a chemical known as a PKCD (protein kinase C. delta) inhibitor that has also been shown promise as a potential drug against glioblastoma, a lethal brain cancer. Starting from a commercially available reagent known as phloroacetophenone (2,4,6-trihydroxyacetophenone), the goal was to use chemical reactions and synthetic techniques (such as column chromatography to purify the products) in order to progress towards making rottlerin. Products of reactions were characterized by NMR (nuclear magnetic resonance). Detailed notes of the reactions and purification processes can be used to understand the nature of chemicals similar to rottlerin.

62 Jeremy Troxell

*IspD Inhibition Using a Fragment Approach for Antimalarial, Antibacterial, and Herbicidal Properties*
The Global pandemic known as the malaria parasite has prompted research in the field of drug synthesis in order for the victims to live a healthier life. The methyerythriol phosphate (MEP) pathway is present in the infectious organism but not humans, making it an ideal target. The MEP pathway consists of seven enzymes and is responsible for the synthesis of essential isoprenoids. The focus of this poster is inhibition of IspD, the third enzyme in the pathway. We discovered that a molecule, FOL-7082 binds to the IspD enzyme. We initiated our chemistry efforts by synthesis of analogs of FOL-7082. Different analogs of FOL-7082 were synthesized to establish a structure activity relationship. The newly synthesized compounds were then tested for their IspD affinity using Differential Scanning Fluorimetry (DSF). A positive shift in the DSF assay indicates that these compounds have the potential for antimalarial, antibacterial and herbicidal activity.

63 Ushna Vaid

**Engineering Liposomes**

Authors: Ushna Vaid  
Department: Chemistry & Biochemistry  
Faculty Mentor: Elizabeth Gaillard  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM

Purpose: To design and evaluate the liposomal formulations to overcome disadvantages such as short half-life, prone to oxidation and hydrolysis, leakage and fusion in vitro. Methods: Liposomes are prepared using different techniques like lipid hydration and extrusion, reverse phase evaporation, ethanol injection, sonication, ethanol destabilization and mannitol freeze thaw methods. The formulations made using each of these methods were evaluated based on particle size and encapsulation efficiency. The particle size was measured using Dynamic light scattering and the encapsulation efficiency was measured using fluorescence spectroscopy. Finally, the suitable formulations were tested for dye release studies using SOTAX dissolution apparatus. Results: We have determined the advantages and disadvantages of each method using for preparation of liposomes. The formulations were selected which had an optimum particle size between 100-200 nm and the best encapsulation efficiency was around 50-70%. The dye release studies showed a release between 25-38 days. Conclusions: We have developed a hybrid method for preparation of liposomes by combining lipid hydration and extrusion, sonication and mannitol freeze thaw method. The advantages from each method helped us to overcome the disadvantages of short shelf life, fusion and leakage.

64 Rebecca Dominquez

**Synthesis of 5-Thio-D-glucopyranose (5TDG)-linked Boron Nanoparticles for use in Boron Neutron Capture Therapy (BNCT)**

Authors: Rebecca Dominquez & Narayan Hosmane  
Department: Chemistry & Biochemistry  
Faculty Mentor: Narayan Hosmane  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

The research project involved the synthesis of a novel drug carrier for use in Boron Neutron Capture Therapy (BNCT), which is a bimodal therapy for cancer treatment. Thus, the carrier drug consists of a boron nanoparticle that is attached to a 5-Thio-D-glucopyranose molecule, a non-metabolic sugar substitute. Subsequently, these compounds can be delivered to a specific tumor for BNCT application. After synthesis, the product was characterized by several established techniques designed for nanomaterials. These techniques include elemental analysis, Infrared (IR) spectroscopy, Nuclear Magnetic Resonance (NMR) spectroscopy, Mass spectrometry (MALDI-TOF), Transmission Electron Microscopy (TEM), and Scanning Electron Microscopy (SEM). Boron uptake in the tumor will be evaluated using cancer cell lines by the standard techniques used for biological evaluations, including bio-distribution. If the boron uptake in the tumor cells proves to be in the range of 20-35 micrograms/gram of tumor (the required concentration for effective therapy), then the cell lines will be subjected to BNCT application using the facilities available at Fermi National Laboratory. Depending on the success of in vitro evaluation, the further in vivo BNCT clinical trials will be conducted at Kyoto University Research Reactor Institute (KURRI) in collaboration with the neurosurgeon, Dr. Masao Takagaki, in Japan.
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Sheriff Otun

Reactivity of Thio-bases (thioguanine, thiouracil and thiocytosine) Radical Cations Studied by Ion-Molecule Reactions.

Authors: Sheriff Otum, Michael Lesslie & Andrii Piatkivskyi
Department: Chemistry & Biochemistry
Faculty Mentor: Victor Ryzhov
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

With the use of ion-molecule reactions, the reactivity of radical cation derivatives of thioguanine (ThioG), thiouracil (ThioU) and thiocytosine (ThioC) was studied. The distonic radical cations were generated by nitrosylating the idole nitrogen of the thiobases in solution followed by collision induced dissociation (CID). The radical is initially positioned on the sulfur atom. The formation of the radical cations of thioguanine, thiouracil and thiocytosine was confirmed using mass spectrometry by identifying the mass-to-charge ratio of the radical cations ThioG•+ (m/z 167), ThioU•+ (m/z 128) and ThioC•+ (m/z 127). The reactivity of the radical cations was studied by ion-molecule reaction carried out with allyl iodide.

Christine Tsui

Design of Nanocoatings by ISPR with Metal Components in Use for Enhancing Surface Adhesion and Corrosion Inhibition of Metal Alloys

Authors: Christine Tsui & Kimberly Henderson
Department: Chemistry & Biochemistry
Faculty Mentor: Chhiu-Tsu Lin
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

When a metal reacts with oxygen and water, a redox reaction happens, which will cause corrosion. Current surface pretreatment for inhibiting corrosion is a phosphate conversion bath which generates a phosphate-chromate layer to adhere strongly to a metal substrate and is insoluble to water. However, it is toxic, carcinogenic, high in cost, and unfriendly to the environment. Therefore, our group proposed an innovative pretreatment: ISPR (In-situ Phosphatizing Reagent), which will form a bound phosphate layer on the metal surface acting as a corrosion barrier; moreover, it is low in cost and non-toxic. In this project, the metal alloys that we used are aluminum, magnesium, steel, and titanium. With these choices of metals, we chose aluminum silicate, calcium silicate, magnesium oxide, and zinc oxide to incorporate with ISPR because of the reduction potentials of metals. A more negative reduction potential suggests that a metal is easier to oxidize and is also a better reducing agent. Goals for the project are creating an evenly dispersed coating that has great adhesion and good chemical resistance, and inhibits corrosion while further protecting the sacrificial component of the metal alloy. Methods for analysis are; imaging by SEM (scanning electron microscopy) and TEM (transmission electron microscopy), elemental analysis by EDX (electron dispersive x-ray), and ASTM (American Standard Testing Method) testing through salt spray, cross cut, adhesion, and chemical resistance. Results will be presented during this presentation.

Patrick Wendling

The Modeling of Aging and Inflammation in Bruch's Membrane through Modified Fibronectin and their Effects on ARPE-19 Cells

Authors: Patrick Wendling
Department: Chemistry & Biochemistry
Faculty Mentor: Elizabeth Gaillard & Mai Thao
Research Category: Science, Technology, Engineering, and Math
Judging Time: 9:00-10:15 AM

Age-related macular degeneration (AMD) is the leading cause of irreversible blindness in Western countries. This ocular disease results from the deterioration of the photoreceptors, retinal pigment epithelium (RPE) and Bruch's membrane (BM). The ultimate effect of losing these tissues is central vision loss. Currently, there is no treatment for the development of AMD because the pathogenesis of AMD is complex. In our study, we investigated the effects of modified fibronectin on ARPE-19 cell attachments as model system for aging and inflammation in the BM to better the understanding of AMD development. Fibronectin was modified by blue light mediated A2E damage, glycation and nitration. Bovine Serum Albumin (BSA) was used as negative control and modified under the same conditions. ARPE-19 cells were seeded onto modified protein coated wells and allowed to attach for 30 minutes. The cell attachments on different coated wells were evaluated by MTT assay. More cells grew with the presence of unmodified fibronectin than the BSA and modified versions. This data showed that nitration and glycation had the greatest effect on APRE-19 cell attachment. These results indicated the significance of fibronectin to RPE cell attachment and may play a role in AMD development.
68 Yesenia Valdivia

Sustained Release Ocular Drug Delivery Systems

Authors: Yesenia Valdivia, Devi Kalyan Karumanchi, Dr. Elizabeth Gaillard, Dr. James Dillon
Department: Chemistry
Faculty Mentor: Elizabeth Gaillard
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

Drug delivery to the eye is complicated due to the presence of several ocular barriers. So, there is a need for development of drug delivery systems which would ensure slower drug release and more efficient treatment. After an ocular surgery, it takes around 4-6 months for the eye to regain its natural immunity. In the meantime, the eye is very susceptible to various bacterial and fungal infections, termed endophthalmitis, which ultimately leads to blindness. In order to overcome this problem and attain a sustained release of drugs, we are developing a method for coating ocular medical devices like intraocular lenses and contact lenses with drug encapsulated liposomes. Diabetic Retinopathy (DR) and Age Related Macular Degeneration (AMD) are the most common ocular diseases and a leading cause of blindness in American adults. Laser treatments and drugs like Lucentis and Avastin are available for controlling diabetic retinopathy and wet AMD. These drugs are anti-VEGF antibodies that inhibit the growth of new blood vessels. These new fragile blood vessels are "leaky" and pool blood into the retinal space, damaging the retina further. The antibody injections injected on monthly basis into the eye are very inconvenient and painful as well as very expensive. As an alternative, we are developing liposomal drug delivery systems to encapsulate the anti-VEGF antibodies for sustained release of the protein over a longer period of time.

69 Amber Sarver

Physicochemical Characteristics of Glycated Alpha Crystallin

Authors: Amber Sarver
Department: Chemistry
Faculty Mentor: Elizabeth Gaillard
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Purpose: To investigate the bio-physical biomarkers for the glycolytic modifications in the lens in order to study the accelerated damage caused due to diabetes related eye diseases. Methods: Alpha crystallin was extracted from bovine eye lenses using size exclusion chromatography. Alpha crystallin was glycated using 10 mM methyl glyoxal for 0.5, 1, 3, 6, and 9 hrs. The biophysical changes in the protein were screened using spectroscopic (Fluorescence, and circular dichroism), light scattering (Dynamic Light Scattering, Static Light Scattering and Small Angle X-ray Scattering) experiments. Other techniques like refractometry and UV-vis spectrophotometry were used to determine the physical properties of the protein. Results: From the steady state fluorescence measurements, we have observed a resonance energy transfer between tryptophan and AGEs. Also, with increase in time of glycation, we have observed that the AGEs absorb at wavelengths longer than 340 nm. Small angle X-ray scattering showed the change in inter-particle distances and structural spacing. Dynamic and Static light scattering data indicates an increase in particle size, molecular weight and decrease in protein diffusivity. The refractive index of native alpha crystallin which is close to that of water also changes with glycation. Solubility parameters of the protein change with increase in hydrophobicity. Conclusion: Through our biophysical studies, we have been able to show the molecular, physical and chemical basis for change in the hydrophobicity and hence, flexibility of the lens.

70 Allyssa Vega

Synthesis, Purification and Characterization of Boron Nanoparticles

Authors: Allyssa Vega, Eyrusalam Bedasso
Department: Chemistry
Faculty Mentor: Narayan Hosmane
Research Category: Science, Technology, Engineering, and Math
Judging Time: 9:00-10:15 AM

Boron is the second hardest element following diamond. Potential applications of boron nanoparticles include rocket-propellant mixtures and biomedical applications as boron neutron capture treatment (BNCT). Boron nanoparticles are synthesized through pyrolysis of decaborane. The product was purified with ethyl acetate. The purified boron nanoparticles were characterized by attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR), transmission electron microscopy (TEM), energy dispersive X-ray spectroscopy (EDX). TEM revealed the nanoparticles have an average diameter of 25 nm.
In the developed world, Age-Related Macular Degeneration (AMD) is the leading cause of blindness with very limited treatment options. Lipofuscin is a yellow-brown pigmented compilation of waste products found in all cells throughout the human body. While lipofuscin is found throughout the human body, its composition varies with each type of tissue. The buildup of lipofuscin in the retinal pigment epithelium is considered to be one of the major risk factors of AMD. The purpose of this study is to investigate the chemical composition of human retinal lipofuscin from human donor tissue diagnosed as wet or dry AMD. A Folch extraction is performed in order to extract the organic soluble lipofuscin from human donor tissue diagnosed as wet or dry AMD. The lipofuscin sample is subjected to liquid chromatography tandem mass spectrometry (LC/MS) coupled with a photo diode array (PDA) and a fluorescent detector (Surveyor LC with PDA, Thermo Finngan LCQ Advantage MS, Surveyor FL). Results show there is a clear difference in the total ion current chromatograms observed from LC/MS analysis. This suggests a unique chemical composition for wet and dry AMD diagnosed samples and proposes that wet and dry AMD may be two different diseases. Understanding the chemical composition of AMD can lead to a better understanding of the pathway of the disease along with realizing better treatment options, earlier diagnosis, and prevention.

Boron nitride nanotubes (BNNTs) are structural analogues of carbon nanotubes and considered to be one of the strongest lightweight nanomaterials. There is a large interest in BNNTs because of their unique properties including hydrophobicity, thermally conductive and chemically inert nature. Moreover, BNNTs are also electrical insulators with a high oxidation degradation resistance up to 900°C. Some of the major applications of BNNTs are in radiation shielding, polymer composites, aerospace and biomedical fields. Currently in our laboratories, BNNTs are being synthesized for its application mostly towards the biomedical aspect, boron neutron capture therapy (BNCT). In the past, lack of good synthetic methodology to prepare BNNTs in large scale has hindered its application in a variety of fields including space, energy and medicine. We have successfully developed an improved method of synthesis BBNTs using autoclave pyrolysis technique in large scale. This method avoids usage of expensive equipments and high reaction temperatures. Using this methodology, we have produced boron nitride nanotubes of desired length and diameters. The nanotubes have been characterized by Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), Energy dispersive X-ray Spectroscopy (EDS) and X-ray powder diffraction (XRD) to confirm the purity of the synthesized products.

Eye lens is a dense matrix of closely packed proteins, of which alpha crystallin, a small heat shock protein, is the major component. The lens is avascular and doesn't have any protein turnover throughout the life. The post-translational modifications that occur in the lens are permanent, making it an ideal archive for studying aging. In case of diabetic patients, the lens starts to accumulate advanced glycation end products (AGEs) over a prolonged period of time. These AGEs have a characteristic auto-fluorescence which has been studied extensively as a measure of protein glycation. We measured the fluorescence lifetimes of intact lens using steady state and time resolved fluorescence measurements. Steady state measurements have shown that as time progresses, the AGE fluorophores get excited at wavelengths ranging for UV to visible region. Time resolved fluorescence measurements at excitation wavelength of 340 nm gave us fluorophore lifetimes to be around 0.63, 2.5
and 7.6 ns with varying relative contributions. These lifetimes are extremely sensitive to the local biochemical environments which differ in healthy and diseased tissue. It would also serve as a baseline for discriminating fluorophores triggering auto-fluorescence for the detection of diabetic eye disease. Overall, we are working on screening the eye lens to develop a non-invasive and reliable tool for early detection of diabetes.

74 John Larson

The End of the Whistle Stop Campaign; The Birth of Television Advertising in the 1952 Presidential Election

Authors: John Larson
Department: Communication Studies
Faculty Mentor: Ferald Bryan
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 10:15-11:30 AM

In the 1952 election were two unlikely opponents squaring off against each other: Governor of Illinois, Adlai Stevenson and former General of NATO forces in Europe, Dwight D. Eisenhower. In this election, television became a large part of the campaign for the first time, and each candidate used it differently. Each candidate had their different views on this new media and how they should use it. In addition, this campaign featured the end of the so-called “whistle stop” campaign, which meant fewer visits around the United States, and less initial face-to-face meetings with the candidates. Even though this new media was already known to the US, they had not seen this style of campaigning before, and this addition to the campaign made the election of 1952 particularly interesting. In the case of the 1952 election, if TV advertising was not used in this campaign, could Stevenson have won the election just by making political stump speeches, and could Dwight Eisenhower have won the election solely on his previous war record as the conqueror of Europe?

75 Gina Collura

Title Not Received

Authors: Gina Collura
Department: Communication Studies
Faculty Mentor: Robert Reichle
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

Abstract Not Received

76 Thomas Bouril

Access For All: Higher Education Accessibility for Europeans with Disabilities

Authors: Thomas Bouril
Department: NGO Leadership & Development
Faculty Mentor: Nancy Castle
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

The emergence of the Convention on the Rights of Persons with Disabilities (CRPD) has highlighted a world focus on the rights of the persons with disabilities. This is especially true in Europe, where both the European Union (E.U.) and the Council of Europe released expansive disability action plans. What is the effect of these new frameworks on access to higher education for Europeans with disabilities? An examination of available data revealed that the momentum towards full inclusion had already gathered steam before the creation of these frameworks, making it difficult to identify an exact impact in an exact moment in time. However, the CRPD is having an effect on pushing European countries to achieve a more uniform and stronger standards for improving access to higher education.

77 Katie Birkey

Female Representation in State Legislatures

Authors: Katie Birkey
The percentage of state legislators that are women in 1990, 2000, and 2010 is used to predict the percentages of Americans who are unemployed, in prison, on death row, without a high school diploma, or living in poverty. The results indicate statistically significant relationships with all population groups except prisoners and the unemployed. This suggests that women may play a role in the creation of public policy aimed at alleviating the ills of those on the lower end of the socioeconomic spectrum. Further empirical testing reveals that female state legislators are positively associated with per pupil education expenditures as well as per capita prison expenditures. These findings imply the need for additional research, while lending support to the notion of diversity within representative institutions.

78 Ashley Palin

Changing Your Mind: The Dynamics behind the Acceptance and Rejection of International Judicial Institutions

Authors: Ashley Palin
Department: NGO Leadership & Development
Faculty Mentor: Ben Bingle
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

While these theories have long framed the argument about the independent capabilities of international institutions, the theoretical frameworks have ultimately been proven unable to explain the unique relationship between States and international courts beyond the International Court of Justice. By relying on the realist-liberal divide, previous arguments about international institutions have maintained a large focus on organizations that promote economic and security cooperation. Considering this, it is unsurprising that there has been no successful attempt to identify individual factors that influence a State’s decision to accept or reject international legal institutions, such as the International Criminal Court and modern tribunals. Using a case study analysis focused on both the overt and covert actions of the United States of America in relation to the International Criminal Court, this project attempts to identify such factors. The findings suggest that a variety of national and international influences, including the presence of an independent prosecutor, the view of legal normativity and the level of potential audience costs affect the relationship.

79 Ashley Palin

Bundestag, Menschenrechte, und Ältesten

Authors: Ashley Palin
Department: NGO Leadership & Development
Faculty Mentor: Ben Bingle
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

With the incredibly rapid pace of global population ageing, many nations are failing to adequately respond to the changing social and economic dynamics that accompanies the global “grey ing”. The nation of Germany does not fall into this category, having made an effort to address the shift in demographics through the 2012 Strategy on Demography. In an effort to identify the source of Germany’s success, this project explores whether the broad human rights guarantees encapsulated within the Deutscher Bundestag (German constitution) have translated into a higher quality of life for elderly populations within the current state. To accomplish this task, data from several sources was used to compare the quality of life indicators, including income security, health, and employment/education of persons aged above 60 before and after the reunification of the German state and the concurrent adoption of the modern constitution. The findings suggest that the human rights guarantees encapsulated within the German constitution have yielded positive outcomes for the elderly community, but the impact may not be uniformly consistent, as the effects vary among the quality of life indicators.

80 Jonathan Sanders

Model Selection Based Synapse Detection Using Three Dimensional Confocal Microscopic Images

Authors: Jonathan Sanders
Department: Computer Science
Quantification of synapses is important for studying functions of neuronal systems. Spatial and morphological qualities of synapse arrangement within a neuron can be key indicators of neurological function and health. The use of machine learning principles combined with minimal user interaction can increase the objectivity and reliability of synapse identification compared to manual counting methods. We present a novel computational method for automatically detecting synaptic markers using 3D confocal microscopic images: A discriminative model consisting of 3D descriptors and classifiers chosen by our model selection tool BIOCAT is used to detect synaptic markers efficiently. Many prospective models can be built and compared in order that the most accurate can be used, resulting in a more robust synapse count. Two channel proximity analysis is also applied to the prospective markers. By localizing synaptic markers to regions of the neuron cell body, many extraneous artifacts and false positives can be discarded. Preliminary results on detecting synapses on the axon terminal of a fruit fly neuron are shown to demonstrate the algorithm's effectiveness. Our investigations expanding on these concepts include methods for collecting size and density metrics automatically using the generated synaptic markers. Utilizing connected component analysis guided by synaptic markers generated with these methods, it is possible to automatically segment and quantify individual synaptic regions.

81 John Hood*  
Silencing Others: Censorship around the World  
Authors: John Hood, Danny Hess, Garrett Lee, Nicole Loring, Sara Stephens  
Department: Foreign Languages and Literatures  
Faculty Mentor: Tharaphi Than  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 11:30-12:45 PM

As the final project for an independent study on the censorship of literature offered within the Department of Foreign Languages and Literatures at NIU (FLST 381/481/581), a website on WordPress.com was created. The aim of the site is to provide a resource for others to access information about censorship, such as censorship within various countries, the censorship of certain books, the silencing of authors, as well as common censorship themes researched in this study. While nations and literature from around the globe are explored, the books examined for this study focus mostly on Southeast Asia, with other regions engaged for cross-comparison purposes. Censorship practices in countries such as Burma, China, Cuba, Vietnam, and even the United States are explored. Several works of censored literature are analyzed, with key critical reviews available on the site. Works, such as those by George Orwell, Duong Thu Huong, and Nu Nu Yi, all of whom were the victims of censorship at one time or another are reviewed. This study moves beyond mere literature review, however, into explorations of the social implications of censorship, such as group marginalization and authoritarian political force. Common themes acting as motivation or rationales for censorship, such as classism, sexuality, religion, and pornography are explored in depth through critical analysis. The ultimate goal of the created site is to exist as an ongoing resource about censorship, added to by future students of any discipline studying the interplay between state-sponsored censorship and free expression through literature.

82 Donald Fiore  
Mapping Urban Gardens  
Authors: Donald Fiore  
Department: Geography  
Faculty Mentors: Thomas Pingel & Courtney Gallaher  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 12:45-2:00 PM

In recent years a sizable public interest has grown around the localization of food sources. Policymakers have begun to view urban agriculture as a way of satisfying new consumer demands while gaining a wide-range of additional community benefits. As investments in such programs begin, it is essential to have a complete understanding of the current scope and future potential of urban gardens in our cities. Efforts have been made in the past to map and measure urban agriculture, but these methods have either been incomplete or very costly. The research project “Mapping Urban Gardens” continues the effort by attempting to identify urban agriculture in the Midwest with a slope-based morphological filter on LIDAR data. This filter is developed by matching a geographic dataset of confirmed garden plot locations, through visual analysis of aerial imagery and on-site survey, with its counterpart LIDAR elevation data. Preliminary data collection found no publicly-available aerial imagery or LIDAR data for 7 Midwestern states to be suitable for use in the project due to failures in precision and annual time-period of acquisition. However, the increasing rate and technological improvements of regional LIDAR/Imagery projects indicates the application of this methodology may be possible in the near-future.
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Climate change is expected to alter ecosystems. Understanding how tree species will respond to changes in precipitation and temperature can give an insight into future forest structure. Quercus stellata, or Post Oak, is currently found in the southeastern United States. This study examined tree ring width versus climatic factors such as temperature and precipitation to assess the effect that monthly climate conditions have on tree growth. Tree ring widths were standardized to compensate for larger ring width during early development. Tree ring chronologies from multiple sites across Post Oak’s range were correlated with precipitation and temperature values from nearby weather stations. The statistically significant correlations between tree ring width and climate factors (mean monthly temperature and mean monthly precipitation) were mapped to show the geographic patterns of Post Oak’s sensitivity to the climate factors. Tree ring width was found to be negatively correlated with temperature and positively correlated with precipitation in the western portion of Quercus stellata’s range. In the eastern portion of its range where precipitation is abundant, tree ring width is not strongly correlated. In light of potential climate change this study suggests that Post Oak has an advantage of being more drought resistant than other species, meaning a northward shift is likely into areas where the species is not currently found, with Post Oak growing well where it already exists. In areas where temperature rises, Post Oak could suffer.

After ecosystems are disturbed, it can take a very long time for these habitats to be restored. At Nachusa Grasslands we are monitoring small mammals and their role in the prairie ecosystem and their use in seed predation.

For my project, I examined images of women in post-Nazi Germany, focusing in particular on 1946, directly after the end of the war. I analyzed women’s magazines in order to consider the topics addressed, problems emphasized, and what was deemed important in a German woman’s life at the time. The characteristics I found defined the reader as a woman who is middle class, worried about immediate survival and cleaning up the rubble, concerned with becoming active in politics, interested in new culture, and wanted to learn more about health and beauty. What is striking, is that in the context of politics featured in the magazine, the war, Hitler, the Holocaust and Nazis are rarely discussed. When these topics are mentioned, it is in a detached way as if this had happened to German woman rather than with them. Reflection and the issue of guilt are not a topic. Another remarkable absence concerns men. Relationships and marriage are rarely discussed and beauty tips do not focus on attractiveness, but on how to make a independent woman feel good about herself. This new independent woman reflects the experience of war and the after war period of change and reconstruction. Her concerns are far removed from the female ideal of Nazi Germany or from 1950’s Germany. The image of the German woman emerging from my analysis is unique, and in between two periods in which women were not independent and more focused on pleasing their husbands and properly raising their children.
Natalie Cincotta

Reexamining German Photography: Unofficial and Official Images from the Eastern European Front, 1939-1945

Authors: Natalie Cincotta
Department: History
Faculty Mentor: Heide Fehrenbach
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

The research examines the extent to which Nazi ideology is embodied in photographs taken by German soldiers on the Eastern European Front between 1939 and 1945, and whether this differs between official and unofficial photographers. The critical consultation of visual media as a valid historical source has emerged in the past few decades, although scholars debate what photographs should be utilized for and how they should be analyzed. Some scholars have even argued that such photographs should not be used at all. Do they embody the views of the photographer? Do they evidence Nazi brutality and Jewish suffering? What do they mean for the modern viewer? Typically, scholars have analyzed photographs in general terms, often without distinguishing between different types of photography and photographers. The research will argue against the notion that photographs are unusable, and will instead advocate the complexity of photography in this period by comparing official and unofficial images through both a contextual and a visual lens. This comparative approach will be integral to understanding the development of visual media and its uses in the Nazi period and in modern remembrance of the Holocaust.

Thomas Bouril

Small Town, Big Strike: An Examination of the International Dimensions of the Southern Colorado Coal War of 1913-14 With a Focus on Mother Jones

Authors: Thomas Bouril
Department: History
Faculty Mentor: Rosemary Feurer
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

This research examines the international dimensions of Mother Jones involvement in the Southern Colorado Coal Wars of 1913-1914 and the Ludlow Massacre. The focus will be on Mother Jones' movements and actions in and outside of Colorado. Focus is also given to the international dimensions of the conflict, including the nationality of miners, the involvement of international figures such as Pancho Villa, and the effects of historical events such as the war in the Philippines. The international dimension of one of America's biggest events in labor history will demonstrate that the Ludlow massacre and the Southern Colorado Coal Wars were far than just an isolated event in rural Colorado, but rather a truly global one fueled by differing perceptions of immigrants and different ethnicities.

Ashley Irizarry & Sarah Hall

A Climatology of Tornado Intensity Assessments

Authors: Ashley Irizarry, Sarah Hall
Department: Meteorology
Faculty Mentor: Walker Ashley
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

Previous research employing historical or synthetic tornado paths as tools for estimating potential tornado impacts on developed landscapes has been limited due to the relatively small sample size of detailed, georeferenced tornado intensity assessment data. Recently, an increasing number of significant (EF2+) and violent (EF4+) tornado events have been evaluated and mapped at extremely high resolution from a variety of remotely sensed and post-event in situ sources by both government and private entities; however, these surveys often generate inconsistent spatial measures of tornado strength, even for the same event. This investigation assembles a portfolio of contemporary significant and violent tornado events that contain spatially comprehensive damage and/or wind velocity information from a diverse set of sources. Thereafter, a climatology of both significant and violent tornado intensity evaluations is produced, promoting the generation of synthetic paths with observationally constrained damage length and width metrics by EF scale magnitude. Results from the climatology and collection of synthetic tornado paths are compared to previous assessments, revealing differences in the spatial scale of the overall tornado footprint, as well as by percentage contribution of swaths by EF scale. The synthetic paths generated may be applied to assess impacts on the built environment, populations, and insurance portfolios.
The East Asian summer monsoon (EASM) affects millions of people who depend on the monsoon rain for their livelihood. Since the late 1970s, however, the EASM has experienced a weakening trend, resulting in frequent floods around the Yangtze River and droughts in northern China. For the last two decades, rapid urban development in eastern China has changed physical characteristics of the natural land surfaces—reduced vegetation cover, decreased surface albedo, and increased surface roughness and dryness over urban and suburban regions. This study examines the possibility that such a large-scale alteration of the land surface may have enhanced the weakening of the EASM by influencing the differential heating between the land and the ocean. To investigate these effects, a well-developed regional climate model (RegCM4) was used to conduct a series of simulation experiments with NIU's high-performance computer. The model's land surface module computes surface-atmosphere exchanges in momentum, heat energy, and moisture fluxes over 22 types of land cover/vegetation classes, including urban and suburban. The model incorporates four cumulus parameterization schemes to simulate small-scale convective rainfall, while an explicit moisture scheme was used to simulate large-scale precipitation. The accuracy of each scheme's rainfall production was tested against observations from 160 Chinese weather stations across three separate temporal and spatial domains. The best-performing scheme was utilized for simulations conducted over a 21-year period (1989-2010) with and without urban land-use. The results showed consistent increases in rainfall in SE China during the monsoon season due to urban land-use, while changes in other regions varied with each month.

Electrons can be very useful in material science studies. Due to the particle and wave-like nature of electrons, or particle-wave duality, great amounts of details and information can be gathered from materials. For example, the origin and behavior of magnetic properties in materials such as LaSrMnO3 can be better understood from electron diffraction data and electron energy loss/momentum transfer. The electrons help map the basic crystal structure of the material as well as any changes the material might undergo. This project is a continuation of La0.67Sr0.33MnO3 (LSMO) crystal studies. The primary focus will be utilizing Dark Field (DF) imaging to gain further information on the structure of LSMO such as defects/anomalies within the crystal lattice with applications to YBaCuO (YBCO) superconductors.

The goal of this project is to study the structure of lipid membranes with atomic resolution using x-ray reflectivity. Silicon supported phospholipid membranes are artificial membranes which share some properties of biomembranes found in eukaryotic (plant or animal) cells. By supporting these membranes on a silicon chip they can be oriented to allow them to be studied with standard surface science probes such as x-ray reflectivity. Such membranes can be used to study the thermodynamics of membranes in a more controlled manner than can be done using living cells, or they may even form the basis for creating semiconductor electronics with biological functions, which could perform function such as blood testing to sense pathogens.
The purpose of this project is to analyze nanometer scale oxide structures utilizing a transmission electron microscope (TEM). Thanks to Moore's Law (the doubling of transistors on integrated circuits every two years) and the technological boom of the late twentieth and early twenty-first century, consumer electronics and computer circuitry has been driven to smaller and smaller sizes. Transistors have become so small that the normally negligible effects of Quantum Mechanics are beginning to affect how our classical circuits behave. In order to keep Moore's Law from collapsing, new nano-scale materials and structures need to be analyzed and developed. For our project, we are analyzing transition metal oxides; in particular, the YBa2Cu3O7 high temperature superconductor substituted with Molybdenum. These transition metal oxides are very important for materials physics, they exhibit many properties that are critical to understanding quantum level systems. Such properties include: high temperature superconductivity, ferroelectric and ion conducting properties, as well as possessing levels of high spatial confinement which is critical on such a small scale. Our part of the analysis is to observe the defects and structures of our sample using the transmission electron microscope at NIU, in the hopes of providing information on the roles extended defects have on our sample. After all, be it a person or a thin film transition metal oxide, the defects are what make it interesting to look at.

Extended versions of the Standard Model predict a small rate of neutrinoless muon to electron conversions. If verified, charged lepton flavor violation (CLFV) would point to new physics beyond the Standard Model. With a sensitivity of four orders of magnitude better than previous experiments, the Mu2e experiment at Fermilab will search for muon to electron CLFV processes in the presence of a nucleus. The Mu2e detector is comprised of many components including: particle tracker, calorimeter, stopping target monitor, cosmic ray veto, and proton beam extinction monitors. Researchers at Northern Illinois University constructed extinction monitoring prototypes used to detect and record residual out-of-time protons which could otherwise cause false muon to electron conversion signals. Initial tests of these prototypes were performed both at NIU using radioactive sources and at Fermilab's Test Beam Facility using a 120 GeV proton beam.

Radiation therapy is among the most common treatment for individuals with cancer. The fundamental principle is to direct particles or high energy photons into cancer cells without damaging the surrounding healthy tissue. Preserving the healthy tissue is in fact one of the complications of radiation therapy. High energy photons in the form of x-rays or gamma rays are easy enough to produce and are extremely effective at treating cancerous regions. However, these photons damage everything along their path often damaging healthy tissue more than the malignant. Heavy ion therapy hopes to improve this by substituting protons (or carbon) for high energy photons. The protons are useful for radiation therapy because they deliver the majority of their energy along the end of their path, which is known as the Bragg peak. By positioning the beam of protons such that the ionizing radiation is deposited in the cancerous tissue at the Bragg peak, the healthy tissue experiences much less ionizing radiation. The protons themselves can also be used to image the location of malignancies using a technique called proton computed tomography (pCT). Much like a traditional x-ray CT scan, pCT uses protons to gather information about an area of tissue in lieu of high energy photons. Our part on the project has been assembling and testing the detector including the silicon photo-multipliers sensors and developing the data acquisition software prior to upcoming beam tests at the proton therapy center in DuPage County.
One method of detecting particles is using scintillators. Our experiment consists of sending x-rays to a plastic scintillator, and the energy deposited irradiates light. This light is then detected by a silicon photomultiplier (SiPM), which is directly coupled to the scintillator. The SiPM, operating in Geiger mode, converts the incident photons into an electrical readout for a computer. The goal of this experiment is to develop an efficient method for detecting x-rays.

Serving as an integral component of particle physics, the anomalous magnetic moment of an elementary particle is often used as a precision test of the widely accepted Standard Model. While the theory successfully predicts the magnetic moment of certain particles such as the electron, recent measurements conducted at Brookhaven National Laboratory indicate that the experimental observation of a muon's g-factor deviates from the theoretical value by 3.4 sigma. This unexpected outcome has caused quite a deal of excitement in the particle physics community as the divergent value suggests the possible existence of physical laws beyond the scope of the Standard Model. Seeking to confirm or debunk this possibility, Fermi National Lab will run a higher precision iteration of the Muon g-2 project which will deliver the definitive experimental value of the muon's g-factor on the order of .14ppm. In order to attain this desired level of precision the implementation of a high resolution straw-tube drift chamber will be used as the primary particle tracking source. This cutting-edge particle detector will be subject to a high vacuum environment and certain quality control procedures have been designed in an attempt to minimize the possibility of a critical failure (i.e. contamination of the regulated vacuum environment). Northern Illinois University is involved in this quality control procedure and will oversee the assembly of the straw-tube tracker modules. Creep, leak, resistivity and other tests vital to the assembly of the prototype drift chamber have already been put into action with successful results. One of these methods includes the study of a non-contact method for measuring the tension of the Mylar straw-tubes. By vibrating the straw-tube inside of a known magnetic field with the use of a loudspeaker, the tension of the straw-tube can be approximated by the relationship of the resonant frequency and the set tension. Further collaboration between Fermilab and Northern Illinois University hopes to automate these quality control systems and implement them during the proton test beam run in May of 2014.

In this project, Doniach models of phospholipid membranes were created using the Python programming language. These models will then be compared to experimental data, for comparison purposes. The models used are based on a thermodynamical understanding of cellular membranes. The models account for variables such as temperature, pressure, electrostatic potential, chemical potential, etc. Checking the validity of the current membrane models may allow for improvements in models and the simulations may be of help for predicting sample behaviors.

Electron-bunch Shaping for Coherent Compton Scattering
Producing high-quality x rays could have important applications to high-precision medical imaging and national security. Inverse Compton scattering involving the head-on collision of a relativistic electron bunch with a high-power laser offers a viable path toward the realization of a compact x-ray source. A method consisting in reflecting a short-pulse laser onto a "relativistic mirror" (a moving thin sheet of electrons) has been proposed and recently demonstrated as a way to enhance the back-scattered photon flux by operating in the coherent regime. In this contribution we present particle-in-cell numerical simulations of the inverse Compton scattering process and especially investigate the impact of the laser-pulse and electron-beam distributions that could substantially improve the x-ray production via coherent emission.

Chamali Abeyratne

Development Amid Crisis: Education as an Important Resource to UNHCR Capacity

While the United Nations High Commissioner for Refugees (UNHCR) serves first and foremost as a material provider today, development initiatives are nowhere less aligned to its mission. Just as the UNHCR's scope of involvement expanded from the 1950 Refugee Convention's legal protection to material assistance, as well as from serving refugee populations to now including internally displaced persons, the UNHCR has not lost sight of its mission to best serve populations during flight-inducing conflicts and disasters. This transformation is not without political considerations, and the shift in long-terms solutions from third country resettlement or asylum seeking in the host nation to voluntary repatriation is partially explained by Western biases during the Cold War era. UNHCR educational development aid is capable of improving immediate conditions, not just for youth populations experiencing trauma after leaving home in abrupt and often violent conditions, but also for adult populations through facilitating understanding and consensus in determining long-term solutions. Knowledge of local conditions and efforts to improve those conditions, both for the protected populations and locals in the host country, will allow cooperation versus dependency. If this leads to a consensus and preparation for repatriation then the benefits are obvious, but the revelation of differing wishes should not be feared and learning about local conditions in the country of origin is important to the voluntary nature of repatriation. Educational structures and maintaining an atmosphere of sharing and learning from experiences will improve consciousness and promotion of safety while enabling the agency of the effected populations.

Lewis Hoss

The Role of Religion in Machiavelli's Republicanism

Scholars of Machiavelli have long debated the role of religion in his political thought. Some have argued that he wished to eliminate religion altogether, others that he was admirer of ancient paganism, and still others that he was a God-fearing Christian. This study explores the nature of Machiavelli's religious thought and finds that it is inextricably bound with his republican sympathies. Machiavelli's desire to bring about a republican political society which emulated the virtue of the ancients required a mechanism with which to instill republican virtue in the hearts and minds of citizens – for Machiavelli religion was this ideal mechanism. By closely examining his political writings, it becomes clear that religion is not simply a useful tool in the arsenal of a political founder, but a necessary socio-political order to bring about health and stability in Machiavelli's ideal republic. Not only does Machiavelli portray religion as a necessary component of republican political society, he also shows the specific way in which religion must be implemented in such a society. Political founders must use recourse to religion in the way which Machiavelli uses recourse to ancient sources of authority as he attempts to persuade his audience. Essentially, the founder of a republic must become a profit just as Machiavelli views himself as a profit. This study will explore the role of religion in Machiavelli's republicanism as well as the nature of the profit according to Machiavelli in order to arrive at a complete understanding of his religious thought.
101 Kiranjit Gill

Supreme Court Law Clerks: Whether Political Ideology Affects Future Job Choices

Authors: Kiranjit Gill  
Department: Political Science  
Faculty Mentor: Artemus Ward  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 9:00-10:15 AM

This particular research project focuses on the role of Supreme Court law clerks in an effort to learn more about this exclusive position. The judicial branch is arguably the most secretive of the three branches of government; therefore, any information in the realm of the judiciary is especially difficult to uncover. Each year, approximately thirty-six law clerks are chosen to work for the nine Supreme Court Justices, and they serve for a term of one year. These law clerks are assigned to a justice and work with them on several tasks, which include drafting their opinions. Since, they play a vital role in the Supreme Court, it is important to learn about the people who have held this position. The research conducted on the 2001-2010 terms depicted that political ideology plays a role when Supreme Court law clerks choose their jobs after their clerkship. This research is a continuation and focuses on the terms of 1986-2000 as well as the 2011-2013 terms in an effort to discover whether similar results will appear that show the relationship between political ideology and job choice after the clerkship. The similarities and differences between Justice Rehnquist’s court and Justice Robert's court are also focused upon.

102 Jeanna Ballard

Unwanted Attention: The Determinants of Nuclear Reversal

Authors: Jeanna Ballard  
Department: Political Science  
Faculty Mentor: Robert Brathwaite  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 12:45-2:00 PM

As the Cold War thawed, the international arena did not witness a nuclear arms race of the sort that the policymakers had predicted. Rather, and more interestingly, some states dismantled their nuclear weapons all together. Identifying and understanding factors that lead some states to participate in nuclear reversal while others choose to maintain formidable arsenals will fill a critical gap in our understanding of international relations. In attempt to solve the proliferation puzzle, scholars have focused on material factors associated with security and economic incentives. While these two competing theoretical perspectives offer valuable insight into the nuclear puzzle, they leave behind a glaring gap. I argue that in order to fill this void, normative factors associated with the concept of prestige must be analyzed for impact on nuclear reversal. Therefore, the plan for this paper is to introduce key definitions that clarify normative factors and their application to the selected cases. Next, the variants of realism and the association tied with material and normative factors will be explained via the writings of John Mearsheimer and other elite scholars. The following section will provide an analysis of norms associated particularly with prestige and its impact on nuclear dismantlement. Finally, the cases of nuclear reversal in South Africa, Ukraine, Kazakhstan, and Libya will be examined to determine whether norms associated with prestige supply a sufficient and alternate explanation to why state leader's decided to eliminate their nuclear arms.

103 Susan Richard

Get Out the Vote: Student Engagement with Government Elections On Campus and Off

Authors: Susan Richard  
Department: Political Science  
Faculty Mentor: Artemus Ward  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 10:15-11:30 AM

My research project is centered around students voting habits. The reason that this spikes interest is due to the fact that student voter turnout is very low in our very own student government's elections. I will have a variety of research from previous student voter turnout and show how our university as a whole was different or similar then and why this may hinder or encourage our more recent student voter turnout.
Charles Moore

Scoring Valence Issues: A Cross-National Study of the Netherlands, United Kingdoms, France, and Germany

Authors: Charles Moore, Michael Clark
Department: Political Science
Faculty Mentor: Michael Clark
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

I am researching the effects valence issues have on the electoral outcomes of political parties under the guidance of Dr. Michael Clark from the Political Science department of Northern Illinois University. Valence is typically referred to by economic performance; however my research expands Dr. Clark's study, and continues to define valence by issues that change the voters' perspective of a party based on three criteria: integrity, competency, and unity. My research scores political parties from four countries based on the analysis of news reports taken from the online database Keesing's Record of World Events. The results of my research will be displayed in a poster I am presenting at the Undergraduate Research and Artistry Day, along with a spreadsheet that documents the scores different political parties receive, and provides information on the reports these scores were derived from. The research I've completed notes which scores come from events involving high-ranking political party members, though there has not been a study to determine if valence issues are only relevant if they involve high ranking personnel.

Matthew Green & Marissa Murphy

Musical Performance Anxiety and Implicit Self-Theories

Authors: Matthew Green, Marissa Murphy
Department: Psychology
Faculty Mentor: David Valentiner
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

Musical performance anxiety (MPA) has not received much attention in psychological research. The way anxiety affects the quality of musical performance and the factors that contribute to anxiety during performances warrants investigation. MPA might benefit from an application of metacognitive constructs drawn from mindset theory. Mindset theory—the implicit self-beliefs regarding individual traits—has been applied to academic ability and learning (Erdley & Dweck, 1991). Additionally, mindset theory has been applied to social anxiety (Beer, 2002). The current study examines whether implicit self-beliefs about musical ability and musical performance anxiety predict trait music performance anxiety, performance quality, and anxiety during performances. High school music students (n=109) completed a baseline questionnaire with measures of Implicit Theories of Musical Ability (ITMA) and Implicit Theories of Performance Anxiety (ITPA). Annually, students are given an opportunity to participate in a music competition (March 2014). We hypothesized that ITMA and ITPA would predict performance anxiety and approach behavior, performance quality (judges’ ratings from the competition), and anxiety during the performance. ITPA predicted trait musical performance anxiety (partial r = .50, p < .01), but ITMA did not. Thus far, 54% (n = 60) of the students have signed up for the annual competition. Subsequent analyses will allow for an examination of whether ITMA and ITPA predict performance approach behavior, performance quality, and anxiety during the performance. An application of mindset theory to the musical performance domain may lead to a better understanding of MPA, and identify targets for intervention.

Thomas Bunge

What Makes a Successful Huskie? The Role of Growth Mindset

Authors: Thomas Bunge
Department: Psychology
Faculty Mentor: Amanda Durik
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Some people believe that their basic intelligence can develop (growth mindset), whereas others believe it is fixed (fixed mindset, Dweck, 2007). Past research has shown that growth mindset is associated with students' academic success. People with a growth mindset are willing to put effort toward learning even when they are not confident with their level of performance. In other words, they are more likely to keep trying even when the task is difficult. This project examines the correlation of growth mindset with important outcomes for NIU students such as GPA, effort, and retention. These
correlations are expected to be the strongest when the condition of failure or challenge is present. This project will examine these relationships using survey data (Map-Works) reported by 988 first-year NIU students during the Spring 2013 semester. We will test the relationships between growth mindset and reported academic behaviors, GPA, and their return for the next academic year. If these relationships exist, it may be possible to foster growth mindset in students in order to encourage them to engage in these important behaviors. This project will help the NIU community understand what role mindset plays in student success.

107 Megan Sieg\textsuperscript{H} & Michelle Kaden

*Retrograde Amnesia in a Novel String Pulling Task After Selective Hippocampal Cholinergic Deafferentation*

Authors: Megan Sieg, Michelle Kaden & Jenny Koppen  
Department: Psychology  
Faculty Mentor: Douglas Wallace  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

Loss of hippocampal cholinergic projections is observed early in the progression of Dementia of the Alzheimer’s Type. The hippocampus has been implicated in mnemonic function. For example, rats with hippocampal damage exhibit retrograde amnesia but not anterograde amnesia. The current study investigated the effects of selective hippocampal cholinergic deafferentation on mnemonic function during a string pulling task. Rats were trained to discriminate between two scented strings before surgery; one scent was reinforced, and the other was not. Four weeks after training, half of the rats received a sham surgery, and half received a surgery where a lesion was made selectively targeting cholinergic neurons. The rats were tested two weeks after surgery with the discrimination reversed. Following reversal training, rats were trained on a new discrimination to evaluate the extent of anterograde amnesia. Latency to contact the string and pull the string was calculated for acquisition and reversal training sessions. The results indicate that the rats that received the lesion lost the memory of which scent was reinforced after surgery and did not have to overcome the memory to learn the reversed discrimination. This suggests that cholinergic neurons connected to the hippocampus are involved in memory, and damage to them may cause retrograde amnesia.

108 Ashley Dagner

*Predicting Counterproductive Research Participant Behavior*

Authors: Ashley Dagner  
Department: Psychology  
Faculty Mentor: Larissa Barber  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 10:15-11:30 AM

Counterproductive research participant behaviors (CRPBs) have been little studied in psychology, even though they may have a huge impact on research. Like counterproductive academic behaviors (CABs), CRPBs can include cheating (e.g., participant crosstalk), lying, inattentiveness, and absenteeism. These behaviors can negatively affect any research which uses undergraduate participants. To diminish these problems, personality and integrity tests are administered to job applicants to identify those who are most likely to participate in CWBs. Although explicit measures are most commonly used in this process, research suggests that implicit measures of personality are more reliable and less susceptible to faking than explicit measures. Of these tests, the Conditional Reasoning Test for Aggression (CRT-A) has been shown to predict CWBs and CABs. This study sought to use the CRT-A to predict absenteeism in the classroom and in research session participation. Results from data collected with 163 undergraduate students did not support the primary hypothesis. However, conscientiousness and trait self-control were related to classroom absenteeism. Trait self-control was also associated with unexcused research absences. Future studies using a larger, more diverse sample are suggested to assess the relationship between implicit aggression and absenteeism.

109 Angela Burns\textsuperscript{H}

*Links Between Father Acceptance and Emerging Adults’ Self-Confidence: Socioeconomic Status as a Moderator*

Authors: Angela Burns  
Department: Psychology  
Faculty Mentor: Laura Pittman  
Research Category: Arts, Education, Health, Humanities, and Social Science
Emerging adulthood is a transitional period between the ages of 18-25 where young people become more dependent on themselves rather than their parents in most aspects of life, but often still rely on their parents financially. Emerging adults (EA) have been shown to achieve higher levels of identity when given the opportunity to live independently (Perosa, Perosa, & Tam, 2002), while a lack of autonomy may lead to poor social functioning (Allen, Hauser, O’Connor, & Bell, 2002). Paternal warmth and acceptance, in contrast, is linked to lower anxiety (Reitman & Asseff, 2008) and fewer risk behaviors in EAs (Schwartz et al., 2009). Although fathers’ acceptance has been linked to the psychological functioning of EAs (Reitman & Asseff, 2008), the breadwinner role is often perceived as central to fatherhood (Bryan, 2013). Thus, the present study hypothesizes that socioeconomic status (SES) moderates the associations between fathers’ acceptance and psychological functioning among EAs, such that the association between fathers’ acceptance and their children’s self-worth and scholastic competence is stronger among families with higher SES. A sample of 438, predominantly Caucasian (66%, 10% African American, 9% Hispanic, 8% Asian, and 7% other ethnicities) undergraduate students from a Midwestern university answered survey questions online using well-established measures. Regression models will be run using SPSS to test whether the interaction between SES and fathers’ acceptance is significant. Findings will be discussed within the context of how family SES may influence the psychological functioning of EAs.

110  Sarah Stuebing

**Evaluating the Role of Frontal Cortical Structures in Spatial Orientation during Spontaneous Exploration**

Authors: Sarah Stuebing  
Department: Psychology  
Faculty Mentor: Douglas Wallace  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 9:00-10:15 AM

Humans and rats alike use spatial orientation to navigate within their environments. This process relies on the use of environmental (visual, auditory, olfactory) and self-movement (vestibular, proprioception, optic flow) cues to maintain spatial orientation (Gallistel, 1990). Disruptions in spatial navigation are frequently associated with acute (stroke) and chronic (Dementia of the Alzheimer’s Type) neurological disorders; however, the nature of the processing deficit continues to be debated. Previous work has suggested a role for the prefrontal cortex structures in spatial navigation (Kolb 1984), but specific roles of cortical subregions remain undetermined. The current study uses the organization of rat exploratory behavior under light and dark conditions to investigate the roles of the medial and orbital areas within the frontal cortex in spatial orientation.

111  Rory Johnson

**The Dark Side of Mentoring**

Authors: Rory Johnson  
Department: Psychology  
Faculty Mentor: Lisa Finkelstein  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 11:30-12:45 PM

This project is about negative experiences in mentoring relationships. A mentoring relationship is a relationship between an experienced member of an organization (mentor) and an inexperienced member (protégé) in which the mentor helps prepare or advance the career of the mentee (Kram, 1986). A negative mentorship would be a relationship characterized by dysfunction between the mentor and protégé. Negative mentoring has typically been explored from the just mentor/protégé’s points of view, however not often from both. Some examples of negative mentoring behaviors found in previous research include such things as subservience, benign deception, sabotage, and unwillingness to learn. We used a longitudinal archival data set from a formal mentoring program to investigate both the mentors’ and mentees’ perspectives regarding problems that emerged in the relationship. Further, we looked at whether number of occurrences and types of problems were related to early termination from the program. The data have been coded to categorize examples of negative mentoring behaviors. These data are being analyzed to see if certain patterns of problems that emerged in some mentoring relationships can help us understand better who terminated the mentorships and who continued. In this poster we will reveal the findings to date and discuss the implications for mentoring programs in organizations.
Humans maintain spatial orientation by using both self-movement and environmental cues. Disruption in spatial orientation is frequently observed during the progression of specific neurological disorders. Understanding how spatial orientation changes across the lifespan may provide early markers that neuropathology is developing. Participants were recruited from the community and were classified as either younger (65 or less) or older (greater than 65). Experiment 1 examined group differences in self-movement cue processing. Blindfolded participants sat in a chair and were given 12 trials to use their index finger to search for a small piece of Velcro tape located on the surface of a table. Upon finding the Velcro, participants were instructed to return to the starting point. Experiment 2 examined group differences in environmental cue processing. Participants were given multiple trials to search for a piece of Velcro in a circular well of beads. Initially the location of the Velcro was stable (20 trials), but during subsequent trials, the Velcro changed position every two trials (6 trials). Data collection is ongoing. This work will establish the changes in spatial orientation that occur during healthy aging and will build a foundation for future studies to characterize the effects of neurological disorders on spatial orientation.

A shyness mindset intervention was hypothesized to lead to less maladaptive responses to peer victimization, for those at higher levels of social anxiety and shyness mindset. Prior to being assigned to either a shyness mindset intervention or a control condition (watching a movie), participants (N = 66) completed measures of shyness mindset and social anxiety. To facilitate belief change, participants in the intervention condition wrote a letter summarizing the information (using the “saying is believing” paradigm) to a hypothetical student entering high school. Participants were instructed to include information about the malleability of shyness, neuroscientific evidence of brain plasticity, inspirational videos, and related material. Participants then completed a hypothetical vignette assessment to assess how they would respond to an experience of peer victimization. Participants were reassessed at a one-week follow-up. Hypotheses were tested using multiple regression analyses with interaction effects. Control variables included: Condition (intervention versus control), Social Anxiety, Shyness Mindset, and the three two-way interactions between these variables. Then, the effect of the three-way interaction (i.e., Condition X Social Anxiety X Shyness Mindset) was examined to test whether the intervention would be beneficial to individuals with high initial levels of both social anxiety and shyness mindset; it was. At high levels of both social anxiety and shyness mindset, the intervention led to reductions less maladaptive responses to peer victimization. At one-week follow-up, similar results were found. The shyness mindset intervention appears to be beneficial, but only for individuals who report both high social anxiety and a fixed shyness mindset.

High quality sleep is vital for general health and well being. With inadequate sleep or sleep disturbance, individuals are at a higher risk for a host of negative outcomes, including overweight or obese status in life (Hasler et al., 2004), internalizing disorders (Wong, Brower, Fitzgerald, & Zucker, 2004), and lower quality of life (Tzischinsky & Shochat, 2011). However, little is known about the factors which influence sleep patterns and behavior, particularly in early childhood. Focusing on predictors of sleep early in life may prevent the extreme costs associated with outcomes of problematic sleep (e.g., medical
costs associated with obesity-related diseases). This project aimed to identify early predictors of sleep problems in children 18 months of age. Participants in this study include toddlers and their mothers enrolled in a larger, longitudinal study from a rural Midwestern area. It was anticipated that infant temperament, specifically negative affectivity and orienting/regulation, would be positively associated with toddler sleep problems, and maternal parenting practices, in particular negative and intrusive parenting, would be positively associated with maternal-reported sleep problems. Results indicated that maternal negative affect/behavior is a significant predictor of problematic sleep at 18 months. The results of this study demonstrate the importance of parenting behaviors for young children's sleep behavior.

115  **Anthony Corbo & Chase Wessman**

*The Effects of Document Order and Scenario on Writing Summaries*

Authors: Anthony Corbo, Chase Wessman  
Department: Psychology  
Faculty Mentors: Keith Millis, Katja Wiemer & David Boveri  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 12:45-2:00 PM

Readers focus on information that is relevant to their goals (McCrudden, et al., 2006). This can be reflected in summaries they write after reading (Dunlosky, et al., 2013). Reading goals can be changed by relevancy instructions, such as adopting a particular perspective (McCrudden, et al., 2005). Changing relevancy, therefore, should alter the content of summaries. The current study aimed to discover what readers find relevant to include in summaries while reading historical documents. Participants read documents dealing with the Indian Uprising of 1857 that varied in the order that the texts were presented, the number of authors, and whether a fictional scenario was incorporated. The participants were asked to read these documents and write summaries containing the information they found important to the uprising as a whole. Information in the summaries was analyzed based on whether it was relevant to the main goal of integrating across documents versus the information that is only important to the individual texts. The results of this study seem to suggest that fictional scenarios and the order of documents increase the amount of situation-relevant information included in the summaries.

116  **Maria Senf**

*Sleep and Boundary Management Around Technology Use*

Authors: Maria Senf  
Department: Psychology  
Faculty Mentor: Larissa Barber  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 11:30-12:45 PM

Compared to the general population, college students have poorer sleep habits, which also tend to negatively affect their academic performance. Research suggests that part of this issue is due to technology use patterns, such as text messaging. Given this context, it is important for students to manage the use of technology to protect their sleep time. This study will examine the efficacy of an educational training session regarding more boundary creation and less technology use around bedtime. After completing pretest measures on technology use around bedtime, sleep variables (quality and duration) and academic/social burnout, participants will be randomly assigned to receive the educational training session on sleep and technology use (experimental group) or not (control group). All participants will then be given an actigraph to measure objective sleep for one week after the pretest session. The actigraph will measure the duration of sleep (total sleep time) as well as the quality of sleep (number of awakenings) each night over a period of one week. At the end of one week, participants will return to the laboratory to complete posttest measures (same as pretest). My expected results for this project are that people in the training session (experimental group) will change their technology use habits in comparison to people in the control group, which will have a positive impact on sleep and academic/social burnout. Helping students manage technology use in college can set them up to succeed in a workforce that is becoming more reliant on technology use.

117  **Alex Moy**

*The Effects of Task Difficulty and Extraversion on Performance with an Attentive Audience*

Authors: Alex Moy  
Department: Psychology  
Faculty Mentor: Patricia Wallace  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 10:15-11:30 AM
Department of Psychology

At Northern Illinois University, the Department of Psychology provides a vibrant and exciting atmosphere in which students can develop and train as a psychologist. NIU undergraduates can pursue a B.A. or B.S. degree or can minor in Psychology.

Students within the Department of Psychology can gain experience working alongside talented faculty. Students are able to complete an independent study, present research at the annual NIU Psychology Undergraduate Research Conference, or volunteer in a faculty led laboratory.

The Department has over 30 full-time, Ph.D. faculty members whose research interests span from clinical to cognitive and instructional psychology. The Department also houses a wide array of technology used in conducting psychological research.

For more information:
Department of Psychology
Northern Illinois University
Psychology-Computer Science Building, Room 400
niu.edu/psyc
(815) 753 - 0372
The presence of others may increase arousal within a person performing a task. This arousal increases the likelihood of a dominant response. Social facilitation occurs during an easy or well learned task when the dominant response is beneficial. Social inhibition occurs during a difficult or novel task when the dominant response is disadvantageous. Internal arousal may also be related to the personality trait of extraversion. People high in extraversion tend to have a lower internal baseline arousal level and thus seek out more external stimuli than those low in extraversion. The purpose of the current study is to test the relationship between level of extraversion and the social context effects of social facilitation and social inhibition. Participants (undergraduate students in an introductory psychology course) complete one easy and one difficult maze either in the presence of another student (paired) or alone. They or their partner records the latency to completion for each maze. Participants then answer a demographic and Big 5 Personality Trait survey. It is hypothesized that participants who score high on the extraversion scale of the personality survey will experience less social facilitation and inhibition compared to those who score lower on extraversion. Specifically, the high extraversion group should show less of a change in completion time from alone to paired condition with both mazes, as compared to the low extraversion group. It is also hypothesized that change in completion time between social conditions will be negatively correlated with level of extraversion. Data collection is ongoing.

118  **Tom Dwyer & Mike Lukaszczyk**

*Understanding Understanding*

Authors: Tom Dwyer, Mike Lukaszczyk  
Department: Psychology  
Faculty Mentors Anne Britt & Patricia Wallace  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 12:45-2:00 PM

The ability to read and comprehend expository texts is important in almost every aspect of life. Unfortunately, many students have difficulty extracting the meaningful information presented. Research is underway to test the effectiveness of a brief tutorial to enhance students’ ability to integrate information across documents in order to create a coherent causal model of a scientific phenomenon. Participants from an introductory psychology class are being randomly assigned to either receive a task-model tutorial or receive a control tutorial on components of literature. The task-model tutorial is designed to help students create an accurate representation of the task of creating a causal model of a scientific explanation. Following the tutorial, all participants are given 5 short documents, each of which contains information about a natural scientific process. Using the set of documents, participants are asked to complete a writing task in which they write an essay explaining the process described in the documents. No single document provides the answer; therefore, integration across documents is required. Participants are then asked to complete short answer, multiple choice, and evaluation items without the aid of the documents. Responses are scored for the completeness of the causal explanation provided in the essay and for accuracy on the short answer, multiple choice, and model evaluation items. It is hypothesized that the participants receiving the task-model tutorial will provide more complete and accurate responses compared to the control participants. Data collection is ongoing.

119  **Nicole Bowker, Juan Tapia, Arturo Zamorano, Jane Neal, & Lillian Asiala**

*Causal Connectives Influence Evaluations of Scientific Explanations*

Authors: Nicole Bowker, Juan Tapia, Arturo Zamorano, Jane Neal, Giselle Sanroman, Lillian Asiala  
Department: Psychology  
Faculty Mentor: Katja Weimer  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 9:00-10:15 AM

The connective “because” implies a causal relationship, and suggests that an explanation will follow. Research suggests that we do not always closely evaluate a reason as long as “because” is present (Langer et al., 1979). We present four experiments that evaluated the effect of “because” on perceptions of explanation quality. In all experiments, participants read 24 descriptions of scientific phenomena, followed by a “why” question and an answer addressing this question. Answers all contained true information drawn from the texts, but varied in terms of causal relevance (good explanations: relevant; fake explanations: sound relevant but are not; bad explanations: irrelevant). We also manipulated whether the connective “because” was used. The first two studies revealed that the presence of a causal connective significantly improved evaluations of explanations, regardless of the type of explanation, and that good explanations were evaluated higher by participants than bad ones. Two further studies, replicate the findings from the previous two experiments, further assessed the mechanisms behind the evaluations through a memory test of the explanations. The use of “because” did not reduce memory, suggesting that the answers were not processed less deeply. The fourth experiment further showed that replacing “because” by the ambivalent connective “when” lowered the effects of the connective on the evaluation of the explanations. The results overall suggest that causal connectives validate a provided explanation. A possible explanation is that the causal connective creates or strengthens a causal link in the reader’s mind between the phrases of the answer.
Barbara Ohata

**Effects of Vestibular Pathology on Spatial Orientation in Mice**

Authors: Barbara Ohata  
Department: Psychology  
Faculty Mentor: Douglas Wallace  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 11:30-12:45 PM

Multiple neurodegenerative disorders have spatial disorientation components. Investigating the information processing associated with spatial orientation may help us to understand the disease progression in these disorders. Although much is known about vestibular function, little is currently well understood about the role it plays in tasks involving spatial orientation. In an effort to understand the relationship between spatial orientation and vestibular system function, the tilted mouse was chosen for this study. The defect in the tilted mouse is that there is almost complete absence of otoconia in the vestibular system. Accuracy of homing behavior was examined in tilted (n=4) and wild type (n=4) mice on the dark probe of the food-hoarding paradigm. Each mouse was released individually from its home base onto a flat, circular area to forage for a previously placed food pellet after which the mouse returned with the pellet to its home base. The Peak Modus motion capture system was used to characterize the topographic and kinematic aspects of food hoarding behavior. The outbound segment of each trip began at the home base, and continued until the pellet was located; from that point, the trip back to the home base represented the homeward segment. Behavior of the tilted mice did not differ from the control group on the outbound segment. The return segments of the control group of mice were direct, but the tilted mice exhibited non-direct returns to the refuge. These results demonstrate that vestibular function contributes to spatial orientation. This may provide an important key to the early progression of neurodegenerative disorders.

Robert Fite & Curtis Krueger

**Testing the Convergence of Interview and Rating Scale Measures of Individual Interest**

Authors: Robert Fite, Curtis Krueger, Sarah Coley, Dr. Amanda Durik  
Department: Psychology  
Faculty Mentor: Amanda Durik  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 12:45-2:00 PM

Individual interest refers to a tendency of a person to engage repeatedly in particular domain content because of the personal value they ascribe to the domain (Hidi & Renninger, 2006; Schiefele, 1991). Individual interest is measured using interviews or rating scales; however, researchers rarely use both methods, so it is unclear whether results drawn from each method are comparable. This study tested the overlap between rating scale and interview-based measures of individual interest. Moreover, we tested how each predicted free exploration of domain content as a behavioral measure of interest. The sample included 139 (66% women) students from introductory psychology classes at Northern Illinois University. Visual arts was the focal domain to which participants responses to five structured interview questions were coded consistent with theory (Renninger & Su, 2011). Several rating scales asked participants to assess their individual interest in visual arts using a 7-point scale. After completing both measures (counterbalanced), participants read a passage related to visual arts and were then invited to explore sets of artwork on the computer. The results revealed a strong positive correlation between individual interest measured by rating scales and individual interest measured by interviews. Furthermore, participants who had higher levels of individual interest were more likely to explore artwork when given the opportunity to do so at the end of the session. The results of this study indicate that research in which interview-based measures are used to assess individual interest may be comparable to research in which rating scale measures are used.

Ashley Sands

**Grandfather-Young Adult Relationships**

Authors: Ashley Sands  
Department: Psychology  
Faculty Mentor: Laura Pittman  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 10:15-11:30 AM

Research has shown that grandparents can be an important influence on the lives of their grandchildren (Dunifon, 2013). Much research has focused on the grandchild-grandmother relationship but very few studies have considered the grandchild-
grandfather relationship. The purpose of this project is to understand the factors that influence the development of a positive grandchild-grandfather relationship. The following factors will be explored: whether there is a difference between the maternal and paternal grandchild-grandfather relationship and whether family socioeconomic status (SES), child gender, parent-grandchild relationship quality, and level of contact during childhood influences the quality of the late adolescent grandchild-grandfather relationship. In a completed study of late adolescent college students, 537 participants (58% female, 62% Caucasian) completed online questionnaires regarding the quality of their relationship with their living grandfathers (n = 295 maternal grandfathers, n = 210 paternal grandfathers), how much contact they had with their grandfathers while growing up, and demographic information about themselves and their families. T-tests and correlations will examine the associations between the quality of the grandchild-grandfather relationship and participants’ gender, family SES, type of grandfather, and level of contact with grandfather during childhood.

123 Nalini Jadia & Matt Woodbury

Social Isolation, Depression and Physical Activity in an Animal Model

Social isolation has adverse effects on mental health contributing to depression and anxiety. These can lead to cardiovascular problems and other health issues. However, regular physical exercise may reduce the consequences of social stress. Prairie voles are a useful animal model to investigate this, as they display human-like social behaviors. Unlike other rodents, prairie voles are socially monogamous and raise offspring together. In the present study, we hypothesized that animals with access to physical exercise would exhibit fewer depressive behaviors, and lower levels of the stress hormone corticosterone. 22 adult female prairie voles were isolated for 4 weeks. During the last two weeks, all animals were exposed to chronic unpredictable mild stressors, such as strobe light or white noise. During this time, half of the animals were allowed access to a running wheel and half remained sedentary. All animals were then introduced to a 5-minute swim test, an index of depressive behavior in rodents, after which plasma was collected. The results indicate that animals with access to a running wheel exhibited fewer depressive behaviors during the swim test versus sedentary animals, as well as lower levels of corticosterone. Furthermore, animals that exercised a moderate amount showed the lowest levels of depressive behaviors and hormone levels when compared to all others. This study suggests that physical exercise may protect against the effects of social stress, and that moderate exercise may confer the greatest benefit. Further research will enhance our understanding of the benefits of exercise on emotional and physical health.

124 Garret Hall, Julia Berg, Jessica Brinson, Angelika Charczuk, John Dunn, Lauren Graham, Caela Hinkle & Ashley Kooiker

Bullying of a Sexual or Homophobic Nature: Gender Differences and Relations to Outcomes

Homophobic and sexual bullying has been studied in adolescents, but rarely in young adults at the college level. Past studies have shown that gender plays an important role in bullying of this nature. Young men experience and perpetrate bullying of a homophobic nature more than young women. Additionally, young women experience bullying of a sexual nature more than young men. Though 44% of harassers thought bullying of a sexual or homophobic nature was no big deal, and 39% were trying to be funny, it has been shown that victims of bullying of this nature are at a higher risk for emotional and behavior problems (Hill, 2011). The goals of the current study were to extend this research by examining the prevalence of homophobic and sexual bullying and victimization in a college sample and investigate the social-emotional outcomes for victims of this type of bullying. Participants were 283 college students aged 18-25, enrolled in an Introduction to Psychology course at a Midwestern university. The sample included 149 females (56.2%) and 123 (43.5) males. Self-report data were obtained using the College Self-Report form of the Behavior Assessment System for Children (BASC-2-COL), The Homophobic Bullying Inventory (HBI), the Homophobic Content Agent Target (HCAT) and a measure assessing Sexual Bullying and Victimization. Results were consistent with previous literature. For example, men reported engaging in more homophobic bullying and victimization than women, whereas women reported higher levels of sexual victimization. Relationships between victimization and social-emotional outcomes will be examined and discussed.
125 Megan Pieterick

Relations among Hoarding Symptoms, Posttraumatic Stress Symptoms, and Confidence in Memory

Authors: Megan Pieterick, Arielle Rogers
Department: Psychology
Faculty Mentor: Kevin Wu
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

Hoarding was previously thought to be a subtype of obsessive-compulsive disorder (OCD), but now is recognized as its own condition. Hoarding Disorder (HD) is characterized by difficulty discarding possessions, which results in substantial clutter, distress, and functional impairment (American Psychiatric Association, 2013). Several factors are proposed to play a role in the development and maintenance of hoarding symptoms, including the experience of stressful or traumatic life events and poor confidence in one's memory. Specifically, individuals with clinically elevated levels of hoarding symptoms report significantly greater incidence of traumatic events and poorer memory confidence than controls, including individuals with OCD (Hartl et al., 2004; Landau et al., 2011). Research also indicates that memory confidence is associated with the experience of traumatic events and posttraumatic stress symptoms (Kindt & van den Hout, 2003). The major goal of this project is to clarify relations among hoarding, traumatic events, and memory confidence. To do this, undergraduate students (N = 85) will complete a variety of questionnaires regarding demographics, hoarding symptoms, traumatic events, and memory confidence. Main hypotheses are that (1) individuals who have experienced a traumatic event will endorse more hoarding symptoms, and less memory confidence than individuals who have not and (2) memory confidence will partially explain associations between traumatic events and hoarding symptoms. Data collection for this project is underway and analyzed results will be presented during the Undergraduate Research and Artistry Day.

126 Alexandra Thelan, Natalie Ckuj, Kirsten Smythe, & Giulia Zanini

A Literature Review of Proposed and Actual Changes to DSM-5 Across Multiple Disorders

Authors: Alexandra Thelan, Natalie Ckuj, Kirsten Smythe, Giulia Zanini
Department: Psychology
Faculty Mentor: Kevin Wu
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 10:15-11:30 AM

Four students worked collaboratively on a research poster as part of an in-course Honors Contract for PSYC 316 (Psychopathology). Each student chose a different domain/disorder to research, focusing on the changes that have happened within the disorders history in the Diagnostic and Statistical Manual of Mental Disorders (DSM). Its most recent publication (DSM-5) in July 2013 served as inspiration for this project. Information primarily was obtained from a literature review of published empirical and review articles, and the DSM-5 itself. After discussing the information in twice-monthly meetings, the information was compiled into a poster completed in Fall 2013 and presented at the Psychology Undergraduate Research Day. The poster contains one quadrant for each students analysis. The domains/disorders represented in the poster are: Antisocial Personality Disorder (Alexandra Thelan), Panic Disorder/Agoraphobia (Natalie Ckuj), Eating Disorders (Kirsten Smythe), and Aspergers Disorder (Giulia Zanini). The goal of this experience was to learn about a specific domain/disorder in more depth than is possible in a traditional classroom setting, focusing on its evolution over time and implications of any recent changes. Group work was chosen to enhance learning through discussion with other students and the faculty mentor. Each student was responsible for preparing her own portion, which encouraged equal contribution from all collaborators.

127 Alison Krauss

It's Just a Game: Aggressive Motives in Parents at Risk for Child Physical Abuse

Authors: Alison Krauss, Michael Wagner, Ellen Lee
Department: Psychology
Faculty Mentor: Julie Crouch
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

The present study examined whether child physical abuse (CPA) risk is associated with attributions of aggressive motives to either self or others. To examine this question, we asked 157 general population parents (91 low CPA risk and 66 high CPA risk) to participate in a competitive reaction time game in which parents were led to believe that they were competing against a child (i.e., a fifth grader). Parents were randomly assigned to one of two win/loss conditions: a 50% loss condition or an 80% loss condition. After the game, parents were asked to complete a self-report questionnaire regarding their use (as well as
the child opponent's use) of aggressive motives during the game. As expected, high CPA risk parents (compared to low CPA risk parents) attributed more aggressive motives to the child opponent. In addition, high CPA risk parents (compared to low CPA risk parents) reported using more aggressive motives. The win/loss condition did not significantly impact self/other aggressive motives scores. These findings suggest that high CPA risk parents are more likely to attribute aggressive motives to children, as well as use more aggressive motives themselves, when playing competitive games. Additional research is needed to examine the extent to which this pattern of findings generalizes to other parenting contexts (e.g., discipline challenges, teaching interactions).

128 Guadalupe Lopez

**Psychological Well-Being of Undocumented Students**

Authors: Guadalupe Lopez  
Department: Psychology  
Faculty Mentor: Laura Pittman  
Research Category: Arts, Education, Health, Humanities, and Social Science  
Judging Time: 12:45-2:00 PM

While economic and legal constraints are the most commonly discussed outcomes of an undocumented immigration status, there is a lack of research done on their mental health. This present study examined how undocumented college students' mental health is influenced by their undocumented immigraons status, and how the broader context may impact their psychological well-being. Through qualitative interviews, the psychological responses of undocumented students exposed to two different political/cultural environments were examined. Participants were 20 undocumented students from California (64% women, n=11) and Illinois (56% women, n=9). Participants answered questions regarding their identification with their heritage culture and the mainstream culture. Sample items included "How well do you feel that you fit into your heritage culture?" and "How well do you feel that you fit into the mainstream American culture?" Participant's psychological well-being was measured by asking questions adapted from the subscales of The Ryff Scales of Psychological Well-Being (Ryff, & Keyes, 1995). Findings indicated that overall participants felt that their immigration status had greatly impacted how they viewed themselves, their relationships with others, how much control they had of their surrounding environment, and their purpose of life. The findings of this study will aid mental health professionals on working with undocumented students in a clinical setting.

129 Brett Peters, MacKenzie Dralle & Kaitlyn Fritz

**Fairness Perceptions of Accommodations: Does Disability Status Matter?**

Authors: Brett Peters, Dr. Santuzzi, Amille Heneghan, MacKenzie Dralle, Kaitlyn Fritz  
Department: Psychology  
Faculty Mentor: Alecia Santuzzi & Camille Heneghan  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

Policies and procedures affecting the workplace (e.g., The Americans with Disabilities Act, 1990) highlight the importance of providing adequate accommodations to those with qualifying physical or mental disabilities. However, individuals who do and do not have disabilities may not agree on the appropriate level of accommodation to ensure accessibility. In an initial study, we examined perceptions of fairness with regard to disability accommodations and their accessibility. We also examined whether adults who report having or not having a disability agree in their perceptions of accommodation use. Adults who self-reported having a disability (n=148) and not having a disability (n=105) completed a web-based survey via StudyResponse. Participants reported their disability status and indicated their agreement with a series of statements on a 1(strongly disagree) to 6 (strongly agree) response scale. For example, "In general, non-disabled people think that the accommodations for those with disabilities give them an unfair advantage." Independent samples t-tests suggested that, compared to individuals who reported disabilities, non-disabled adults more readily believed that there are ample accommodations for individuals with disabilities in a variety of environments (e.g., transportation, employment, and housing). However despite these findings, relative to non-disabled adults, adults with disabilities more readily perceived these accommodations to be an unfair advantage. As organizations make decisions regarding the availability and use of accommodations, they should be aware of how fairness perceptions differ between both current and potential employees.

130 Hayley Love

**Parent-Child Conflict about Peers and Adolescents' Social Adjustment**

Authors: Hayley Love, Haeli Gerardy  
Department: Psychology  
Faculty Mentor: Nina Mounts
This study investigated mother-child conflict about peers and adolescents' social functioning. Data were taken from a larger investigation on parenting and peer relationships. There were 73 relatively ethnically diverse (54.8% Caucasian, 26% African American, 15.1% Hispanic, 26% multiracial) mother-adolescent pairs (37 males, Mage = 12.34). Parent-child conflict about peers was assessed using the Conflict about Peers questionnaire (Mounts, 2007). Adolescents' reports of friendship quality were assessed using the Friendship Quality Questionnaire (Parker & Asher, 1993). Social behaviors were assessed using a revised version (Gerardy, Mounts, & Luckner, 2013) of the Children's Social Behavior Scale–Self Report (Crick & Grotpeter, 1995). A 2 (reporter) × 2 (gender) mixed method ANOVA tested for gender and reporter (mother versus adolescent) differences in conflict. There were no significant differences. Bivariate correlations examined relationships between mothers' and adolescents' reports of conflict about peers, adolescents' social behaviors, and adolescents' reports of friendship quality. Mothers' and adolescents' reports of conflict about peers were positively correlated. Higher conflict about peers was generally related to higher levels of social maladjustment (but also positive friendship quality), especially regarding mothers' reports. Separate regression analyses examined relations between mother-reported conflict, adolescent gender, and adolescent-reported social outcomes. Significant two-way interactions between gender and conflict regarding positive friendship quality, prosocial behavior, and inclusion emerged. For girls, higher mother-child conflict about peers was associated with lower levels of social inclusion and prosocial behavior. For boys, higher mother-child conflict about peers was associated with higher levels of social inclusion, prosocial behavior, and positive friendship quality.

131  Abraham Preciado, Michael Samolis, Tyler Wrenn, Mercedes McWaters, Eden Anderson, & Leslie Matuszewich

Can Goal- and Sign-Tracking Predict Performance of Adult Rats in the Water Maze?

Authors: Abraham Preciado, Michael Samolis, Tyler Wrenn, Mercedes McWaters, Eden Anderson, Leslie Matuszewich
Department: Psychology
Faculty Mentor: Leslie Matuszewich
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 9:00-10:15 AM

Understanding individual differences in learning is crucial to create an optimal school environment. Rats also show differences in learning that can be characterized in operant boxes through autoshaping. Rats can be categorized into “goal-trackers” that primarily show behaviors related to approaching a food cup or “sign-trackers” that primarily show behaviors related to approaching the cue (lever) that indicates food is coming. The purpose of the study was to determine whether adult male rats with different tracking affinities showed differences in learning curves, reference memory, working memory and swimming ability in the Morris water maze. The acquisition phase of the water maze consisted of five days (4 trials per day) of training the rat to swim to a fixed, hidden platform location. A probe trial was conducted to test reference memory without the platform present. Matching-to-place trials tested working memory by moving the platform to a novel location every day. Lastly, a visible platform test was done to test overall swimming ability when the goal (platform) is visible. It is hypothesized that sign-trackers are more likely to respond to cues in their environment, suggesting better acquisition, probe scores and matching-to-place trials. During visible platform, goal-trackers may perform better because the goal is no longer hidden below the water level. The ability to understand how cues and goals may influence individuals differently is important to help understand diverse learning styles.

132  Kathryn Rupp

Goal-Driven Reading of Explanations

Authors: Kathryn Rupp
Department: Psychology
Faculty Mentors: Anne Britt & Patricia Wallace
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Prior research has shown that after reading scientific texts, readers are not very accurate at summarizing and reporting the process that they just read. In an attempt to enhance engagement, some expository texts contain seductive (extraneous) details; however, such details are often difficult for students to ignore (the seductive details effect). In fact, the seductive details can actually interfere with the learning of the important scientific information they were intended to enhance. We created a tutorial to inform students about the purpose and structure of scientific explanations (task model) and tested whether such knowledge could help them more actively guide their reading of the text. Therefore, we predict that a group receiving this task model tutorial will produce a more complete summary of a scientific explanation presented in single expository text and fewer seductive details than those who receive a control tutorial (focused on content in literature). The study involves a 2 (Tutorial) × 2 (Seductive Details) between participants experimental design. University students are randomly assigned to each of the
four conditions. The tutorial manipulation involves the presence of either the task model tutorial or the control tutorial prior to writing an explanation essay based on a science text, and the seductive details manipulation involves the presence or absence of seductive details in that text. Data collection is ongoing.

133  Jason Shirar

Binge Drinking Haze and a long-term Daze: How Heavy Drinking is Associated with Troubled Wayfinding

Authors: Jason Shirar, Molly Parker, Phil Blankenship, Ashley Blackwell, Douglas Wallace
Department: Psychology
Faculty Mentor: Douglas Wallace
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

There is evidence that binge drinking has a detrimental effect on the hippocampus, and by extension on spatial orientation. Traditional assessments of spatial orientation fail to dissociate between environmental cues and self-movement cues. The current study investigated spatial orientation deficits in relation to binge drinking in manipulatory scale spatial tasks. Introduction to Psychology students were screened for binge drinking behaviors with the World Health Organization's (WHO) Alcohol Use Disorders Identification Test (AUDIT). Students were subsequently categorized into two groups as determined by drinking habits, binge and non-binge drinkers. Experiment one examined the effectiveness of self-movement cues among participants. For this experiment, participants were blindfolded as they searched a flat smooth environment with their hands for an objective, and subsequently were required to return to their points of origin. Binge drinkers exhibited self-movement cue deficits through increased error in ballistic movement towards points of origins, especially in trials requiring high levels of circuity to find the objective in the environment. Experiment two examined participants' ability to use environmental cues to guide movement. Experiment two required participants to search with their hands for an objective through a maze of beads which obscure their ability to see the objective, so that environmental cues may be used to determine patterns. Binge drinkers exhibited a deficit in environmental cue usage early in training; however, group differences were not observed as testing progressed. These observations are evidence that binge drinking is associated with performance impairments consistent with disruption in hippocampal function, which is necessary for spatial navigation and determining an accurate heading. These results establish a foundation for future research investigating whether these impairments remain despite subsequent changes in drinking behavior.

134  Aidan OsterbyH, Joe Magliano, & Jim Clinton

The Effect of Agency on Spatial Perspective Taking

Authors: Aidan Osterby, Jim Clinton, Joe Magliano
Department: Psychology
Faculty Mentor: Joseph Magliano
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 10:15-11:30 AM

People can spontaneously adopt the spatial perspectives of others (i.e., understand that their spatial orientation can differ from others) when they see others acting on the world around them, a process known as spatial perspective taking. However, it remains unknown whether spatial perspective taking can occur in response to socially interacting with someone. Two experiments were conducted to determine whether or not we engage in spatial perspective taking when expecting social interactions. Participants will view pictures that depict two objects, and the task will be to determine the relationship of one object to the other (e.g., to the right of, to the left of). The presence of a person between the two objects and the nature of how that person interacts with the objects and the participant will be manipulated. If participants described the objects using language such as, "to the left of," this will indicate that participants adopted the spatial perspective of the person in the picture. If they describe the objects using language such as, "to the right of," then this indicates an egocentric perspective (i.e., participant-centric). Experiment 1 will replicate Tversky & Hard (2009) that demonstrated that spatial perspective taking occurs when another person initiates an action on an object. In Experiment 2, participants viewed films containing two objects and presence of a person and the extent that he interacted with an object and participants was systematically varied. This project contributes to our understanding of how we understand the nature of spatial environments in which social interactions take place.

135  Bryce Sommer

Improving Scientific Essay Writing Through Task Model Construction

Authors: Bryce Sommer
Department: Psychology
Though it is an integral aspect of many university curricula, strategies for integrating texts—especially scientific texts—may not be adequately taught. As a result, students may have a difficult time accurately identifying and communicating meaningful information in scientific research. In the past we developed a tutor that aimed to instruct students on how to appropriately summarize scientific texts. The current study sought to develop a tutor that teaches students how to integrate information from across multiple documents in order to answer essay questions; a task that students often struggle with. Participants consist of 2 sections of an upper level psychology course at NIU who either receive a tutorial that instructs them on how to effectively answer essay questions or are assigned to read a textbook chapter that is unrelated to the study. Participants are then asked to answer three essay questions about 3 empirical articles they have previously read for class. Responses are assessed using a rubric that probes for the quality of the participant's claim, evidence, and relevant information about the articles. Statistical analysis is based on the number of points a participant receives compared to the possible points for a particular question. It is hypothesized that allowing students to develop a better representation of task demands will significantly improve their performance on short answer essay questions. Data collection is currently ongoing.

136 Giulia Zanini

In-group Prejudice in the Workplace

Authors: Giulia Zanini
Department: Psychology
Faculty Mentor: Alecia Santuzzi
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Based on past research about in-group favoritism, women should form more positive evaluations of other women (in-group members) than men (out-group members). Importantly, women might expect to receive more positive evaluations from other women than from men. However, recent research suggests that women actually might form more negative evaluations of other women, particularly in environments where women are outnumbered by men. Our project will examine whether the negative bias among women is stronger in male-dominated as compared to female-dominated workplaces. We also will examine whether women have a false sense of trust of other women in male-dominated workplaces. A survey study will ask male and female workers to evaluate a fellow female colleague's skills, abilities, and overall performance. The survey also will ask female workers about the level of trust and expected positive evaluations from other female workers in their workplace. A similar survey will ask the same questions about a male colleague for comparison. We expect that women in male-dominated departments will evaluate female colleagues more negatively than female colleagues in female-dominated departments. We also expect women to expect more positive evaluations from other women in male-dominated as compared to female-dominated departments.

137 Lizbeth Roman

Women's Role within the Immigration Movement

Authors: Lizbeth Roman, Sara Briseno
Department: Sociology
Faculty Mentor: Simon Weffer
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

Since 2006, there has been a dramatic increase in the number of immigration related protests. "The marches have succeeded in bringing attention to a group of people who live and work in communities throughout the country but who often seem invisible and voiceless" (Voss 2011). The motivation behind these protests is to pressure the federal legislation to move forward with comprehensive immigration reform and in the process allow the twelve million undocumented people in this country to become recognized by the government. "Social movements in the United States have always been about political outsiders, whether progressive or conservative, challenging the established political system" (Voss 2011). Immigrant rights organizations see this moment as an opportunity to challenge the current politics around immigration legislation. As researchers, it is important to understand the demographics of the people and organizations that participate in protests. In this project, I examine the role of gender and leadership as it pertains to the immigration movement in the United States. Specifically, how many women hold leadership roles in immigrants' rights organizations? How can we explain the variation of women's roles within and across these organizations? What does it mean if women have limited roles in leadership, but are major parts of the protest movement, especially representing in large numbers at protest events? In analyzing immigration protest organizations, I will have a better understanding on how race and gender have impacted the leadership roles women have had in the immigration movement.
138  Sara Briseno

Immigration Protest and Media Coverage in Illinois

Authors: Sara Briseno
Department: Sociology
Faculty Mentor: Simon Weffer
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

With over eleven million unauthorized immigrants currently living in the United States, immigration has been at the forefront of national politics, debates, and agendas. Scholars began to take notice on immigration mobilization due to the 2006 marches where an “estimated 3.7 to 6 million people took to the streets in over 160 cities across the United States to rally for immigrant rights” (Bloemraad et al., 2011). The legacy of 2006 brought together communities and the rise of new protest activity, despite repression that the communities faced. Due to the rise of recent immigration related protest activity, this project’s goal is to look at the dynamics of immigration protest in Illinois over the last three years. The data gathered will then be analyzed to see how immigration protest is being covered and by what type of media outlets. Social movements have long used newspapers as the data source of record for chronicling social movement/protest activity. But what happens when newspapers are insufficient in their coverage to examine protest? Can we compensate by using new forms of media? My analyses will examine this question, as well as attempt to determine if there are any systematic biases to coverage for one form or the other, and which events are most likely to be covered by multiple mass media types.

139  Nelisha Gray


Authors: Nelisha Gray
Department: Sociology
Faculty Mentor: Robin Moremen
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

The purpose of this research study is to analyze the social construction of body image from the perspective of African women students at NIU through first-person interviews with five African women students at NIU. Their social construction of body image is compared between being in America and being in their home country in Africa. A literature review analyzes the societal, cultural, and social factors of how the social constructions came to be. These findings are compared with the data retrieved from the interviews. Social Construction feminist theory is applied to better understand the findings. The findings discuss changes in the social construction of body image for African women when they are living in their home country versus when they are living in America.

140  MacKenzie Rich

The Sociology of Animal Crime

Authors: MacKenzie Rich
Department: Sociology
Faculty Mentor: Keri Burchfield
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 12:45-2:00 PM

Theory and research suggests that animal crime is an increasingly relevant topic in sociology and criminology. And new laws passed over the past 50 years intend to more severely punish those who commit these crimes. Still, most research examining animal crime is solely focused on the link between animal violence and human violence at the individual level. We seek to sociologically examine patterns of animal crime and their correlations to other crimes using Chicago Police Department data and court cases involving animal crimes. By combining police crime data and court case data, we are able to see from a broader perspective the types of areas animal crime occurs in, whether or not the offenders have criminal backgrounds, and how and what types of laws police, prosecutors and judges use to target these crimes. A sociological view of animal crime suggests that by raising awareness and increasing education about animal crime, this will reduce not only animal violence, but human violence, as well.
141  Alexandra Queeney

Title Not Received

Authors: Alexandra Queeney
Department: Sociology
Faculty Mentor: Michael Ezell
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 11:30-12:45 PM

Abstract Not Received

142  Dylan Donley & Michelle Boesen

Perception and Production of L2 Spanish Diphthongs by Learners of Different Ages

Authors: Dylan Donley, Karen Lichtman, Michelle Boesen
Department: Spanish
Faculty Mentor: Karen Lichtman
Research Category: Arts, Education, Health, Humanities, and Social Science
Judging Time: 10:15-11:30 AM

Two vowels in Spanish may either form a one-syllable diphthong, as in the word hoy, or a two-syllable hiatus, as in the Spanish word o-i. Spanish generally has less hiatus and higher prevalence of diphthong formation than does English. Prior studies on L2 Spanish diphthongs have shown that for adult English L1-Spanish L2 learners, two-vowel sequences were construed as hiatus, not diphthong, on a paper-and-pencil word-dividing task (Zárate-Sánchez, 2010), that this type of speaker produced longer vowels than native Spanish speakers (MacLeod, 2012), and that learners may not improve their production of diphthongs even when given explicit instruction (Nagle, 2012). This study asks the question: Do children and do adults perceive and produce Spanish rising-sonority diphthongs as hiatus? With a varied number of onset consonants? With onset consonants and a coda consonant? The method of this study is for subjects to participate in a perception and production test of Spanish diphthongs in nonce words. The production task has them hear a word and repeat it. The perception task has them clap in accordance with the number of syllables perceived in the word. Three groups are participating in the study: children age 5-7, college students in beginning Spanish classes, and college students in advanced Spanish classes. Preliminary results show that English speaking college students learning Spanish tend to perceive and produce diphthongs incorrectly as hiatus. Children and advanced college students, although they don't perform like native speakers, show less of a tendency to treat diphthongs as hiatus.

143  Edvin Blanco, Joseph Sliwa, Paul Anacay, & Jihyun Seo

Miniature Lab

Authors: Edvin Blanco, Joseph Sliwa, Paul Anacay, Jihyun Seo
Department: Electrical Engineering
Faculty Mentor: Martin Kocanda
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Knowing your life plan is very difficult because it can change at a moment’s notice. The standard plan for an undergraduate electrical engineering student is to graduate with their bachelor’s degree within four years. One of the biggest frustrations a student can face is deviating away from their intended plan. Every student has a different reason on why they veer away from their four year plan. A frequent difficulty that a student faces when attempting to get back on track is a scheduling conflict with classes. At Northern Illinois University, attending students face many difficulties when it comes to bad weather, class overlaps, and traffic. Class overlap affects all students more so for commuter students which are greatly affected by weather and traffic. An engineering student’s frustration of scheduling conflicts, traffic, and weather are resolvable with a simple portable miniature lab. The miniature lab has everything a student needs to fulfill their lab assignment at the location and time of their choice. The miniature lab has multiple components including a breadboard, a function generator, an oscilloscope, a voltmeter, and an ohm meter. The only other way a student can choose the location and time to fulfill their assignment is purchasing all the equipment individually. Purchasing equipment can cost a lot of money out of the student’s pocket. The miniature lab is affordable alternative and can be reconstructed with all the knowledge students learn throughout their undergraduate career.

144  Mauricio Coss, John Armamentos, & James Mul

Discrete Personal Network Device
The Discrete Personal Network Device is a simple device which will connect to the USB port of a computer and enable wireless communication between another computer which has a duplicate of the same Discrete Personal Network Device connected. Without the necessity of being near hotspots or connecting to the internet through local means, the Discrete Personal Network Device enables the user to transfer information between two systems with ease at any location as long as the two systems are within working range of one another with regards to the transmitting distance of the device. In creating your own personal channel between two systems, there is added security and reliability. The Discrete Personal Network Device is a useful device that can be used to quickly establish communication between two systems without the hassle of being restricted to certain locations in which you would need to connect to the internet or other servers before communicating to another system.

145 Asmat Khan, Matt Marshalek, Atif Mirza, Amir Al-Khatib, & Alex Moran

*EEG to Control Electronics*

Authors: Asmat Khan, Alex Moran, Atif Mirza, Matt Marshelak, Amir Alkhatib
Department: Electrical Engineering
Faculty Mentor: Martin Kocanda
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

The human brain is the most complex organ, perhaps the most complex object in the world. The average human brain has billions of neurons connected to each other, specific regions lighting up due to electricity, as they communicate and pass signals set off by triggers. Neurons analyze the sensory information transmitted to them, process it, and signal the correct system to carry out further actions. This all takes place comparable to a 1 trillion bit per second processor. Mental thoughts such as visual, tactile, emotion, stimulate specific neurons in different parts of the brain. Our goal is to utilize this to have the brain control our electronics. We devised a way to control electronics through the use of an Electroencephalography or EEG. An EEG is a recording of the electrical activity of the brain. There are five major frequencies in which the brain operates: Delta (under 3hz) responsible for deep sleep, Theta (3-8hz) light sleep or extreme relaxation, Alpha (8-12hz) awake but relaxed, Beta (12-30hz) active awake, Gamma (30hz and up) higher mental activity. We've used the EEG to design devices to make everyday life easier by making electronic equipment more responsive to the brain. For example, rather than getting up to turn off the lights and T.V. before going to bed you can just fall asleep and it will detect brain activity and everything will shut off on its own, or while driving your car if you start to fall asleep the car will know and alert you and slow down.

146 Justin Block, Travis Reed, & Derrick Moeller

*Sitting Posture Coach*

Authors: Justin Block, Travis Reed, Derrick Moeller
Department: Electrical Engineering
Faculty Mentor: Suma Rajashankar
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Many people in the world today suffer from back pain. Often, this back pain is due to poor sitting posture. Many people sit at desks for the majority of their work day and look at computer screens. Many people sit at home at a computer desk or in front of a television. When poor posture is used, it can lead to weakened upper-back, lower-back, and abdominal muscles. There are many ergonomic devices on the market that help sitting posture, but very few that hold anyone accountable for actually using the ergonomic device properly. With the advent of thin flexible piezoelectric force sensors, smart phones, microcontrollers, and Bluetooth technology a simple alert system can be developed that helps the average person keep track of their own posture behaviors. This is possible using a design in which a mat embedded with force sensors covers the sitting and leaning surfaces of a chair. The data collected by these sensors is then transmitted to a Bluetooth enabled device which will keep the user conscious of their own posture. When consistent bad posture is detected the user can be alerted so that they can correct themselves. Sitting posture throughout the day can be tracked and recorded for later reference. This device can be made common in the work place and at home where it can reduce sitting posture related injuries.
The human mind interacts with the outside world by way of electrochemical signals transferred through the nervous system. All subsequent physical processes are mediated through this pathway. Today, technology has caught up with the biological world to such a degree that we can process biologically produced electrical signals into tangible information. Through digital processing techniques, computer systems can relate a person's bioelectrical activity to the physical movements of an individual without the need for visual and mechanical recognition systems. The device developed in this work behaves as an intermediary between the biological processes responsible for movement and the computational systems responsible for analysis. What has been developed is a modular data acquisition system (DAQ) capable of interfacing between 24 or more surface-Electromyography (sEMG) sensors, accelerometers, and gyroscopes. Acquired data is correlated in real-time, digitized, pre-processed, and transmitted wirelessly to an external computational device for session storage and manipulation. Information derived from the data can be further manipulated to interact with the surrounding environment, in user-biofeedback applications, or clinical studies. The system as presented will continue development over the next six months to include potential end-user applications and software development.

This project will deal with Active Noise Control systems. This project deals with quieting the noise created by a person snoring. To do this through the use of an ANC system, anti-noise must be created to cancel out the snoring sound waves to create silence. The goal of this project is to create a realistic simulation of the noise cancellation by using MATLAB v7, a programming environment used to solve real world problems. I have been provided with a snore sound file that will be used during the project. To make the simulation applicable to the real world, microphones and speakers will be taken into account in terms of how they directly affect the noise cancellation. This project will also feature a block diagram that displays how the various components of the ANC system such as the microphones, speakers, and person snoring will be interacting with each other during the noise cancellation. Various characteristics of snoring will also be touched upon in this project.

When a system is expected to be reliable there is only one factor that compromises that reliability, and that is the human element. One piece of manufacturing that is an example of expected reliability is a firing element. A firing element could be a rifle, paintball gun, crossbow, or any device used for firing projectiles. All of these devices were crafted for reliability and accuracy. With the human element, any attempt of using a firing element can result in inaccuracies of precision, and timing. With the S.M.A.R.T. system we provide a more reliable and cost effective alternative to the firing process of a firing element. With the combination of servo motors, processors, and unique coding, our S.M.A.R.T. system can identify a target at a specified range and execute that target with consistent precision. Most automated systems used for firing projectiles are beyond the budgets of regular working class citizens. The S.M.A.R.T. system can be affordable for most consumers and used for various applications including hunting, and recreational purposes. Our system will identify a target down range, acquire its position, rotate the apparatus to the required position, and wait for a signal from the user to execute the target. The blend of precision and human decision making makes the S.M.A.R.T. system an exceptional mechanism for target acquisition and execution.
The Department of Technology would like to recognize the following students and their advisors for their research accomplishments:

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Christopher Saffle
Maxwell Stinson
*Advisor—Dr. Mirman*

For more information:
Department of Technology
Northern Illinois University
Still Gym 204—(815)753-0531
www.niu.edu/tech
The goal of our Senior Design Project is to integrate a wireless temperature sensor into a room's current ventilation system. When the temperature exceeds a maximum set point, a wireless signal is sent and activates a variable frequency drive (VFD) which then starts a fan motor to cool the room. The design would be implemented at Freedom Field, a non-profit organization in Rockford, IL which deals with renewable energy solutions. During a tour of the facility, our group noticed that one of the rooms is excessively hot due to a number of large motors operating in it. We came up with an automated way to cool the room down without personnel intervention. The design will utilize two Arduino's (microcontrollers) and two Xbee's (radio modules) as the driving factors of the wireless connection between the sensor and the motor that powers the fan. The VFD controls the speed of the fan and as the temperature of the room rises, the increased fan speed will have a greater cooling effect. This automated application will improve the working conditions in the room. With the application of this system, we believe that the facility will be able to provide a higher quality of air in the room.

An existing powder mixing line at Tate & Lyle Custom Ingredients of Sycamore was analyzed by a multidisciplinary team of engineers from the fields of mechanical, industrial, and electrical to determine the optimal design for future implementation. Design considerations include reducing downtime between product changes, decreasing labor during operation, and increasing process throughput. In the interest of reducing cleaning downtime, a Clean-In-Place (CIP) system is to be implemented, replacing all current components with upgraded CIP equivalents. The CIP features will include nozzles which will be used to supply water, cleaning solution, and air drying at appropriate pressures, temperatures, and flow rates. The selection of an optimized CIP Skid considers the total flow rates and whether multiple components are cleaned in serial or parallel. Fugitive dust control methods will be implemented to prevent room contamination during operation. Time and cost analyses are performed to determine improvements in material throughput for the new production line. The resulting room layout has been configured to have a centralized CIP, minimize unnecessary operator movement, and increase profitability of the operation line. Multiple packages at different levels of capital investment are proposed to Tate & Lyle so that they may determine the most financially feasible option to move forward.

This project will deal with the theory of Electrochemical Impedance Spectroscopy (EIS). The purpose of this project is to fabricate interdigitated electrode sensors that will be able to detect bacteria in a culture media and analyze the behavior and growth rate of various bacteria based on their signature impedance properties. The goal of this project is to create an optimal and cost-effective microbial sensor that will be used for the direct investigation of the electrical properties and behavior of bacteria cells. The performance of the chip design was determined using MATLAB, a high-level technical computing language used for numerical computations and to create models and applications. The bacteria impedance is recorded using Iviumstat, an impedance analyzer and a graph of the signal responses is then plotted. Due to the vastness of this project, continued work will be done to expand testing of the sensors on various bacteria, expand testing to biomarkers and build a signal response library of all the various bacteria tested.
This project will deal with the theory of Electrochemical Impedance Spectroscopy (EIS). The purpose of this project is to fabricate interdigitated electrode sensors that will be able to detect bacteria in a culture media and analyze the growth rate of various bacteria based on their signature impedance properties. The goal of this project is to create an optimal and cost-effective microbial sensor that will be used for the direct investigation of the electrical properties and behavior of bacteria cells. The performance of the chip design will be determined using MATLAB, a high-level technical computing language used for numerical computations and to create models and applications. Due to the vastness of this project, continued work will be done to expand testing of the sensors on various bacteria genus, expand testing to biomarkers and build a signal response library of all the various bacteria tested.

In the automotive and recreational vehicle industry, the need to transfer the power of the engine to drive wheels is a necessity. One method in transferring this power in recreational vehicles such as 4-wheelers and snowmobiles is through the use of a CVT (continuously variable transmission). Current CVT designs consist of either a purely mechanical system for most recreational vehicles and in some automotive applications an electro-hydraulic system. For the racing style recreational vehicles the tuning of the CVT can become quite cumbersome due to the need to disassemble the CVT to replace the weight system used in the mechanical design not allowing for on the fly adjustments of the rate of change in the gear ratios for different events such as acceleration runs to sled pulls. That was the inspiration for our project the ECPCVT (electronically controlled, programmable CVT) in which we replaced the mechanical weight system with a micro-controller, additional control circuitry, and linear actuator to vary the rate of change in the gear ratio of the transmission in a multiple speeds or the overall final gear ratio based on position dependent upon the selected program.

Gel Electrophoresis is the process of distinguishing different DNA strands from each other. This process is done by hand which involves manually transferring DNA samples to its pre-made gel tray where the testing will occur. The configuration of its acids, proteins, and carbohydrates can be seen and analyzed by submitting an electrical voltage through the samples. Common practices are done in universities, forensics, and private lab firms. An automated version of this process will be developed. A rail system will hold the manipulator that fill each well. The manipulator itself will hold the pipettes which will be able to extract a specific amount of sample and inject it to the gel wells. Several samples will be transferred and tested at the same time to reduce time. The manipulator will also have a sterilization process in order to quickly conduct future trials. Other manufactures have developed similar models but due to sterilization and small market, pricings can range from two to five thousand dollars. Design goals will be to develop automatic version of the process at a more affordable rate. Trials will be conducted to validate precision and accuracy of both the sample transfer and spatial representation due to its original frame of reference. Other trials will be done in respect to time to complete one cycle.
156  Nathaniel Thurman

Custom Linear Actuators

Authors: Nathaniel Thurman, Jamie Garcia, Javier Castillo, Kevin Rodriguez
Department: Electrical Engineering
Faculty Mentor: Donald Zinger
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

The “Custom Linear Actuators” is a linear actuator suspension control system, which aims at reducing the turning radius of a vehicle at high speeds by independently controlling the height and angle of a vehicle in all four axles for better traction. Basically, the overall goal is to maintain a more stable vehicle while attempting turns at higher speeds, braking, or conditions of low traction. The system is comprised of five components; a microcontroller, accelerometer, turning wheel angle describe via potentiometer, and four linear actuators on each axle with position sensors. The microcontroller is an Arduino Due, interpreting data received from the multiple sensors and issuing control commands to the individual linear actuators using a bi-directional H-bridge controller. Next, the linear actuators adjust vehicle positions based on the control commands received by the microcontroller. The smaller scale model for passenger vehicles will be the “Redcat Racing 1/8 Scale Nitro Powered Buggy Backdraft 3.5 2-Speed Transmission”, which can reach 40 mph. The Actuators are a Firgelli L16 Miniature Linear Motion Series customized with a 100mm stroke and a force of 50N. In order to replace the shocks of the RC Car with our custom actuators, we had to test the vehicle on a leveled surface and augment the shock towers to accommodate the actuators that are larger than the shocks. The power source will be two batteries to power the Arduino Due and the L16s Actuators.

157  Artem Goloshubov & Tom Cholly

Lean Implications In Manufacturing

Authors: Artem Goloshubov, Tom Cholly
Department: Industrial and Systems Engineering
Faculty Mentor: Purushothaman Damodaran
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

This semester-long project was established by SPX Hydraulic Technologies of Rockford, IL to improve workstation productivities and eliminate waste within their Ram Press and Ram Puller Assembly workstations. In order to accomplish this, several concepts of lean manufacturing and lean six-sigma were considered to break the project into phases and eliminate waste methodically. The first phase of this project was to define the problem which entailed assigning a project scope, determining feasible objectives, and creating a project timeline. Measuring the problem became our second phase of the project, which was focused on workstation specific operations of each assembly station as well as the upstream stockrooms supplying them with parts to complete their job tasks. Though statistical analysis in our third phase of the project, suspect problem items were identified and evaluated for their process flow and waste. From this, in-depth data and systems analysis lead to: re-constructing a part distribution method to incorporate work-content based supermarkets, a problem-item identification system, and re-validation of workstation-based bench stock items (and grouping them into part families). In the full report of this project it will be described how the fourth phase of the project exploited these individual achievements to construct a new and more efficient layout change for the Ram Press and Ram Puller Assembly workstations, and how these successes were properly maintained through our fifth and final phase of control.

158  Norman Hayes, Ian Toupin, & Michael Ray

CNC Sheet Punch Fabrication Efficiency Project

Authors: Norman Hayes, Michael Ray, Ian Toupin
Department: Industrial and Systems Engineering
Faculty Mentor: Purushothaman Damodaran
Research Category: Science, Technology, Engineering, and Math
Judging Time: 9:00-10:15 AM

By optimizing resources, businesses can become more competitive. CST Industries, a global leader in storage tank and cover solutions, would like to improve the efficiency of fabrication of sheets ran through their punch/plasma CNC machines. This project will focus on four main issues involving the fabrication system's throughput of product: management of the CNC tooling program, an enhanced order release and inventory management system, a stable work flow and a reduction to downtime for changeovers and transportation. A tool management system will be designed to act as a central hub in which statistical analysis can be performed on tool utilization, inventory, and reorder points. In addition, this system will also function as a user work log. This system will utilize the 5S methodologies to enable work flow. Enhancing the order release and inventory management system will streamline CST Industries’ part and side sheet fabrication operations. Data obtained
from forecasting, inventory; among others will be the framework for the influence of supplying the right amount of inputs to meet the demands of product output. A natural pull of work through the sheet fabrication process is needed. Understanding hindrances to work flow along with implementing an aggregate plan, better visual management, organization of the sheet metal storage area, and management of the material handling equipment will be used effectively to address these inefficiencies. From this project, a plan can be implemented to improve the efficiency of the CNC sheet punch fabrication.

159 Arnulfo Irazoque, Jacob Meyer, & Timothy Martin

Lean Process Improvement for the Digestive Health Center at CGH Medical Center

Authors: Arnulfo Irazoque, Jacob Meyer, Timothy Martin
Department: Industrial and Systems Engineering
Faculty Mentors: Purushothaman Damodaran & Gary Chen
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

Adopting the Lean and Six Sigma paradigm can significantly increase the quality and overall efficiency of hospital operations. The Digestive Health Center of CGH has been having difficulties effectively communicating patient cancellations and no shows with the Gastrointestinal Clinic. Utilizing Lean and Six Sigma philosophies can substantially improve the efficiency and dependability of the DHC. For this project, Lean and Six Sigma tools will be used to minimize the cancellations and no shows of patients in the Digestive Health Center (DHC) at CGH Medical Center. With the help of the CGH Medical Center employees, this project can set the foundation towards becoming a Lean based facility.

160 Chris Lloyd & William Grennan

Improving Repair Process Lead Time at SPX Technologies

Authors: Chris Lloyd, William Grennan
Department: Industrial and Systems Engineering
Faculty Mentor: Purushothaman Damodaran
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

SPX Technologies is a manufacturing company that produces hydraulic pumps in their Rockford, Illinois location. At this facility, there have been inquiries as to why the lead time for repairing pumps is so long. The warranty department at the manufacturing facility handles customer complaints and repairs. At its current state, it takes the repair team on an average of about 10 days to complete a full diagnosis and repair for a single pump. The overriding objective of this project is to lower the warranty repair lead time from about 10 days down to around 5 days. Some underlying objectives include but are not limited to: minimize time waiting for special parts to be delivered, minimize time taken by engineering to diagnose specific problems, to help with job assignment on a day to day basis, standardize their production planning, eliminate idle time of repairmen, find frequently repaired products (and product families), identify the root cause(s) of frequent product failures, and to minimize the non-value-added work performed by the repairmen.

161 Dustin Flesch & Erik Desch

Swinging Wind Turbine

Authors: Dustin Flesch, Erik Desch
Department: Mechanical Engineering
Faculty Mentors: Nicholas Pohlman & Jenn-Terng Gau
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Wind turbines have become a prominent symbol of the increasing use of renewable energy. In this study, the functionality of a wind turbine that is hinged for gains in energy is studied. In order to investigate the unique feature, a turbine is suspended from a fabricated swing, and placed in a wind tunnel to study the effects of changing wind speed. This experiment identifies whether reasonable gains as the turbine is pushed back on the pendulum and thus higher off of the ground. The increase in potential energy is posited to be gained electrically when converted to kinetic energy as the turbine falls through the pendulum arc. Another facet of this study is to examine if a substantial amount of increase in energy can be gained through the addition of another generator located at the pin joint of the swing. Overall, it is shown that stabilization does occur in the turbine system when the swinging motion is implemented. While it does not have an overall gain in energy, the transitions of wind energy are much smoother. Also, it is seen that even though theoretically another generator can be useful, after friction and other efficiency losses, the gains are negligible.
162  Nathan Arendas, Christopher Melanson & Nicholas Thompson

Straw Tube System Mounting Design for G-2 Particle Physics Experiment

Authors: Nathan Arendas  
Department: Mechanical Engineering  
Faculty Mentor: Nicholas Pohlman  
Collaborators: Brendan Casey (FNAL), Del Allspach (FNAL)  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM  

The Fermi National Accelerator Laboratory is conducting an experiment to uncover the momentum of procession for subatomic particles called muons. The experiment requires arrays of straw tube trackers placed within high vacuum chambers extending from the internal radius of a circular particle accelerator. The design of a mounting system that guarantees precise and uniform placement of the tracking stations, as well as facilitates individual module replacement within the array will be illustrated. In order to maintain the high vacuum within the chamber, the mounting system will employ a sealing technique that has limited permeation rate and will not induce significant stress on the vacuum chamber. The permeation and outgassing rates of two standard sealing techniques, copper CONFLAT and fluorocarbon O-rings, are evaluated from design implementation and experimentally tested under expected vacuum conditions to determine which technique is optimal for the mounting system.

163  Erik Johnson, Dwayne Wilson & Lovest McCastle III

Reheat Stop Valve Lapping Machine

Authors: Erik Johnson, Dwayne Wilson & Lovest McCastle III  
Department: Mechanical Engineering  
Faculty Mentor: Jenn-Terng Gau  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM  

The reheat stop valve is an on off valve that controls steam flow to the low pressure side of a steam turbine. It regulates steam flow by a clapper arm which slams shut against the valve seating face, blocking steam flow. Over a period of time this valve seating face can become deformed allowing steam to pass through and further erode the seating face. To repair this face, it is normally hand lapped to bring the surface back into tolerance. This is time consuming as the tolerances for this seating face are very small, and requires several attempts to set the lap up in the correct position which will meet the concentricity and perpendicularity tolerances once the lapping process is complete. Finite Element Analysis, and in lab testing using strain gages, will be used to determine the design of the parts and fixtures. The purpose of this senior design project is to design a machine and fixtures to make this process more efficient. This will enable the machinists to set up the machine once, and be confident in knowing that it will be in the correct position throughout the entire process, and In turn this will save the company valuable down time, and increase the profit margin by eliminating waste.

164  Brian Martin & David Haldeman

Automated Outdoor Grill

Authors: Brian Martin, David Haldeman  
Department: Mechanical Engineering  
Faculty Mentor: Ji-Chul Ryu  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 10:15-11:00 AM  

Technology today is helping make everyday tasks easier in every facet of life. The purpose of this automated grill is to follow the growing technological trend and make cooking on the grill easier. By taking the commodity of a user-input temperature selection feature that ovens commonly use, and utilizing it in propane burning grill, we can bring forth a new technology that grill masters will cherish, as well as the amateur cook. A user interface is created to allow the cook to set a specific temperature, and a microcontroller board Arduino is utilized to control the flow-rate of propane to the flame through a control valve. The valve is adjusted by a motor which responds to the temperature inside the grill measured by thermocouples. The success of the product depends on how to integrate this user interface, which requires electricity, into a grill that uses gas and to diminish the potential harm to users created by these two items. By using proper materials for casings and insulation, this potential hazard can be minimized. This will allow for safe use and a successful product. Those amateur cooks may now be able to fool people into believing they are truly grill masters.
**165  David Willit**

*Hopkinson Split Bar Material Testing Apparatus*

Authors: David Willit, Kyle Corn & Khushmin Soni  
Department: Mechanical Engineering  
Faculty Mentor: Jenn-Terng Gau  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

The Hopkinson Split Bar (HSP) is a device used for testing the impact strength of materials. Through the use of a high velocity projectile, impact force is transmitted through two high strength bars and the specimen which lies between. The strain within the bars is measured and various material data can be calculated for the material. The NIU Materials Laboratory currently houses a HSP apparatus, but lacks in multiple areas of performance. This project seeks to create a new device that allows expands the breadth and depth of data collection while expanding upon operational safety. New components are to be created, tested and verified through CAD modeling and analysis software. A sophisticated control system is to be designed and created to allow the collection of data and real-time analysis. Detailed simulations of the system are to be created so that theoretical results may be compared with the real world data, allowing for a feedback system to improve future results. Once designed and built, tests will be run in order to refine the system. Additional sensors and other adjustments will be added based on the end of project results.

**166  Joseph Limonciello, Kyle Riley & Justin Whiting**

*FermiLab G-2 Particle Locating Straw Tester*

Authors: Joseph Limonciello, Kyle Riley & Justin Whiting  
Department: Mechanical Engineering  
Faculty Mentor: Nicholas Pohlman  
Collaborators: Brendan Casey (FNAL)  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM

Attaining quick and accurate measurements is more important now than ever due to increasing technological needs. An automated test stand was conceptualized and designed to test FermiLab Muon g-2 particle tracking straws. These straws would be pressurized on the inside and subject to vacuum on the outside creating a large pressure differential. With tracker modules made up of 16 – 96 straws, a single failure in fabrication results in a total module failure. The automated test stand examines pressure loss of the straws over time and records the readings using an automated data acquisition system. Straws were assembled and tested for leaks to determine acceptable time frames for performing the test procedure. A lightweight aluminum chassis to hold all the hardware was constructed, circuitry designed and a LabView VI created to encompass the testing. The stress points of the straw under pressure were analyzed using finite element analysis where the largest deflection is found in the middle sections. Results from the project show that quick and accurate quality control checks are possible to test large numbers of straws.

**167  Thomas Cowden**

*Using Modeling in Pro-Engineer Software to Investigate Design Process for Split-Hopkinson Bar Apparatus*

Authors: Thomas Cowden  
Department: Mechanical Engineering  
Faculty Mentor: Jenn-Terng Gau  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 9:00-10:15 AM

While the field of engineering constantly faces issues related to design, safety, and cost-effectiveness, the objective of this research is to obtain understanding of the modeling and analysis behind improving such factors. To specifically conduct this study, both mechanics topics and team dynamics are observed in Northern Illinois University’s facilities with the help of a split-Hopkinson bar. Essentially, the split-Hopkinson bar is a machine that consists of an incident and transmitter bar that, when subjected to one dimensional motion, allow for a certain specimen to be analyzed under applied forces. While the machine may be compared to other apparatuses that rely on conceptual physics principles, the split-Hopkinson bar relies on scientific assumptions behind one dimensional motion for such analyses. The complications arise when this machine is subjected to non-conservative forces that heighten difficulty in making these assumptions; therefore, constant upgrading is carried out to minimize unwanted factors. As for the Hopkinson bar at Northern Illinois University, past observation has led to knowledge of alignment issues that researchers will attempt to eliminate. To complete the stated objective, it is with an emphasized modeling approach that assistance will be given to a graduate student in redesigning and upgrading the bar. Upon completion of such project, it is projected that a number of objectives are met/acquired, including understanding of the modeling process through training on engineering software, introductory team experience in the respective field, and a redesigned apparatus that better operates with cost-effectiveness and accuracy.
One aspect of engineering that is becoming more and more popular as technology advances is control systems. A control system is a program that controls how something acts. For example, there is a control system in a Segway that keeps it balanced as you lean forward and backward. The thrust controlled orientation device will have a control system so that it can hover and balance itself. It will have four thrusters equally spaced apart that will be pointing directly downward. These thrusters were designed for a maximum amount of force from thrust. The device will essentially be a quad copter but instead of four fans there are four thrusters.

Many deaths are caused by motor vehicle accidents and the majority of them are from failing to check the blind spot. According to CDC.org, the statistic shows that nearly 840,000 blind spot accidents occur each year in the United States, resulting in 300 fatalities. Current blind spot sensors are only attached in high-end vehicles, such as the Mercedes-Benz S-Class. We believe that it is unfair only upper class cars are equipped with this safety feature and every driver should have access to this device at a lower cost. Our purpose for this project is to recreate an affordable and portable external device that can easily be installed on any vehicle. By being able to check the blind spot, a significant amount of motor vehicle accidents can be prevented. There will be a three main analysis done for this project. First, we will create the design of the mount that is appropriate for the sensor using a CAD software. Then, calculate the wind resistance at a high velocity and vibrations caused by rough pavements. Finally, we are to design the feedback control system using an Arduino chip that can determine the distance of upcoming vehicles. The ultra-sonic sensor is the most ideal part for this project because of its low cost and precision. This sensor will be attached to both side mirrors and will display LED lights once the IR signal from the sensor catches the nearest object. Our main goal for this project is to ensure the safeness of those that are driving vehicles, as well as promote fewer casualties by creating a product that will reduce casualties on the road.

People love cold beverages. Unfortunately cold beverages are not always available and waiting for a refrigerator to cool them is frustrating. Research into the effective dispersion of liquid refrigerants allows beverages to be chilled in mere seconds with minimal energy input. This revolution in liquid refreshment brings convenience to millions while remaining environmentally safe and healthy.
The NIU Formula SAE team is in need of a running engine for their May 2014 competition in Michigan. The engine they plan on using is the Yamaha R6 which was chosen by a previous powertrain team captain. The governing body, Society of Automotive Engineers, has set requirements in which every team must adhere to in order to compete. The requirement that affects the intake design the most is the 20 mm restrictor that must be placed between the throttle and the engine and all air must pass through the restrictor. The purpose of this project is to provide the NIU FSAE team with a tuned and running engine by way of a redesigned intake. This will be done by careful planning and design with the specifications set by the SAE. The design of the intake will be done with the use of SolidWorks 3D software and Virtual 4-Stroke software and optimized using Star-CCM + software. In order to compensate for the 20 mm restrictor that is required the plenum has been maximized in order to create an air reserve for the cylinders to draw from.

172 Matthew Woodall

*Engineering Design Process Application*

Authors: Matthew Woodall  
Department: Mechanical Engineering  
Faculty Mentor: Meung Kim  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

The objective of this project revolves around learning and then applying the engineering design process. This project consists of two separate stages, both following the same method of action. Throughout stage one; I learned the basics of the engineering design process and how to design objects on the computer aided design software developed by Parametric Technology Corporation (PTC) called Creo Parametric 2.0. I then created a predefined object from the textbook, Modern Graphics Communication (Giesecke), using the Creo Parametric 2.0 design software. Next I performed stress and thermal analysis tests using the same software and learned how to prototype the object with the rapid prototyping machine in the Engineering Building. The final step of this stage is to write up a final report on the design. The second stage followed the same process of designing, analyzing, and prototyping, however the object design was created from scratch.

173 Luke Martin

*Structural Loading and Degrees of Freedom for the Beamstop in the Muons-to-Electrons Experiment*

Authors: Luke Martin & Udenna Okafor  
Department: Mechanical Engineering  
Faculty Mentor: Nicholas Pohlman & David Hedin  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 11:30-12:45 PM

The purpose of this project is designing structural support pieces that will be used for the experiment Muons-to-Electrons (mu2e) planned at Fermi National Accelerator Laboratory. A critical member in the experiment is the muon beam stop where all remaining particle energy is absorbed to prevent neutron radiation. The project had three phases: 1. Develop multiple conceptual designs; 2. Iteratively modify the designs based on feedback from the project engineers and physics requirements to produce detailed features; 3. Evaluate structural stresses and component masses to confirm strain deflection and factor of safety. The results are reported in laboratory requirement and specification documents detailing the dimensions, location of components, and features of the designs. Specific components reported here include a gimbal support to allow freedom of motion during beamstop movement as well as temporary and final support connections necessary for installation. The detail designs are distributed to vendors for construction estimates necessary for Department of Energy Technical Design Reviews to confirm the feasibility, risk factors, and financial cost of the mu2e experiment.

174 Jacksone Howe

*Two Phase Air Cooled Cold Plate*

Authors: Jacksone Howe  
Department: Mechanical Engineering  
Faculty Mentor: Pradip Majumdar  
Research Category: Science, Technology, Engineering, and Math  
Judging Time: 12:45-2:00 PM

With the current method of cooling electronics in remote aircraft locations, UTC Aerospace has asked for an improvement.
This improvement requires the use of external fluid reservoirs and pumps to be eliminated and a two phase cooling system to be implemented. The electrons are mounted to the cold plate and transfer heat into fluid channels machined into the plate. The fluid will begin to vaporize and rise out of the channels into finned tubes where the vapor is cooled into liquid and flows back into the cold plate channels. This cycle continues utilizing the internal pressures of the system in order to cool the electronics for operation without failure. Producing and testing a prototype along with a computer simulations, the functionality of the two phase design will be analyzed in order to determine if there is proper electronics cooling.

175  Derek Malanowsk, Alekander Kecojevic & Tyler Czerwinski

Bison Gear Fan Motor Design

Authors: Derek Malanowsk, Alekander Kecojevic & Tyler Czerwinski
Department: Mechanical Engineering
Faculty Mentor: Jenn-Terng Gau
Research Category: Science, Technology, Engineering, and Math
Judging Time: 9:00-10:15 AM

The problem that we are dealing with is a fan design that is wearing out and making loud noises after the gear motor box is used for a while. These gear motor designs are popular in ice vending machines and automatic opening doors. Customers are not happy with the loud noises that are coming from the fan motor once the plastic clip starts to wear out. The clip wears out and induces slop in the fan which is creating the noise. The new design must be able to be assembled in under a minute. Also the new design cannot cost significantly more to make. The new design must be analyzed thoroughly before putting into production.

176  Antonio Aguilar Jr

The Study of Particle Motion During Extraction From Storage

Authors: Antonio Aguilar Jr
Department: Mechanical Engineering
Faculty Mentor: Nicholas Pohlman & Athar Mohammad
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

The use of fossil fuels has two challenges: polluting the earth and decreasing long-term availability. Alternative fuels are being studied as a replacement and some are already implemented into society such as ethanol or hydrogen fuel cells. One alternative that is being considered is using biomass as an energy source. In order to use biomass as efficiently as possible, losses in transportation should be minimized. Understanding the acceleration and deceleration of biomass in transport tools such as a storage hopper that supplies an arbitrary energy converter are important for implementation. The objective of this research is the study of particle flow, positions, velocities, and acceleration. The investigation focuses on the movement of particles dragged by a conveyor belt at the bottom of a storage hopper. The particles will help simulate the biomass moving through a storage hopper and into a conversion reactor. The data collected will help design efficient ways to transport biomass for uniform delivery of mass or volume to any type of bio engineering conversion system.

177  James Yanik, David Bierdeman & Kallol Barai

Table Tennis Trainer

Authors: James Yanik, Kallol Baria, David Bierdeman
Department: Mechanical Engineering
Faculty Mentor: Brianno Coller
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Table tennis or ping pong is a very popular worldwide sport. However, there is one specific downside to ping pong. That is, in order to improve one’s skills or to enjoy a spirited game of ping pong, a player must have another player to practice or play with. Thus, unless there is someone else who is near your skill level who wants to play, it is impossible to play or improve at the game. What if there was a way to play the game whenever you wanted? What if it were able to match your skill level and help you improve no matter if you were a beginner, a professional, or anywhere in between? What if it could simulate a complete game to help you enjoy the game while improving your skills at the same time? This is exactly what the Table Tennis Trainer or TTT will do. The project is a table tennis trainer (TTT) that utilizes motor controls with a user interface to effectively launch ping pong balls. The trainer will be able to launch balls at varying velocities, angles, spins, and locations on the table. The trainer will include a net and ball pump that will be able to collect and reload the ping pong balls for continuous operation. The user will choose the ball launch settings through a custom made android app. Through the TTT system, a user will be able to greatly improve their skills with the smallest of amount of time invested in training.
The upright is an important component in the steering system of any vehicle. Controlling vehicle dynamics such as high speed stability, tire contact patch, and steering can be achieved when optimizing upright design. For years the NIU Baja team used OEM Polaris uprights designed for ATV applications which limited design points and overall handling. The proposed project features a custom design that focuses on performance and durability by adjusting parameters such as ball joint position, kingpin inclination angle, and material. Since vehicles are subject to many different forces from heave to cornering, it was important for us to understand the forces experienced by the upright. A series of tests were conducted to determine these unknown force magnitudes by utilizing sensors such as forces gauges and strain gages. Once these values were estimated we commenced to construct a prototype and FEA analysis to conduct further structural and material analysis for our upright design. After careful considerations pertaining to the rules and regulations that the Baja team must follow, as well as communication with actual members, a final design was devised. This report ensues to describe the details of the final upright design and the factors that led to certain design considerations.

Kreider Services, a non-profit organization, is in the process of expanding their Secure Recycling Service division with a food scrap composting program. The composting process starts with an in-vessel composter from Ecovalue and finishes with a portable packaging hopper used to bag the compost. Kreider currently lacks a safe and efficient method to move compost as it leaves the vessel to a designated location for curing. This process involves monitoring temperature and moisture levels and aerating the compost while it remains in the curing process for at least 30 days. Many designs were developed and considered, but one was chosen for testing. The final design utilizes a u-trough fitted with a screw conveyor that transports the material over the course of the 30 day curing process. Two portable overhead stations fitted with infrared sensors will monitor temperature and humidity. When humidity drops below the range of 40-60%, a misting system will activate to increase moisture content. If temperature rises above the desired temperature of 130-160 degrees Celsius a fan will turn on. The main electrical components include: Raspberry Pi, operational amplifiers, electric fan, and electric pump. A small scale prototype will be used to test how effective the screw conveyor is at advancing and mixing the material. Additionally, the electrical system will be evaluated on its ability to read and interpret the data from the sensors, allowing for adjustment to the curing process.

This is an Engineering Technology Senior Design project. The purpose of this project is to design and manufacture an automated food packaging machine. Specifically, our system is designed to efficiently load, count, and package apples for small scale use. The main issues that exist in current automated food packaging systems are excessive size and the lack of mobility. Our machine will be small and portable so it can even be used in the field if necessary. Potential users of our machine will benefit from its versatility and size. Another added benefit of this machine is the way it will be produced. We kept a minimalistic design in mind to not only keep the production costs low for us, but to also benefit the user by offering this product to them at a low cost. We want this machine to be accessible to as many markets as possible so that we can help as many potential users start producing packaged goods.
Remote Sensor Piconet

Authors: Jesus Pineda, Dan Cruz, Javon Cartwright
Department: Technology
Faculty Mentor: Theodore Hogan & William Mills
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

Our project is a low implementation cost alternative to existing systems that stream data from remote sensors placed throughout a facility. For this work, the sensors chosen were industrial hygiene (IH) monitoring equipment from Casella (particulate and noise) and TSI (temperature and relatively humidity). Our project utilizes Bluetooth Low Energy (BLE) to stream data from the sensors to one or more Android tablet(s) with our custom application. Another aspect of our project is that we are attempting to utilize different sensors from different companies that would normally not be usable in a single system as is being proposed. The sensor data will be polled from the sensors via ASCII commands, and the resulting ASCII format data will be transmitted via the piconet (Bluetooth system) to the Android tablet (with Internet connectivity). The BLE we are using is through the Arduino UNO microcontroller with attached BLE Shield. The decision to use Arduino technology was based on the similarity to PLC programming (which we were already familiar with), affordability, and ease to use. The tablet (HP 7 1800) will then utilize our specialized Android OS application to compile all data from the sensors into a real-time table and chart for ease of analysis and interpretation. All data in the Android application can then be accessed via the Internet. The goal of this system is to provide a low cost methodology to allow an analysis of various sensor data.

Assisted Lift Mobility Cart

Authors: Jordan Johnston & Mark Christensen
Department: Technology
Faculty Mentor: Abul Azad
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

Approximately 12.5 million Americans over the age of 65 live alone. Unfortunately, these individuals often face problems with moving around their homes, standing up and sitting down, and getting in and out of bed. Lifting furniture is available and greatly assists independent senior citizens, however, there is yet to be an assisted lift mobility cart. A cart that would be able to transport the patient from one side of the house to the other and help them stand up would reduce accidents and allow patients to maintain their independence. The seat will also be able to fully recline to ease getting in and out of bed. This assisted lifting mobility cart is based off the existing personal electric mobility cart, but offers several improvements. The lifting process of the seat will be completed by using linear actuators, a gas spring, and a tilting mechanism. A highly adjustable seat will assist in moving patients to a standing position. Much like the power seats in modern cars, the seat will be able to slide forward and backward, and the backrest will be able to recline. In addition, the height of the seat will be adjustable within a range of at least one foot, and a plastic side skirt will cover the internal mechanism of the seat and be easy to clean.

Smart Charger

Authors: Brian Grobe & Bryan Gorecki
Department: Electrical Engineering
Faculty Mentor: Donald Zinger
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

This project, in its present form, addresses the issue of long term battery life in mobile devices. When a phone is left on a charger longer than it needs to be, for example, while someone is sleeping, it reaches its full charging cycle long before it is unplugged. During this time the phone is at full capacity and is going through many micro charge cycles, which over time decreases the battery's ability to hold a charge. Our solution involves integrating circuitry into the charger block that will detect when the phone has reached a full charge and disconnect from the power source. This will break the path of power from the source to the phone and prevent the series of micro charges from taking place that would normally continue until the device is unplugged. The approach being used to solve this problem incorporates a microcontroller and a relay into the circuitry of the charger. The microcontroller will acquire a specific reading going into the phone and decide whether the phone is fully charged or needs to continue. Once the device has reached a full charge the microcontroller then sends a signal to the relay to break the path of power to the phone. This circuitry will ultimately help to maintain longer battery life. It is relatively inexpensive and can easily be incorporated into current technologies.
Please Note: Contents of the Abstracts were printed as submitted by the Project Participants and are represented in the College of the Student’s Research.

H denotes University Honors student
M denotes McKearn Fellow
R denotes current Research Rookie
S denotes University Honors Summer Scholar
Northern Illinois University houses a plethora of beauty; unnoticed beauty that exists everywhere, and all it would take to notice this beauty is a very slight shift in perspective. My project is about using art to create a sense of wonder and intrigue in familiar environments, and especially that of the organismal diversity of NIU. Through the use of illustration and photography I hope not only to make pretty pictures, but to also get my audience involved in their own backyards. Through my research I’ve found that nature plays a key role in mental health, an idea known as Biophilia; literally the love of life. With this philosophy, I want to help build connections to NIU, especially for those who have trouble coalescing with the University. I want to be able to show undergraduate students that there are worthwhile facets of NIU wherever they look, even in the environment around them.

Working together with Professor Bart Woodstrup we developed an artistic data visualization of solar energy entitled The Solar Rose. Using an Arduino microcontroller we were able to acquire data from a small solar panel. Using that information we visualized the amount of energy being generated by the panel with a computer running the open source programming language, Processing. The visualization consists of an algorithmically generated graphic that resembles a flowering plant. The flower that is created is affected by the amount of light that the solar panel received during its growth period (one day). There are two goals for the project. The first is to create a small art installation that could be set up in a school or library. We have worked in connection with the NIU STEM Outreach organization to achieve this goal. In this way the project reaches an audience of adults and young people to demonstrate how art and science can be used together to create and inspire. The secondary goal is to create 2-dimensional prints of the flowers created by the software in order to be framed and presented in an art gallery.

My research on the Afro-Brazilian berimbau is a continuing project over a total of five semesters with Dr. Gregory Beyer. Because of last year's URAD presentation and video performance of my duo that Dr. Beyer and I put together, we were asked to perform at an international event in Chicago for people who study capoeira (the Brazilian game associated with berimbau), which led to my interest in capoeira and the various roles women take on in the context of contemporary capoeira practice. The research portion of my project discusses capoeira, my experience while taking capoeira classes, and my discoveries concerning women's roles in capoeira today. The artistry portion of Projeto Arcomusical is our continued promise to compose six new pieces each for berimbau, ranging from solos to sextets. Dr. Beyer and I will eventually have 12 new compositions for berimbau after Spring 2015, bringing the instrument to a higher level in contemporary percussion music.
The Penguin Process will be a feature-length documentary that will take viewers behind-the-scenes of The Penguin Project as the artists and peer mentors who are involved in the Penguin Project build their relationships. The Penguin Project is a group that gives children and young adults (ages 10-22) with disabilities the opportunity to audition and perform in a musical. The documentary will highlight the individuals involved in the many aspects of the organization. This project encompassed research of disabilities and how theater impacts youth and primary interviews to be incorporated in the final documentary, The Penguin Process. The main research of this project was on the history of the Penguin Project to provide background for the documentary. In addition, preliminary interviews of parents of the children involved in the Penguin Project were conducted and formal video interviews were conducted at a later time. The information gathered through the interviews will be used to determine and present the impact of such an organization in a local community. This research, along with video and audio components, will result in a documentary whose primary production was completed during the Fall 2013 semester. From current footage, a short video has been created that focuses on the history, purpose, and implementation of the Penguin Project on the local DeKalb community. The written interview notes and research components will be used to demonstrate the importance of The Penguin Project on the lives of the children and parents involved in the documentary film.

E5   Dupre Taylor

Adaptation of Marquez Ceramic Filtration System for Ground Water Contaminant Removal

Authors: Dupre Taylor
Department: Mechanical Engineering
Faculty Mentor: Melissa Lenczewski & Andrew Otieno
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

An independent research initiative has been established to assist CATIS-Mexico in the re-design and implementation of the Marquez Ceramic Water Filtration System for use in central Mexico. Over-harvesting of the Independence Aquifer through recent decades has led to a dangerous increase in levels of ground contaminants in the regions well water, most notably Arsenic (V) and Fluoride. Sustenance farming communities have seen a violent increase in Skeletal Fluorosis, tooth decay, and Arsenicosis. Research goals include both the comprehensive testing of the regions well water, as well as successful adaptation of the Marquez ceramic filtration system to include Arsenic and Fluoride removal capabilities. Through testing and mapping regional well-water contamination levels of campesino (rural) communities throughout Guanajuato, communities are educated on the possible dangers of their well water. To date, out of 60 community wells being analyzed and monitored, 60% currently exceed Mexican national water quality standards for Fluoride concentrations and 15% exceed safe Arsenic concentrations. Five experimental media have been identified as viable possibilities for effective Fluoride and/or Arsenic removal: Tamarind kernel powder, cysteine, activated alumina, wood biochar and bone biochar compound. Aesthetic properties, cultural variables, and sustainability in communities with low socioeconomic status are taken into consideration. We expect to synthesize experimental filter media with the existing system through a molded PVC coupler manufacturing process. The iCATIS team of EWB-NIU aims to improve on the current filtration system used by CATIS-Mexico to include capabilities of reducing influent groundwater contamination of As (V) and Fluoride to within acceptable EPA/WHO concentrations.

E6   Viraj Patel & Marcus Rangel

Rayovac Pick and Place

Authors: Viraj Patel & Marcus Rangel
Department: Mechanical Engineering
Faculty Mentor: Jenn-Terng Gau
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

Packaging is an important part of the manufacturing business. The packaging of products requires many different types of machinery and engineering. Sometimes these machines may not work as planned and new engineering changes are required. The current pick and place mechanism on one of Rayovac Batteries packaging line is not working the way it was designed to. In order to achieve maximum efficiency the mechanism on that packaging line must be changed. First, design requirements were gathered in order to begin designing the new mechanism. The new design will utilize electromagnets to lift and place the batteries instead of the current pneumatic mechanism. Then 3D modeling of engineering designs were created and simulated. Once the design stage finished and approved the models were fabricated and implemented into the machine. After the installation, PLC programing was used to ensure timing of the mechanism. Applying these new engineering changes should result in high efficiency of the packaging line and less downtime.
The KRL test adapter is a fixture used by Falex in their Four-Ball Extreme Pressure Test Machine to test the shearing and breakdown of lubricating fluids. The test adapter is used in accordance with the CEC (Coordinating European Council) using a standardized test procedure. The aim of the test is to simulate real world conditions of lubricating fluids and see how their lubricating properties and viscosity change over an extended period of time by way of reading a torque output reading. This test provides unbiased results in the use of lubricating fluids. The current design of this test adapter is outdated so the goal of this design projects is to update and improve it through functionality, reliability, and machinability. The adapter must be easy to set up for each test and this is done through easy placement of the bearing. It is reliable in that the adapter will not move or become loose if left unattended and the internal fluid flow allows for thorough use of all lubrication to get accurate torque readings. The machinability of the adapter is improved by using simple geometries that allow for use of standard tools especially in designing the cold plate. A simple tool path and cross section is used in the machining of the cold plate.

Pulsejet technology has existed for well over a century but has only realized limited success in the aviation world. The German V-1 flying bomb, for example, used a valved pulsejet engine for propulsion. Drawbacks of previous implementations include poor fuel efficiency, limited regions of operation, and cumbersome starting procedures. The goal of this project is to make several improvements to existing valveless pulsejet technology in order to make pulsejets more feasible for use in the aviation industry. Using fluid dynamics analysis an improved engine design has been created to maximize the engine's mechanical efficiency. An integrated computer control systems utilizing pressure sensors, feedback loops, and fuel injection will support the goal of increased efficiency. The improvement is achieved through careful combustion cycle control including phase timing and precise metering of fuel injection. The twin combustion design coupled with a computer controls ignition sequence will make the engine self starting. In order to achieve this self starting feature, the controls system allows the chambers to be ignited out of phase, allowing for the inflight restart of the engine. These novel approaches to valveless pulsejet engine design will make the engine more attractive for utilization in the aviation field.

Safety and injury prevention have become a major part of the manufacturing industry over past years. Companies save tens of thousands in liability costs by insuring that employees are working in the safest possible way. As Industrial Engineers, one area of study involves the relationship between humans and the elements of their work environment. This field is called Ergonomics. Dunlee Philips is conducting an ergonomic rejuvenation of its manufacturing facility in Aurora, Il in an effort to reduce the risk of injury to its workers. Two main areas of focus involve a hydrogen furnace and exhaust tubes. The group has used several ergonomic assessment tools and computer programs to determine how unsafe these work areas are and why. The data has shown that the weights of the materials as well as the awkward movements of the operators are the main causes of risk. The group is using CAD software to design improvements to these processes. Theoretical analyses of the improved designs show significant decrease in risk of injury to the employee. In addition to these two areas, the group will also analyze and improve smaller areas that will be of little to no cost to the company.
E10  Austin Pietrobon & Nick Johnson

Electric Shifter for Formula SAE

Authors: Austin Pietrobon & Nick Johnson
Department: Electrical Engineering
Faculty Mentor: Donald Zinger
Research Category: Science, Technology, Engineering, and Math
Judging Time: 11:30-12:45 PM

The proposed project is to design an Electronic Shifter for the NIU Society for Automotive Engineers Formula team. The problem with the old pneumatic device is that it is unable to achieve neutral without an added unorthodox device to stop the plunger to an estimated spot thought to be neutral. The driver cannot see the mechanism or the engine to remedy the situation himself. This project offers the solution of designing an Electronic Shifter specifically for the NIU Formula SAE team. The project being implemented will run JRK 21v3 motor control that will control a linear actuator, which will shift the transmission. This will be dependent on the input from the driver. The JRK Motor control chip will tell the actuator to shift up, down or in neutral. The challenge is to create the correct current to run the linear actuator. The car’s 12 volt battery and alternator coil are the only power sources. The bulkiness of the devices must remain minimal and still be able to withstand the outdoors elements. This device will also withstand the standard for shifters in NIU’s FSAE program. This cheap device will be able to be replicated for every car that is made. Then this will be one less worry on the future student members of this organization.

E11  Matthew Campbell & Jared Smith

Supermileage Car Speed Measuring and Timing Device

Authors: Matthew Campbell & Jared Smith
Department: Electrical Engineering
Faculty Mentor: David Schoeder
Research Category: Science, Technology, Engineering, and Math
Judging Time: 10:15-11:30 AM

The purpose of the Supermileage Car Speed Measuring and Timing Device is to accurately measure and display velocity in Miles Per Hour (MPH), and lap time of the vehicle developed by the Northern Illinois University Supermileage Team. The vehicle will participate in two competitions and this device is required to provide the necessary information to the driver as per the rules and regulations of these competitions. The components of the design include: a sensor, instrumentation amplifier, frequency-to-voltage converter, microcontroller, touch-screen display and power module. This compact design also meets strict weight requirements, and severely reduces the effects of Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) on the circuit as a whole. The overall cost to complete and implement the design is low, less than $150.00. The circuit functions first by creating a pulse from a wheel mounted on the vehicle. This wheel is comprised of 60 teeth, each cut to the same specifications. The sensor transmits a beam, which is broken by the passing of the teeth, and thus creates a square pulse. Next, the signal is fed through an instrumentation amplifier, whose purpose is to reduce EMI and RFI. The frequency-to-voltage converter then takes the “clean” signal and converts it to a specific voltage, based on the frequency. This voltage is then routed to the microcontroller, which then displays the speed on the touch-screen display. The driver may make selections via the touch-screen to also display lap time and total running time.

E12  Audrey Pearson, Ryan Riddel, Kevin McNary, & Martin Zon

Autonomous Robot with Artificial Vision

Authors: Audrey Pearson, Ryan Riddel, Kevin McNary, & Martin Zon
Department: Electrical Engineering
Faculty Mentor: Ji-Chul Ryu
Research Category: Science, Technology, Engineering, and Math
Judging Time: 12:45-2:00 PM

This presentation documents the design of and development process for an autonomous robot designed to navigate a course and perform tasks based on both a given set of instructions and visual/sensory information obtained in real-time. This robot was designed for entry into the 27th annual Jerry Sanders Design Competition in central Illinois. The robot is comprised of four critical subsystems: (1) the “chassis”, the mechanical system upon which all sensors, internal controls, and communications are mounted; (2) the “vision system,” which is a redundant system with one solution running on the Arduino UDOO and another running on a Spartan 6 FPGA, (3) the “controls system” or “artificial intelligence” (AI), which collects all visual and sensory data and makes judgments in accordance with a preloaded instruction set, and (4) the graphical user
interface, which is used to both load instructions prior to autonomous operation and to monitor a video feed from the robot during operation. The vision systems developed for this robot have some basis in preexisting open-source projects, and as such the code written, modified, and improved for these systems will also be released as open-source projects for the benefit of the public.

E13  Mohammed Jbara & Bryan Trim

(AMSC) Advanced Meters using Smart Control

Authors: Mohammed Jbara, Bryan Trim, & Ahmad Halawa
Department: Electrical Engineering
Faculty Mentor: Martin Kocanda
Research Category: Science, Technology, Engineering, and Math
Judging Time: 9:00-10:15 AM

Advanced Meter using Smart control implements a system approach to monitoring all circuits in the household and control of individual devices connected. Using a system approach connects every power circuit and subdivides the power circuit with their working devices. Communication to the devices is made using unidirectional CAN bus connected to the server. Giving total control of the home owner’s power and power devices will give the home owner control of their electrical bill. The main control for this system will be handled using a single micro-controller operating as a web server. Using a web based server will give the home owner control anywhere there is an internet connection. The web server will also serve as a primary control and monitoring connected to individual devices. Giving the control of power usage to the homeowner will give the necessary information for better decision making for saving electrical energy in the home and will help better the environment. This information is valuable in case some involuntarily leave a TV or a computer on. Device timer can be adding to not allow for over power usage, also the web server us universal and upgradable for future development. Some future development ideas could be that the web server could act as a SMPT server or an E-Mail server. If a device is being used too much, an e-mail could be sent to the homeowner letting the homeowner that a device is consuming too much power. Additional analysis will be performed to determine the system's effect on energy efficiency in an effort to contribute to a more green-friendly home.
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• Have declared a major

Applications are accepted in January and February for the upcoming summer.

Questions can be addressed to ugresearch@niu.edu.
WWW.NIU.EDU/SROP
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Conference Registration

7:30 - 8:00 AM  
Conference Registration  
Outside Sandburg Auditorium, Main Level, Holmes Student Center

Please stop at the tables outside of the Sandburg Auditorium to register. During registration, you will receive: Conference Registration, Conference Program, Name Tag, Conference evaluation form, GSRA membership / Contact form, Lunch Ticket

We strongly encourage you to attend the entire day. You are welcome to leave your posters up for the entire day.

Make sure you explore the Regency Room for posters and Campus Resources & Opportunities in the morning. During the afternoon, Sigma Xi will hold their poster session. According to their website, “Sigma Xi is an international, multidisciplinary research society whose programs and activities promote the health of the scientific enterprise and honor scientific achievement. There are nearly 60,000 Sigma Xi members in more than 100 countries around the world. Sigma Xi chapters, more than 500 in all, can be found at colleges and universities, industrial research centers and government laboratories” (www.sigmaxi.org). If you are interested in an invitation to join the society, this would be an ideal time to speak with chapter members and leadership.

Following registration, please join us for the Breakfast Chat.

Breakfast Chat

8:00 - 8:45 AM  
Breakfast Chat – Dr. James Schmidt & Dr. Sean Farrell (History Department)  
Sandburg Auditorium, Main Level, Holmes Student Center

Dr. Schmidt & Dr. Farrell will be speaking during the breakfast chat. They both teach in the history department. Feel free to grab some breakfast, while enjoying their talk. They will also be chairing two sessions for history graduate students.

Dr. James Schmidt, Chair, History Department


http://www.niu.edu/history/faculty/profiles/schmidt.shtml

Dr. Sean Farrell, Assistant Chair, History Department

“In general, my research has focused on the links between violence and the formation of communal identities in modern Ulster. My first book, Rituals and Riots: Sectarian Violence and Political Culture in Ulster, 1784-1886, examined the relationships between Catholic/Protestant rioting and the emergence of a divided political culture in the north of Ireland. In recent years I have co-edited two volumes of essays on aspects of the modern Irish experience (with Danine Farquharson and Michael de Nie) and am currently writing a series of articles on evangelical Protestantism and popular politics in early Victorian Belfast. This summer I’ll be starting serious work on my next major project, a study of the nineteenth-century Irish and Irish-Australian intellectual and politician Charles Gavan Duffy. I am currently President of the American Conference for Irish Studies.”

http://www.niu.edu/history/faculty/profiles/farrell.shtml
University Resources & Opportunities (morning)

9:00 - 11:50  Poster Session & Campus Resources & Opportunities (morning)
Regency Room, Main Level, Holmes Student Center

Institute for the Study of the Environment, Sustainability, and Energy (ENVS)
Center for Black Studies
The Writing Center

9:00-9:50  Graduate School Presentation on Thesis and Dissertation Formatting
Lincoln Room, 2nd Floor, Holmes Student Center

Posters - Morning Session

Your posters will be up all day. Feel free to visit paper presentations and campus resources, but please use your judgement when leaving your posters.

9:00 - 11:50  Poster Session & Campus Resources & Opportunities (morning)
Regency Room, Main Level, Holmes Student Center

1  Christine Knudson  Geology & Environmental Geosciences (Dr. Walker)

Magmatic water content of Pacaya Volcano, Guatemala, determined from a thermodynamic model for the plagioclase-liquid hygrometer

Pacaya Volcano is an active composite volcano located in southern Guatemala, about 30 km from the nation's capital, Guatemala City. This volcano has variable eruptive styles ranging from non-explosive to moderately explosive. Pacaya's modern cone is accessible, and the bulk rock compositions have been well documented. Volcanic rocks from Pacaya are mostly basaltic to basaltic andesite and tend to be porphyritic, containing approximately 20-30% crystals. Data from olivine hosted melt inclusions suggest relatively low water contents for a subduction zone volcano, particularly compared to neighboring composite volcanoes along the Central American Volcanic Arc (Walker et al., 2003). The goal of this research is to use plagioclase phenocrysts in basaltic lavas from Pacaya as a secondary method to verify the unusually low magmatic water contents as reported in previous work. Water contents were estimated using the plagioclase-liquid hygrometer (Lange et al., 2009). Plagioclase crystals were selected from thin sections made of bulk rocks from five different eruptive events. Phenocrysts were analyzed using the electron microprobe at Northern Illinois University. The plagioclase-liquid hygrometer from Lange et al. (2009) is a semi-empirical model based in part on thermodynamic data. Their model works for plagioclase compositions of An93-An37, and for liquid compositions of 46-74 wt. % SiO2. This method requires an independent measurement of plagioclase crystallization temperature. The crystallization temperatures were estimated using the MELTS software package (Ghiorso and Sack, 1995).

2  Alex Haberlie  Geography (Dr. Ashley)

Warm-Season Convective Initiation Climatology for the Atlanta, Georgia Region

Hazardous weather impacts in and around large cities are becoming increasingly visible and important to a steadily increasing urban population. Existing hazardous weather studies have illustrated a regional maximum in thunderstorm activity around cities. However, no study has specifically examined the convective behavior that contributes to these maxima. This study seeks to quantify one of the thunderstorm hazards that could disproportionately impact an urban population—convective initiation (CI). To do this, an automated analysis method was developed to interrogate 17 years (1997-2013) of radar data for evidence of CI event clustering around urban areas. The method used synoptic classification and late morning conditions to stratify days that could produce land cover induced CI. Once these days were picked, each radar scan was analyzed using an object-oriented, three dimensional, clustering procedure to extract persistent thunderstorm objects and their initiation points. Only points that were spatially disconnected from existing convection were considered to further control for CI forcing mechanisms not related to land cover. The resulting climatology suggests that urban areas and even land cover boundaries can induce CI on synoptically benign days in the Southeast United States. The implications of these findings are then discussed.
More Fiber Means More Dirt? The Role of Geophagy in Diademed Sifakas

Geophagy has been observed in an increasing number of primate species, with six main hypotheses existing regarding its function: 1) toxin adsorption, 2) antacid action, 3) diarrheal alleviation, 4) parasite removal, 5) nutrient supplementation, and 6) altitude-related iron enhancement. We quantified geophagy and diet characteristics of diademed sifakas (Propithecus diadema) living in disturbed and undisturbed rainforest habitats at Tsinjoarivo, Madagascar. Geophagy was common (0.44 bouts/day or 33.3 sec/day; 0.30% of daily feeding time), and average bout duration was 76.51 sec. Seasonal variation in geophagy (lean season, 22.5 sec/day; fruiting season, 44.9 sec/day) mirrored variation in total food mass consumed. Foliage, slightly richer in minerals, and fruits, slightly lower in minerals, made up the bulk of the diet during the lean and fruiting seasons, respectively. The toxin adsorption hypothesis is not cleanly supported as geophagy is least common in the season richest in both seeds and leaves and subsequent correlations were weak. Mineral supplementation is not supported; while geophagy is highest during higher fruit consumption, higher overall food intake more than compensates for fruit's lower mineral concentrations. There was a moderate correlation between monthly soil consumption and mass of dry matter consumed ($R^2=0.00-0.56$ for each of 4 groups), but a higher correlation was found with amount of fiber (NDF) consumed ($R^2=0.31-0.73$). It is unclear whether alkaline soils could act as a viable buffer for hindgut fermenters. Further study is necessary to evaluate possible functions in alleviating diarrhea or mitigating parasitism.

Early Diagnosis of Diabetes Mellitus through the Eye

Diabetes mellitus is an endocrinial metabolic disorder characterized by high blood sugar levels which gives rise to complications in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the hemoglobin turnover, which is faster in case of diabetics and hence is a major disadvantage for diagnosing the patients in their early stages. Detection and intervention of diabetes in early stages can prolong the onset of diabetes. Alpha Crystallin, an ocular lens protein is a small heat shock protein with no protein turnover and hence acts as an archive for post-translational modifications especially glycation which forms fluorescent advanced glycation end-products (AGEs). We have used steady state and time resolved fluorescence measurements to study the spectroscopic changes in alpha crystallin with increase in time of glycation. The AGE fluorescence lifetimes are extremely sensitive to the local biochemical environments which differ in healthy and diabetic tissue. It would also serve as a baseline for discriminating fluorophores which trigger auto-fluorescence for the detection of diabetic eye disease. Fluorescence measurements from non-diabetic and diabetic human donor lenses matched the spectral profiles created using glycated alpha crystallin as a model. Overall, this study will help us to establish a diagnostic tool for early detection of diabetes mellitus.

Driving Blind: Weather-related Vision Hazards and Motor Vehicle Crashes

Visibility-related weather hazards have significant impacts on motor vehicle operators due to decreased driver vision, reduced roadway speed, amplified speed variability, and elevated crash risk. This research presents a national analysis of fog-, smoke-, and dust storm-associated vehicular fatalities in the U.S. Initially, a database of weather-related motor vehicle crash fatalities from 1994-2011 is constructed from National Highway Traffic Safety Administration data. Thereafter, spatiotemporal analyses of visibility-related (crashes where a vision hazard was reported at time of event) and vision-obscured (driver's vision was recorded as obscured by weather and a weather-related vision hazard was reported) fatal vehicular crashes are presented. Results reveal that the annual number of fatalities associated with weather-related vision-obscured vehicular crashes is comparable to those of more notable and captivating hazards such as tornadoes, floods, tropical cyclones, and lightning. The majority of these vision-obscured crash fatalities occurred in fog, on State and U.S. Numbered Highways, during the cool season, and during the morning commuting hours of 5 to 8 AM local time. Areas that experience the greatest frequencies of vision-obscured fatal crashes are located in the Central Valley of California, Appalachian Mountain and Mid-Atlantic region, the Midwest, and along the Gulf Coast. From 2007-2011, 72% of all vision-obscured fatal crashes occurred when there was no National Weather Service weather-related visibility advisory in effect. The deadliest weather-related visibility hazard crashes during the period are exhibited, revealing a spectrum of environmental and geographical settings that can trigger these high-end events.

Population distribution in the United States follows a pattern of development known as urban sprawl. The trend of urban sprawl and its associated development of pervious land cover types such as natural and agricultural land to impervious land cover types such as roads, parking lots, and structures has had significant impacts on watershed hydrology and river ecosystems. As a watershed becomes increasingly developed, the discharge of the watershed increases and in effect the frequency and intensity of flood events increases. Using the Des Plaines River Watershed as a case study, a model was made to demonstrate that the use of population density as a measure of percent impervious cover is a viable proxy to show its correlation with river discharge. Population densities of the watershed were correlated against the watershed's discharge for the decades between 1940 and 2010. The model indicated with a significance value of < 0.001 and an R² value of 0.92 that population density within the Des Plaines River Watershed was positively correlated with the discharge of the Des Plaines River. The use of population density in this model as a proxy for percent impervious cover when land cover data is unavailable provides a robust approach for revealing how variations in level of development impacts watershed hydrology.

An Examination of the Relationship Between Body Image and Bullying in Adolescents

The present study reanalyzed data from the 2009-2010 Health Behavior in School Children Survey (HBSCS) to examine how several dimensions of body image are associated with different types of bullying experienced by adolescents. Frustration and dissatisfaction with body were the most consistent predictors of more frequently experiencing different types of bullying. Despite overwhelming evidence in the literature that obese and overweight youth are more likely to be bullied, the data did not indicate significant relationships between adjusted BMI category and bullying frequency. These results suggest that it is important to look beyond weight status when planning and implementing bullying prevention and education programs.

Do Students in Developmental Reading Literacy Programs Process Text Differently than Traditionally Admitted Students?

Many students enrolled in universities and community colleges are underprepared to meet expectations for reading literacy in their courses. As such, many students are referred to a developmental education (DE) program to bolster their reading literacy skills. Referral criteria are usually based on standardized tests. However, these tests do not provide information about what students do in the process of reading. In this exploratory study, we used a computer tool, the Reading Strategies Assessment Tool (RSAT), to assess the mental processes that are involved in the course of reading. Our goal is to find out in what ways students in a DE program process the text differently from students enrolled through traditional admittance criteria. RSAT analyses revealed that DE students were less likely than non-DE students to relate the sentence that they were reading to the background knowledge that supported the comprehension of that sentence. On the other hand, these data suggested that DE students engaged in some inference processes important for comprehension similarly to their non-DE peers. Our data do not only identify mental processes that distinguish struggling readers from a comparison group, but also provide a proof of concept for the utility of RSAT as an assessment tool for a developmental program.

Image perceptions between Chinese Language Teachers and College Students in the U.S.

Visual aids, such as flashcards, posters, films, and photos, have a long history in the foreign language classrooms and textbook materials in the use of recalling students’ memory of vocabulary, phrases, and sentences (Allan, 1983; Hammerly, 1986; Seelye, 1991). The challenge in learning Chinese language lays not only on its graphemes, phonemes, and spellings are less consistent and less predictable than those of alphabet language (Miller, 2010; Chuang, Joshi, & Dixon, 2012) but also a plenty of homophones exist in the language (Hu, 2012). The focus of this study is to describe the experiences of digital visual material usage among university
Chinese language teachers in their listening and speaking class. The results of this study indicate that eastern and western cultures have different image perceptions. The results also indicates that the necessity of adapting students' opinions and perceptions while designing, modifying, and selecting class visual materials.

10  Jim Clinton Psychology (Dr. Magliano)

Similarities and Differences in Adapted Narratives

When viewing a film after reading the text version of the same story, we typically notice details that deviate from the original story. This requires one to activate knowledge from the prior narrative and use that to evaluate the content from the current version. However, little is known about the psychological processing of adapted works. The goal of this initial study was to assess the extent to which individuals perceive differences across film versions and text versions of the same narrative. Participants were asked to read or watch a story, then return a week later to experience the other version of the story. When participants experienced the 2nd version of the story, they were asked to identify the parts of the story they noticed differed from the previous version. Half of the participants pointed out differences as they occurred (i.e., “in the moment”) and half reported the differences after the fact (i.e., from memory). Preliminary analyses showed that participants identified similar locations regardless of whether they were evaluating the film or the text version and regardless of whether they were reporting differences “in the moment” or after the fact. This suggests that people process text and film in similar ways.

11  Paula Di Domenico Literacy Education (Dr. Elish-Piper)

High School Teachers’ Disciplinary Literacy Knowledge: A Mixed Method Study

In order to effectively implement the Common Core State Standards, high school teachers need to be aware of and able to instruct the literacy skills valued by their disciplines. In other words, they need to have knowledge of disciplinary literacy, or an understanding of how to construct and interact with text in a manner that attends to the norms and values of the discipline. Currently, there is a dearth in the literature as to whether or not high school teachers possess disciplinary literacy knowledge. The purpose of this presentation is to share findings from an investigation of the disciplinary literacy knowledge high school teachers from four disciplines (English, math, science, and social studies) report to possess and the knowledge they utilize while planning for instruction. The discussion will include possible avenues for professional development related to teachers’ disciplinary literacy knowledge.

12  Molly Fitzpatrick Anthropology (Dr. Irwin)

Are eastern bamboo lemurs disturbance specialists? Preliminary indications of ecological stress in Hapalemur griseus.

Habitat disturbance can have negative effects on ecosystems and species, but certain species are tolerant to, or even adapted to, disturbance. Hapalemur griseus may be especially resilient to habitat loss because of dietary specialization on bamboo, many of which colonize gaps and edges; however, little is known about the health and viability of Hapalemur in degraded habitats. This study investigated the effects of disturbance on the diet, population density, and morphometrics of Hapalemur griseus at Tsingy, in disturbed/fragmented and undisturbed/continuous forest during two dry seasons. We used all-day focal follows to study four groups (N = 2 to 8) July to September 2011, and two groups (N = 4 to 12) from June to August 2013. Morphometric data show a near-significant decrease in chest circumference in the disturbed habitat (Mann-Whitney U-test, p = 0.095). Home ranges measure 6.8-10.2 ha in undisturbed forest, and 1.1-1.8 ha in disturbed forest. Statistically significant variation between habitats was discovered in activity budget (particularly feeding and travel). Four bamboo species are consumed at both sites, making up 74% of the undisturbed groups’ diet, and 86% of the disturbed groups’ diets. Two of these species were found to contain cyanide; groups in continuous forest ingested bamboo without cyanide more frequently. The top 8 food species constitute 96% of feeding time, indicating very low dietary diversity. These preliminary results, including the combination of reduced body condition and reduced dietary diversity, suggest a cost to living in disturbed habitat, despite the observed increase in population density.

13  Sriram Jakkaraju Chemistry & Biochemistry (Dr. Horn)

Understanding the Molecular Driving Forces Behind an in vitro Enhanced Affinity Antibody through Thermodynamic Profiles

Antibodies play an important role in pharmaceutical research and medicine as they are frequently used for therapeutic and diagnostic applications. Antibody fragments are attractive alternatives to conventional antibodies for both therapeutic and diagnostic
applications. Typical antibodies possess a ‘Y’ shaped structure, containing two heavy and light chains. Antibodies possess high affinity and specificity based on the three-dimensional structures, antigens bind antibodies using complementary determining regions (CDRs). Single domain VHH antibodies produced from camels and llamas display comparable binding affinity to conventional antibodies, despite the reduced binding interface. Despite the fact that affinity maturation of an antibody for its target is quite common using library-based techniques such as phage & yeast display, antigens, very little is known about the thermodynamic origins of enhanced affinity. Here we are investigating an Anti-RNase A VHH Antibody (VHH-Mat) and its origins of enhanced affinity. ΔΔΔG values calculated from alanine scanning mutagenesis indicated that only four of the nine residues were critical for VHH-mat’s increased in affinity. To determine individual and group contributions towards antigen recognition, binding and stability studies were conducted on individual, double, triple, CDR1-only, and CDR 3-only variants that changed original wild type residues to that of VHH-mat. Several interesting trends have been observed, between CDR1, CDR3 binding loops. Altogether, these findings will help to further improve the discovery of high affinity binders for various other targets through in vitro library-based display methods.

14 Richard Jayne Geology & Environmental Geosciences (Dr. Pollyea)

Assessing groundwater recharge mechanisms in the Pampa del Tamarugal Basin of northern Chile’s Atacama Desert

In northern Chile’s Atacama Desert, groundwater is the sole source of water supplying municipal, industrial, and agricultural users. The Pampa del Tamarugal Aquifer (PTA) is the primary aquifer in this region, providing water to the cities of Iquique and Arica, as well as the economically important mining industry. It is generally accepted that groundwater recharge into the PTA originates as precipitation (~800 mm/yr) from the high Andes; however, the mechanisms responsible for this recharge are poorly understood. Currently, there are two prevailing ideas: deep hydrothermal fluid circulation through fissures below the PTA and near-surface drainage through alluvial fan networks. This study will quantify the influence of both recharge mechanisms by combining an intensive field investigation with publicly available aquifer data to develop a high-resolution numerical groundwater model of the PTA. This work builds off of preliminary results demonstrating that deep, thermally driven groundwater circulation is theoretically possible within the basin. This work is designed to result in pragmatic constraints on future groundwater resource availability in the region, and to explore long-term groundwater supplies in response to projections of extreme climate variability.

15 Heidi Johns-Fielder Speech-Language Pathology (Dr. Van Mersbergen)

Prevalence of Voice Disorders in 911 Emergency Telecommunicators

Research has shown that a career where the voice is the primary tool of the job can be of concern for an individual (Vilkman, 2000). Williams (2002) defines occupational voice disorder as excessive use or abuse of the voice at work can lead to symptoms of soreness, hoarseness, weak voice, sore throat and aphonia. Emergency 911 dispatchers are mentioned in two general studies as occupational voice users that could be at risk for voice disorders (Hunter, Tanner, & Smith, 2011; Williams 2002). To test the theoretical assumption that 911 telecommunicators are exposed to risk for voice disorders because of their heavy vocal load and increased job stress, this study assessed the prevalence of voice complaints in 911 emergency telecommunicators. A survey was sent to two large national organizations for emergency personnel with 153 respondents providing information about voice health, voice complaints, and work load. Results of the survey reveal that although 911 telecommunicators have a higher rate of voice complaints during their work day that the general population, their rate of voice disorders resembles the general population and not the population of occupational voice users. Explanations for this might include the nature, loudness, and quality requirements of the voice use.

16 Anthony Kephart Biological Sciences (Dr. Holbrook)

Multi-method analysis of Monoraphidium triacylglyceride content and composition and suitability for biofuel production.

Algae are a promising source of triglyceride biomass for use in generating biodiesels. Microalgae have significantly higher biomass production and higher lipid production rates than other energy crops. Many species are capable of growth in municipal wastewater, lowering algae production costs and reducing eutrophication effects. If wastewater is to be used as a food source, the number of suitable sites is then dependent on microalgae species performance in a variety of physical, chemical, and biological environments. Monoraphidium is a genus of algae that is capable of tolerating the annual cold temperature and lower light conditions of the Midwest. In order to verify its capacity to perform as feedstock for biodiesel, numerous qualities must be characterized. Previous work has detailed their growth, but has not directly quantified or characterized the resulting triglyceride composition of the species. My current goals are to 1) ascertain the quantity of neutral cellular lipids within Monoraphidium sp. under various chemical and
physical environments, and 2) analyze the respective triglyceride composition. Numerous methods can generate this information including colorimetric and fluorescent lipid detection, TLC plating, and gas chromatography. Thus far, our research has further shown Monoraphidium sp.'s ability to compete at low temperatures and detailed the physical and chemical changes of the medium due to algal growth. Presently, I am testing the neutral lipid load of Monoraphidium using a modified Nile red staining procedure. The process will be rescaled for use on a fluorescent plate reader and ultimately sample composition will be processed using chromatographic techniques.

17 Nicholas Kirchner Biological Sciences (Dr. Holbrook)

Lipid Loading and Optimal Growth Conditions of Monoraphidium for the Purposes of Algal Biodiesel Production.

Algae have the potential to produce biodiesel through the transesterification of extracted lipids. We are working with algal species indigenous to the Midwest that can grow in wastewater during the annual cool seasons that occur in the Midwest. Also, the algae must be able to grow in an outdoor non-sterile environment in order to make use of available infrastructure at water treatment facilities. Monoraphidium and Chlorella are two species of algae that produce extractable lipids and may be capable of tolerating a wide range of environmental conditions. Monoraphidium was able to maintain inoculant cell count (~20% total cell count [tcc]) and ~70% biomass at low light (25 µmol photons m-2s-1) at temperatures ≤10ºC. In similar conditions, Chlorella showed decreased productivity but still represented the majority of the tcc (~80%), although their biomass was only 30% of the total. Both algae can be used to create biodiesel, but Monoraphidium may be the more cold-tolerant species if started at a higher initial population density. Thus, Monoraphidium could be grown as a biofuel feedstock year-round in water treatment plants as effluent temperatures range between 10-15ºC. The goals of this project were to determine optimal conditions for the growth of Monoraphidium in a mixed culture, and to maximize the production of lipids for conversion to biodiesel. To accomplish this, it is important to understand lipid loading within algal cells. When nutrients were depleted from the media, the algae tended to increase production of neutral lipids reaching a critical point when the cultures can be harvested.

18 Nilanjana Kumar Physics (Dr. Martin)

LHC search for Stoponium and other di-higgs resonances in channels containing two b-jets and two photons

After ATLAS and CMS has confirmed the existence of a resonance whose properties are consistent with minimal Standard Model Higgs scalar boson (h) with a mass 125 GeV, the current challenge in High Energy Physics is to search for new physics that lies beyond standard model (BSM). Existence of a heavy scalar particle is predicted by various kinds of BSM theories. Our work is motivated by a heavy scalar Stoponium, a hadronic bound state of stop and anti-stop predicted by Supersymmetry which solve little hierarchy problem and predicts relic abundance of Dark Matter. In our work we have shown that phenomenologically it is possible to observe stoponium or any other heavy scalar particle that decays into pair of higgs boson at CMS or ATLAS detector in CREN in future collider runs at 14 TeV energy and 300 inverse femtobarn Luminosity. We have chosen a wide range of mass for the heavy scalar (275 GeV-1000 GeV). Our study shows a number of significant events for this decay is possible to observed over other background processes after implementing particular cuts while selecting the events in channels containing two b-jets and two photons. We have also estimated the cross section for this particular process to be observed. Based on this we came up with the exclusions in cross-section vs mass plot, which can be useful for the experimentalists while looking for the events in future collider experiments.

19 Matthew Lange Education Psychology (Dr. Tonks)

The Impact of a Threat to Academic Competence

The purpose of this study is to investigate the influence that a threat to university students’ academic competence has on their perceived autonomy, competence, and motivation in academics. A pre/post-test design was used to gather measures surrounding an academic threat to current undergraduate students (n=77). Following the threat students’ competence beliefs significantly increased, but their perceived autonomy and intrinsic motivation significantly decreased. The results support predictions of symbolic self-completion theory and self-determination theory, and suggest that the way students respond to academic threats may prevent some students from seeking the help they need.
A Genetic Association between Developmentally Regulated GTPases (DRG) and Ski Like Helicase-1 (SLH-1) in Arabidopsis thaliana.

DRG proteins are encoded by an ancient highly conserved family of examined GTP binding protein genes. DRG1 and DRG2 orthologs have been found in all eukaryotic organisms tested. Recent evidence in yeast and Arabidopsis suggests that another gene SLH-1 a DEAD-Box Helicases, genetically interacts with DRG1 and DRG2. Likewise, the DRG Family Regulatory Proteins DFRP1 and DFRP2 that generally and physically interact with their respective DRG partners. DFRP1 and DFRP2 also interact genetically with SLH-1. A triple mutation of either drg1, drg2 and slh-1 or dfrp1, dfrp2 and slh-1 produces a lethal phenotype where at some point the zygote or embryo sac appears to be aborted. This study has two aims. First, is to characterize the several double and triple mutant combinations of the drg, dfrp, and slh-1. In particular, we will focus on the embryonic lethals produced by the triple mutants in order to identify the developmental stage at which lethality occurs. The second aim is to construct a 6-His tag on the SLH-1 helicase so that antibodies can be made in order to further study the proteins physical interaction with the DRG and DFRP proteins and with ribosomes. In order to physically characterize any phenotypic change in all possible double mutations of the DRG, DFRP, and SLH-1 genes 9 mutant Arabidopsis crosses have been obtained. First, double mutants will be generated (i.e drg1, DRG2, slh-1). A second group of mutants will be generated in which the plant is homozygous for 2 mutant alleles and segregating for the third (i.e. drg1, DRG2/drg2, slh-1). Preliminary studies show that plants that are heterozygous for one allele produce what we call a “Missing Seed” phenotype in which one quarter to one half of the seeds are aborted. To determine if this abortion occurs in the gametophyte or sporophyte stage of the plants life cycle, crosses between these plants and wildtype plants are being carried out. All the double mutants are also being observed in three stages of growth. 1) Early, 1-7 days plants are grown on agar plates to see any changes in root and shoot development or in germination. 2) Middle 7-30 days in which the plants are relocated to soil and observed for any developmental changes. 3) Late 30-50 days in which the reproductive organ development and ovules are examined. Thus far many interesting preliminary observations have been made. The SLH-1 DEAD-Box Helicase consists of roughly 2100 residues. Rather than raising an antiserum against the entire protein, we chose to target two conserved regions. Region 1 is near the N-terminus and Region 2 near the C-terminus. These regions have been cloned into Qiagen vector pQE30 to generate a 6-His-tagged fusion protein. Attempts to construct antibodies are soon to be made using rabbits for the antiserum production. Once these tasks are complete a much better understanding of the physically interactions of SLH-1 should result. This report will cover the current progress and interesting data that has been obtained so far in these endeavors.

A Conceptual Model of Ice Shelf Sedimentation

A conceptual model of ice shelf sedimentation is proposed. Most marine terminating glaciers end while grounded on the seafloor as a large vertical cliff, whereas ice shelves gradually lift off from the seafloor and end with a floating terminus. The depositional processes that occur beneath ice shelves are still unobserved and very poorly understood despite the critical role they play in the stability of ice sheets. The proposed conceptual model applies unpublished sedimentation rates recorded by Dr. Ross Powell to known glaciological and geologic processes. It is capable of replicating the geometry of known ice shelf deposits through both advance and retreat at a continental shelf scale. This ice shelf sedimentation model functions as an important stepping-stone for future research, as no depositional model at the continental shelf has been published yet. The conceptual model also updates previous work from scientific literature that has been neglected for over a decade despite the recent advances glacial geologic processes. This updated adds scale, a third dimension, new geologic/glaciologic processes, and greater specificity to a neglected and often overlooked portion of glacial geology.

Dietary Assessment of a School Meal Program in Tanzania

Objective: To assess the current meal program for residents at a Tanzanian Secondary School and compare it with available nutrition standards. Design/Setting/Participants: Mixed design with interviews of school cooks (facilitated by translator) and Headmaster; mealtime observations and calculated daily intake of students. Outcome Measures/Analysis: Structured questionnaire addressing food purchase and preparation, dietary goals for students, attitudes and emphasis placed on nutrition in the school. Nutrient intake data analyzed using Nutricalc, MyPlate, and Dietary Reference Intake (DRI) goals to estimate students’ adequacy of intake compared to macro- and micro-nutrient needs. Results: The meal plan at the Nyegina Secondary School (n=511) consisted of three meals for all students (13-18y) based on the purchase plan and custom of the school. Interviews and observations determined that students routinely consumed entire meals. Estimated caloric intake, protein, carbohydrates, and dietary fiber met DRI goals along with many vitamins and minerals. However, the following vitamins and minerals fell below the DRI goals with percentages depicting students’
low estimated daily nutrient intake: vitamins A (5%), B12 (0%), and D (0%); and minerals calcium (15%), phosphorus (87%), and potassium (63%). Conclusions/Implications: For this Tanzanian school-based meal program, recommendations include improving food purchasing patterns, optimizing nutrient timing and resources, and expanding access to nutrition education and standards. Although caloric and protein needs appeared to be met, limitations in this meal program could affect these adolescents’ learning abilities and contribute to health problems typically seen in developing countries. Encouraging local stakeholders to buy into changes can lead to implementation of recommendations.

23 Shannon McCarragher Geography (Dr. Rigg)

The Effects of Amur Honeysuckle on Light Environments and White Oak Seedling and Sapling Photosynthetic Efficiency in Oak Savanna Restorations at Nachusa Grasslands, IL

White oak seedlings require high light levels and positive seasonal carbon gains to successfully establish, mature, and survive to trees. Over the past 70 years, open-canopy oak savannas communities have transformed into closed-canopy forests, in part due to the encroachment of invasive species, such as Amur honeysuckle, and shade-tolerant tree species. Additionally, there has been a recorded reduction in the number of surviving white oak seedlings. White oaks are, therefore, predicted to lose their historical dominance within the next few decades unless they have a competitive advantage over both native and invasive encroaching species. This study aimed to measure the effects of invasive species encroachment on white oak photosynthetic efficiency and carbon balance in the closed-canopy oak savanna restorations at Nachusa Grasslands, Lee County, IL. This was accomplished by: 1) measuring understory light levels using quantum light sensors; 2) measuring leaf-level carbon gains and losses for white oak seedlings using a Portable Photosynthesis System device; and 3) documenting seasonal leaf development, from bud development to leaf death, for white oak, dominant trees, and Amur honeysuckle. Ultimately, this study identified spring as a crucial time for carbon gain in white oak seedlings at Nachusa Grasslands, especially since the total seasonal carbon gain was often small. The minimum daily average light levels at which white oak seedlings were identified as achieving optimal photosynthetic efficiency, ranged between 80-310 \( \mu \text{mol}/\text{m}^2/\text{s} \). Findings from this study will be used to guide management strategies with the ultimate goal to stimulate white oak regeneration and recruitment. This was accomplished by 1) monitoring understory light using quantum light sensors to measure Photosynthetically Active Radiation (PAR); 2) measuring leaf-level carbon assimilation and respiration for white oak seedlings using a Portable Photosynthesis System device; and 3) documenting general leaf-out and senescence phenology for white oak, dominant trees, and Amur honeysuckle. Ultimately, this study found spring to be a crucial time for white oak seedlings at Nachusa Grasslands. The carbon balance in white oak seedlings was found to be marginally positive, so any additional decreases in light due to invasive species encroachment could be damaging. Minimum daily average light levels at which white oak seedlings achieved optimal photosynthetic efficiency were found to lie between 80-310 \( \mu \text{mol}/\text{m}^2/\text{s} \). Findings from this study will be used to guide management strategies for invasive shrub removal and canopy thinning, with the ultimate goal to stimulate white oak regeneration and recruitment.

24 Ellen Pudney Nutrition & Dietetics (Dr. Ozier)

Food Pantry Focus Groups to Identify Nutrition Education Needs

Objective: Identify awareness of the existing nutrition education program and the perceived benefits and barriers to eating more healthfully among food pantry clients. Theory, Prior Research, Rationale: Previous research identified the need for nutrition education development to be guided by client focus groups. Targeting perceived benefits and barriers of eating healthfully along with self-efficacy in feeding families more healthfully has also been shown to guide program development. Study Design, Setting, Participants: Focus groups with a convenience sample totaling 32 English and Spanish speaking pantry clients. Outcome Measures and Analysis: Focus group questions addressed perceived benefits and barriers to eating more healthfully, level of self-efficacy related to eating healthfully, level of awareness of the pantry’s existing nutrition education program, and interest in nutrition education programs at the pantry. The results were analyzed using Richard Krueger’s analysis strategy. Results: The most common perceived benefit for eating more healthfully was disease prevention while the perceived barrier was cost. Particularly that organic foods were “healthy foods,” yet expensive. Another barrier was kids being “picky eaters,” specifically not eating vegetables and whole grains. The level of self-efficacy in providing healthy foods for families varied greatly among clients. There was very low awareness of the current nutrition education program. Providing recipes and nutrition tips in the pantry waiting area about how to prepare, cook, and store vegetables was the most common suggestion for nutrition education. Conclusions and Implications: Perceived benefits and barriers to healthy eating potentially influence clients’ behavior. Making nutrition education convenient regarding preparing, cooking, and storing vegetables appears to be a topic of interest among pantry clients.
25  **Brandon Semel**  *Anthropology* (Dr. Irwin)

**More Fiber Means More Dirt? The Role of Geophagy in Diademed Sifakas**

Geophagy has been observed in an increasing number of primate species, with six main hypotheses existing regarding its function: 1) toxin adsorption, 2) antacid action, 3) diarrheal alleviation, 4) parasite removal, 5) nutrient supplementation, and 6) altitude-related iron enhancement. We quantified geophagy and diet characteristics of diademed sifakas (*Propithecus diadema*) living in disturbed and undisturbed rainforest habitats at Tsinjoarivo, Madagascar. Geophagy was common (0.44 bouts/day or 33.3 sec/day; 0.30% of daily feeding time), and average bout duration was 76.51 sec. Seasonal variation in geophagy (lean season, 22.5 sec/day; fruiting season, 44.9 sec/day) mirrored variation in total food mass consumed. Foliage, slightly richer in minerals, and fruits, slightly lower in minerals, made up the bulk of the diet during the lean and fruiting seasons, respectively. The toxin adsorption hypothesis is not cleanly supported as geophagy is least common in the season richest in both seeds and leaves and subsequent correlations were weak. Mineral supplementation is not supported; while geophagy is highest during higher fruit consumption, higher overall food intake more than compensates for fruit’s lower mineral concentrations. There was a moderate correlation between monthly soil consumption and mass of dry matter consumed (R^2=0.00-0.56 for each of 4 groups), but a higher correlation was found with amount of fiber (NDF) consumed (R^2=0.31-0.73). It is unclear whether alkaline soils could act as a viable buffer for hindgut fermenters. Further study is necessary to evaluate possible functions in alleviating diarrhea or mitigating parasitism.

26  **Robert J Srygler**  *Biological Sciences* (Dr. Stafstrom)

**Targeted Gene Knockout Using MultiSite Gateway Three-Fragment Recombination to Study DRG and Related Genes in the Moss Physcomitrella patens**

DRGs are highly conserved members of the TRAFAC class of GTP-binding proteins (G Proteins). This group includes the Ga subunit of the heterotrimeric G proteins. There are 13 groups of G proteins that are believed to have been present in the Last Universal Common Ancestor (LUCA). This ancient protein family includes transcription initiation and elongation factors (IF2, EF-Tu), Small G proteins (Ras, Ran, etc.), and DRGs. G proteins are often involved in signal transduction, being activated with GTP and deactivated with GDP. Archaea have one Drg gene, and all studied eukaryotes have at least one representative of the Drg1 and Drg2 orthologous groups. Our lab has used Pea, and the model plant organism Arabidopsis thaliana to study the function of Drg and other related genes. We are currently working on deleting genes of interest in the moss Physcomitrella patens in order to take advantage of its unique properties. There are several benefits that Physcomitrella patens offer that are not present in the other two plants. The majority of the lifecycle of moss is spent in the gametophytic phase. This phase is haploid, so there is only one copy of a gene to be removed. Under the proper conditions, *P. patens* can be kept in this phase indefinitely. Another benefit is that the gametophyte has a filamentous growth pattern. This allows easy observation of individual cells, which is not possible in plant tissues that have three-dimensional growth patterns. The most important feature of *P. patens* is that it has a high rate of homologous recombination. It is this phenomenon that allows for targeted gene knockouts. Homologous recombination is used in research with organisms such as yeast, but is not known to occur in other plants. The MultiSite Gateway Three-Fragment recombination system is used to target the specific genes in *P. patens*. This is performed by cloning a region of DNA, both upstream and downstream of the gene. These two cloned regions are then inserted into a single plasmid with a resistance gene for a selectable marker inserted between. This new construct is cut from the plasmid using restriction enzymes, and finally inserted into the moss protoplast. Homologous recombination causes the inserted DNA to recombine with the target on the chromosomal DNA. The moss is then grown on media that will select for cells with the resistance gene. Any cells that grow will be lacking the targeted gene. After deleting the genes from the moss chromosome, we can study the effects of these mutations at the cellular and organismal level. Importantly, we can study effects that occur in the haploid gametophyte stage. This is very difficult to do in higher plants due to the dominance of the sporophyte generation.

27  **Dan Tattersall**  *Statistics* (Dr. Polansky)

**Analysis of Multi-Level Networks using ERG Models**

Networks form complex dependence structures that, while giving a contextual environment to observations, create difficulties in modeling. This research explores the theory behind Exponential Random Graph Models for networks with an uncommon application to multi-level networks. The study of multi-level networks is interdisciplinary, and by creating a method to model them, we can move beyond descriptive statistics and into statistical inference.
Members of the Glycosyltransferase family 43 (GT43) have been found in plant and animal kingdoms where they catalyze different reactions. In plants, they are known to be involved in the elongation of the xylan backbone and the addition of sidechain residues to this backbone. Xylan, comprising about 30% of the plant secondary cell wall in monocots, crosslinks the cellulose and lignin chains providing rigidity to the plant cell wall. Interestingly, no GT43 proteins have been found in the lower level eukaryotes yet. With recently available next generation sequencing (NGS) data, here we mined transcriptomes of 37 different plant and algal species that do not have fully sequenced genomes, including 3 ferns, 5 liverworts, 2 hornworts, 15 charophycean green algae (CGAs), 11 chlorophyte green algae and 1 red algae for any GT43 homologs. We have found GT43 homologs in 21 out of the 37 species, which include 2 hornwort species, 5 liverworts, 3 ferns, 10 CGAs and only 1 chlorophyte green algae. Further blast search with the single chlorophyte homolog as query revealed a single homolog in even more ancient choanoflagellate. Interestingly, the CGA homologs formed a separate clade from the rest of the plants, which is ancestral to all the GT43 proteins in higher plants. We also predicted 3D tertiary structures of the Arabidopsis IRX9 and IRX14 proteins which have been experimentally shown to be involved in xylan backbone synthesis. We plan to examine multiple sequence alignment of GT43 proteins to identify conserved sequence motifs and further map the motifs onto the predicted structures, which would provide us new insights into the functions of these proteins. Overall, we hope to achieve evolutionary and structural insights into this important family of enzymes in plants.

The focus of this research proposal will be to investigate the links between family expressiveness, attachment, and communication patterns in the intimate relationships of young adults. More clearly, the study will attempt to examine the extent to which the level of emotional expressiveness in the family of origin influences the individual's adult attachment style, and therefore the way he/she communicates during conflict in his/her intimate relationship.

As a doctoral candidate in Literacy Education, my program has focused on guiding conditionally-enrolled students to a better understanding of the reading and study strategies needed to be successful at the college level in several of the disciplines encountered within general education requirements. In the fall 2013 semester, that parameter narrowed to single focus of reading and studying in introductory psychology. This action research project enabled me to serve as both practitioner and researcher, allowing course requirements and learning needs to continuously inform the curriculum in my reading and study strategies course. Through individual and group interviews, observations, checklists, and document analysis, I have been able to glean insights into the challenges students face in introductory psychology. My hope is to share these insights in order to help students better prepare to face discipline-specific challenges and ultimately, to experience greater academic success.

The ability to write clearly and correctly is a fundamental skill required for academic success. Bilingual students often find it challenging to spell correctly at the expected level. The transferability across languages involved in writing is evident when considering language proficiency. The influences seem most evident at the level of surface features of written text (Cronnell, 1985). Furthermore, bilingualism undeniably affects children’s literacy development (Bialystok, 2002). Polish-Americans constitute a major ethnic group consisting of many speakers of English. Despite this, the writing and spelling of Polish-Americans has not been studied in depth. Thus, the purpose of this study was to determine if the dominant oral language of Polish-American students (English) influences their spelling in Polish, in comparison to native Polish speakers in Poland. Twenty Polish words were selected to represent the developmental spelling features established on the Words Their Way Elementary Spelling Inventory (Bear et al., 2000). Additionally, the Spanish spelling feature chart provided in the Words Their Way Elementary Spelling Inventory (Bear et al., 2000) was adapted to Polish by the investigator who is a bilingual, native Polish speaker and teacher. Many Latin words have been adopted in Polish, making Polish similar to Spanish in several ways, for example its shallow orthography. A total of 50 participants, 25
bilingual Polish-English speaking students and 25 monolingual Polish students in third grade (ages 8 to 10), were asked to complete
the spelling test dictated to them by their teacher. The spelling test was part of the normal curriculum in the weekend Polish school.
The collected data were part of the curriculum for the Polish school in the US, and in Poland as part of a collaborative educational
effort. The data obtained in Poland were provided by a Polish teacher via an anonymous spelling test taken by the third grade
students on May 14th 2013. The data collected at the weekend Polish school in Illinois were taken during the Spring 2013 schoolyear
and were deidentified by replacing names of the students with ID numbers. No other identifying information was present on the
data. Therefore, this existing data was available to the investigator for retrospective analyses. All documents were scored for overall
correct spelling by the investigator and double checked by a native Polish speaking independent teacher from the weekend Polish
school in America. The misspellings were then coded for developmental spelling features, linguistic category, complexity of the word
(e.g. length, silent letters, consonant clusters, and vowel sounds that are different in English) by using the Developmental Spelling
Inventory (Bear, 1989). The misspelling scores and the specific developmental spelling feature errors were first analyzed descriptively
and then analyzed with a T-test for any group differences by country (America vs. Poland), and gender using SPSS statistical
software. A preliminary literature review to support the research will be presented at the conference. This review will highlight the
importance of looking at spelling features rather than word accuracy and may aid educators in identifying underlying spelling error
patterns impacting a child’s Polish spelling.

CISLL Affiliated posters focusing on Second Language Learning
Organized by Dr. Reichle

Sabie Zenku Baftiri & Anna Strozza, Implicit/Explicit Instruction and Its Effects on Second Language Learning
Marion Gibney-Desmaison, Social/motivational factors and the Unified Competition Model for Second Language Learning
Nathan Pontus & Jose Badillo, Frequency effects second language learners and the declarative/procedural model
Joseph Catalano & Gina Collura, The significance of visual stimuli and cues in second language acquisition
Theodore Sikubwabo & Gail Cappaert, Learner factors on second language acquisition
Nicolas Born & Breanne Bijonowski, Individual variables and second language learning
Brandon Makthepharaks & Kristopher Strickland, Second language semantics

Paper Session 1

Most sessions will not have a chair to monitor time (except Session A & D). If there are three presenters in the session, allow up to 15
minutes for each paper. If there are four presenters in the session, allow up to 12 minutes for each paper. You may allow for questions
following your presentation, during lunch, or our closing reception.

10:00 - 10:50 Paper Session 1

Session A: “Contestation and Consensus in the Pre-War British Empire”
Chair: Sean Farrell, Ph.D.
Lincoln Room, 2nd Floor, Holmes Student Center

Ian Burns History (Dr. Farrell)


Scholarly examinations of the affects of the Howth gunrunning operation of July 1914 have largely suggested that the event radically
affected the stated views of the Irish Volunteer Force (IVF), directing the organization’s membership toward a more wholly separatist
stance regarding the future of Ireland. However, this paper makes the case that a full analysis of the rhetoric of violence present in
primary sources display that a significant portion of nationalists were already highly radicalized, and ready to resort to the use of
aggressive violence if circumstances permitted as early as June of 1914. Crucially, any type of violent action was made impossible
without the importation of a vast quantity of usable rifles and unrealistic until the successful mass arming of separatist Volunteers,
which the Howth operation was unable to accomplish. This paper seeks to show that the real significance of the arms landing at
Howth is, therefore, the way in which separatist Volunteer leaders successfully used the incident as an integral element in a wider
propaganda campaign, directing other Irish Volunteer members toward a more radical stance by exaggerating the gun landing’s
significance. Moving beyond traditional points of analysis that have obscured tangential effects, I argue that Howth was for many
typical Volunteers a critical juncture in an incremental process of radicalization. At the same time, for Irish Nationalist elites Howth
justified the furtherance of militarized rhetoric and later violent action by displaying how easily the IVF could be manipulated by a
small group of motivated conspirators.
**David Downs History (Dr. Farrell)**

‘The protest was left to a few members’: Nationalist Criticism and the Reunification of the Irish Parliamentary Party

In his award-winning study of British imperial culture, Andrew S. Thompson argues that imperial issues became central at all levels of British political life during the last years of the nineteenth century, illustrated by the proliferation of imperial interest groups that were often associated with the major political parties at Westminster, as well as a boom in the discussion of imperial matters in the British mass media and in venues such as music halls and the theatre. During the years 1899-1902 a vocal and moderately influential anti-war movement existed in Britain, as has been discussed by such scholars as Gregory Claeys, Martin Ceadel, and Paul Laity, to name a few. This was also the case across the Irish Sea, as nationalists of many stripes mobilized anti-war and anti-British rhetoric throughout the highly unpopular conflict. Nationalists were often vocal in their support for the Afrikaners, who seemed to share certain similarities with nationalist Ireland. Nationalist institutions and organizations across Ireland issued public proclamations in support of the Afrikaners, despite the risk of censorship and reprisal by the British state. Many nationalist political leaders incorporated anti-war rhetoric into political rallies, public debates, and other forms of mass political propaganda. This may have been in response to public outcry directed at nationalist political leaders, who were seen as complacent in their support of the nationalist cause, with low attendance in Parliament by nationalist MPs and little coherent or effective criticism of the government’s pro-war policies. Closely examining the nature of anti-imperial war rhetoric in nationalist Ireland during the South African War, this study illustrates how opposition to the war created a kind of common language that was shared across the broad spectrum of Irish nationalism, thus beginning a movement that would have farther reaching implications for Ireland.

**Kevin Luginbill History (Dr. Farrell)**

‘For the Peace and Civilisation of the World’: The 1903 British Imperial Reform Campaign

Much of recent scholarship on Great Britain and its Empire has focused on the question not only of the extent to which Britain shaped and controlled its colonies, but how in turn those colonies affected British society and the lives of individual Britons. How the British formed their national identity and interacted with the wider world was in great part shaped by its control, either directly in the colonies or indirectly through its preeminent economic and financial power, of an enormous part of the world. But in spite of this interest in all matters imperial, the 1903 imperial reform movement has received scant attention in recent historical work. This paper aims to highlight the centrality of the Empire in this heated political debate, examining the dialogue it produced in the press and Parliament, and between colony and mother country. Conceived by its foremost supporters as a means of reforming the Empire, the debate over economic and trade union stirred controversy that cut across traditional political lines, and challenged politically-minded Britons to question the very foundation of the country's traditional economic and ideological identity. Faced with the contradiction between reform's deeper implications and traditional values, Britons were forced to either reaffirm their adherence to those traditions or embrace new visions of the British nation and the Empire offered up by the movement.

**Session B: Illinois Room North, 2nd Floor, Holmes Student Center**

**Mohammad Ahtar Mechanical Engineering (Dr. Pohlman)**

Towards Smooth Flow in a Granular Conveyor.

The transportation of granular material provides challenges for many industries from agriculture to pharmaceuticals. Phenomena such as convective acceleration result in wasted energy when motion is opposite or perpendicular to the primary direction of conveyance. Additionally, adjustable flow rates may be necessary based on the transient demands of the receiving vessel or conversion reactor. This thesis proposes to use experiments in a flighted conveyor to examine the velocity and energy consumption of transport. Methods including computer vision, in addition to a digital scale and integration software to attempt to achieve automated flow control out of a flighted conveyor that result in constant mass accumulation for any given desired feed rate with minimal energy loss from convective acceleration.

**Fardin Khalil Mechanical Engineering (Dr. Majumdar)**

Three-dimensional CFD and Aeroacoustics Analysis of Wind Turbine Performance

Wind turbines release aerodynamic noise that is one of the most barriers in wind energy development and public acceptance. There
is a strong need to find noise reducing wind turbine blade design concepts and technologies and develop them to further expand wind farm. Aeroacoustics is the noise generated by the interaction of blades, specifically the tip and trailing edge, with inflow turbulence structures and subsequent boundary layer separation and vortex shedding in the wake region. The objective of this study is to analyze the effects of different aerodynamic conditions on the performance and the aeroacoustic issue of wind turbines with the purpose of developing a better design and noise reduction means for the system. Aerodynamic and aeroacoustic operation of a wind turbine is analyzed using a three-dimensional CFD and aeroacoustics model and using a commercial CFD Software. Blades are modeled based on NREL S825 airfoil shape due to its high maximum lift and low profile drag. Wind turbine aerodynamic performance as well as broadband aeroacoustic noise with a focus on the trailing end, tip, inflow turbulence and boundary layer separation is investigated over a range of operating conditions.

Ilia Mokhtarian Mechanical Engineering (Dr. Fallahi)

**Design of a Six-legged Walker for Tug-A-War and Track Competition**

The objective of this study is to design a leg for a walker. This is achieved by selecting and scaling a Hoeken Mechanism to a size of designer choosing. The Hoeken mechanism then is augmented with a pantograph mechanism to flip the path of the foot and to scale it up to achieve a more efficient motion for walking. The walker will use six Hoeken-Pantograph mechanisms. The legs are divided into two groups such that at any time three legs are on the ground and three legs are lifting and stepping forward. The walker will be used as a class project for a mechanism design course at the Department of Mechanical Engineering at Northern Illinois University. The walkers will participate in a tug-a-war and track competition.

Session C: Heritage Room, 2nd Floor, Holmes Student Center

Dennis Awen Adult & Higher Education (Dr. Archer)

**World Music is World Diplomacy (Why We Should Teach and Learn World Music)**

Every day we are busily engaged in academic studies, work, etc. The society that we live in is not only concerned with local news and issues but international events as well. For example, the world experienced North Korea making threats by launching nuclear attacks on the United States and on South Korea earlier this year. Worldwide human conflict is inevitable due to political, military, and diplomatic reasons; however, there are two ways resolving conflict: (1) using military and physical violence whether they carry good or bad intentions, and (2) pursuing diplomatic and peaceful efforts. Teaching and learning world music is a topic of great interest within elementary school, middle school, high school and in universities. It teaches students about different people, languages, and cultures that exist throughout the world. It also should be a topic of great importance among adult learners. This paper focuses on why teaching and learning world music can be an important conflict resolution strategy for adult learners, especially when dealing with people of different nationalities and cultures. It includes background on conflict and conflict resolution, explores the origins of conflict and violence, discusses some theories about music, explores applications of world music and conflict resolution in the Middle East, and analyzes the potential on how world music can be used to help resolve conflicts between North and South Korea and the United States.

Doug Engelman Sociology (Dr. Markowitz)

**How Families Become Grounded Within the Chaos that is Mental Illness**

When persons initially experience symptoms of mental illness, many refuse to acknowledge this to themselves or to family members. This denial may be a direct result of anticipated stigma and fear of rejection on the part of the family. In a society that perpetuates negative attitudes towards those with mental illness, families experiencing symptoms for the first time may anticipate a negative trajectory for their family, and the family member with mental illness. Numerous studies document the effects of mental illness; strained and distant relationships with immediate family and extended family. Through analysis of family interviews, I look at the attitudes and aspirations of three families who are dealing with a recently diagnosed child, and one adult child dealing with a parent who has been under treatment for many years, and who has never known life without mental illness in her family. Using a grounded theory analytical approach, I identify ways in which these families grapple with the issues surrounding their family member with mental illness. “To Live Without Hope is to Cease to Live” Fyodor Dostoevsky.
Becoming a Visualizer

As someone in the arts, it is important to move beyond analyzing visuals. Technology has created an opportunity for access to data and information, which allows researchers more time to explore the data itself. Becoming a visualizer requires the researcher to explore and communicate in more dynamic visual ways. Visualization requires care in selection of methods to find or share information appropriately. These acts can be assisted by technology to varying degrees or done by hand. This presentation will share my own journey to becoming a visualizer and the benefits I perceived from researching in this way.


Charles and Ray Eames employed the medium of film as a way to explore the design constraints of a particular project and a way to explore ideas interesting to the couple surrounding a particular subject or concept associated with their films. This paper examines two films of Charles and Ray Eames, Glimpses of the USA (1959) and The Powers of Ten (1977), in an effort to recuperate the scholarship of Eames' films. This paper seeks to understand the films as visual culture and as a representation of a post-structuralist hyperreality created by the designers. I will argue that the Eames' films created a sense of hyperreality as specifically illustrated in the Glimpses of the USA and the Powers of Ten. Generally, hyperreality is a collection of images that create a definition of a reality that, while sometimes distorted, blends the real and the artificial image in a way to create a new reality with no clear distinction between the real and the created image of the real for the viewer. The scholarship of the Eames' films can be seen as complexly situated between fields rather than singly within film studies or design history. The films rather exist as a complex expression of talent of the twentieth century’s most enigmatic design couple as they explore new expressive, communicative formats, as well as the reception and cognitive experiences of learning and perception of the viewer.

Paper Session 2

Most sessions will not have a chair to monitor time (except Session A & D). If there are three presenters in the session, allow up to 15 minutes for each paper. If there are four presenters in the session, allow up to 12 minutes for each paper. You may allow for questions following your presentation, during lunch, or our closing reception.

11:00 - 11:50 Paper Session 2

Session D: “Changing Notions of Immigrant Labor in America.”
Chair: Jim Schmidt, Ph.D.
Lincoln Room, 2nd Floor, Holmes Student Center

Nicole Dressler History (Dr. Fogleman)

To Pass “As Free People”: Runaway Indentured Servants, Convict Servants, and Slaves and the Reinvention of Identity in Eighteenth-Century Virginia

Throughout the eighteenth century in Virginia, many indentured servants, convict servants, and slaves responded to their bondage by escaping from authority figures and integrating into free communities. Although historians have examined runaway laborers in the context of colonial servitude and slavery, few scholars have thoroughly explored runaways’ measures to pass as free people. Despite harsh legal consequences for running away, hundreds of bound laborers chose to escape, adding to planters’ worries over labor management. Masters published newspaper advertisements describing their runaway laborers, offering rewards in exchange for their capture, and warning people of the legal consequences that followed if they assisted escapees. Drawing upon colonial newspaper advertisements for runaways from the 1740s through the outbreak of the American Revolution, this paper explores how escaped laborers endeavored to sustain their freedom. The ads illustrate that laborers sought to transform their status from bound to free using six different strategies: manipulation of visual identities, command of language, knowledge of domestic activities, thefts, violence, and formation of alliances. Runaway advertisements are one of the few genres of eighteenth-century texts that depict bondsmen as the focal point of the documents, providing historians a unique window to better understand the actions and relationships of those who rarely left behind records. These ads demonstrate that runaways devised creative strategies and managed
vital resources to reinvent themselves as free people. More significantly, Virginia’s runaway advertisements reveal how race, gender, and class became an integral part of the narrative of colonial Virginia’s laborers.

Robert Marach History (Dr. Schmidt)

Blood of Our Generation: Union Veterans and Immigrant Labor

This paper examines the Grand Army of the Republic’s attitudes towards immigrants and labor in the United States. I argue that through nativist tendencies such as persecution of immigrants and immigration restriction laws, The Grand Army of the Republic organization that attempted to bolster their own self-interest at the expense of immigrants. By teaching a narrow definition of citizenship that included absolute loyalty and devotion to the United States, they solidified their authority as the paradigm of citizenship. It begins by discussing radical political ideologies that veterans strictly opposed. It also talks about veterans’ beliefs of how immigrant laborers used radical political ideologies to undermine the American system. The paper then shows how Union veterans used their significant political connections to initiate immigration restriction laws. This study contributes to the historiography of Civil War veterans by exploring the role that the legacy of the war had on factors such as immigration and labor relations. The following excerpt is drawn from newspaper reports and records of Union veteran organizations.

Benjamin Schmack History (Dr. Feurer)

“Everything Despicable and Backward and Reactionary”: The Struggle of Radical Coal Miners in Southern Illinois

My paper examines how the radical immigrant miners of Zeigler, Illinois preserved radical sentiment in Southern Illinois during the mid 1920s, despite the decline of both the coal industry in the region and radicalism within the United Mine Workers of America (UMWA). In particular, it focuses on a little known court case involving thirteen members of UMWA Local 992 of Zeigler, Illinois. The case, “The People vs. Henry Corbishly et. al.,” saw a remarkable collusion between the Bell and Zoller Coal Company, the UMWA, the Ku Klux Klan and the courts to suppress the rights and voice of the radical immigrant laborers within UMWA Local 992. The Zeigler miners used their Communist connections, particularly in William Z. Foster’s Trade Union Educational League and the International Labor Defense, to publicize, fund and support their struggles. Their efforts bridged the gap between the defeats to organized labor in the early 1920s and the radical “dual unions” of the late 1920s and 1930s, which found a strong base of support in Zeigler. This paper differs from previous literature in that the paper pertains to grassroots trade union activism during the 1920s, which is a period often neglected by historians due to the perceived lack of success of the movement before the “popular front” of the mid 1930s. In addition, the majority of the existing literature neglects thorough analysis of Zeigler and the aforementioned case, despite the remarkable window that they provide into the everyday realities and tribulations of immigrant miners during the 1920s.

Session E: Illinois Room, 2nd Floor, Holmes Student Center

Chenda Hong Educational Technology, Research, and Assessment (Dr. Walker)

Simple linear regression: income and happiness relationship

Are wealthier people happier? To answer the question, this research study employed simple linear regression analysis to confirm the positive bivariate relationship between income and happiness. The study obtained the secondary data from Inter-University Consortium for Political and Social Research by selecting only 959 participants living in New York City. The participants were selected by using representative random sampling method. There were 457 females and 502 males which were equal to 47.7% and 52.3% respectively. The results indicated that there is a statistically significant positive relationship between income and happiness; however, the relationship is really weak, which is consistent with the previous research studies (Howell & Howell, 2008 as cited in Boyce et al, 2010; Easterlin, 2001). The study confirms Easterlin’s theory that over life time, happiness tends to remain stable in spite of the growth of income. Thus, the answer to the research question is “yes” people who have more money are slightly happier than those who have less. The limitation of the study is that it can only reveal the correlation between income and happiness, but not causation. The research study cannot tell if income is the cause of happiness. Furthermore, as income is slightly related to happiness, future research should extensively include more independent variables in the study such as age, health, education and employment.

Hans Muehlsler Educational Technology, Research, and Assessment (Dr. Smith)

The DuPage County Regional Office of Education Physics Exam: An overview and psychometric assessment

This study assessed the DuPage County Regional Office of Education (ROE) Physics Exam. Mechanics, electricity & magnetism
(E&M), and wave phenomena were the primary constructs. The exam was intended for and administered to first-exposure physics students of all levels. The most recently completed version was psychometrically assessed for unidimensionality within the constructs using confirmatory factor analysis (CFA) with robust WLS estimation. Reliability indices indicated consistency of scores (αMechanics = 0.87, αE&M = 0.91, αWaves = 0.55). An item analysis using a 3-PL IRT model was performed on the mechanics items (N=1124, a=1.04, b=1.02, c=0.25) and a 2-PL IRT model was performed on the E&M (N=586, a=1.12, b=-0.65) and waves items (N=586, a=0.41, b=-2.3); a distractor analysis was also performed on all items. Lastly, differential item functioning (DIF) and differential test functioning (DTF) analyses, using the Mantel-Haenszel procedure, were performed using gender, ethnicity, year in school, ELL, physics level, and math level as groupings. Significant differences between groups were detected, but follow-up by an expert panel failed to detect and explain the differences. Evidence establishing validity has been building. It has been concluded that the DuPage ROE Physics exam, with the exception of the waves construct, provides reliable scores, with appropriate psychometric properties for its given purpose.

Michael Ribant Geography (Dr. Greene)

Modeling the Accessibility of Chicago's Public Transit: A Dasymmetric Mapping Approach for Handling Shortcomings in Census Data

This paper describes techniques to more accurately compute and map population accessibility measures for Chicago's bus and rail lines. It uses dasymmetric mapping to generate the spatial distribution of population, yielding more precise population density estimates than traditional mapping methods. It also uses ancillary mapping techniques intended to visualize the sampling errors inherent in today's census data. Modeling transit accessibility using census data has become more challenging recently for two reasons. First, transit accessibility modeling is commonly displayed using traditional choropleth methods, which aggregate results to arbitrary areal units such as census tracts, thus hiding the variability of the underlying data. Second, the American Community Survey has replaced the decennial census as the official source of demographic data and while this data is more timely than that provided in the past, it is sample-based and thus has inherent sampling errors which are both wide and widely misunderstood. This research asks the following questions. First, can the dasymmetric mapping method be applied to cartographically represent the results of transit accessibility in Chicago more effectively than choropleth mapping? Second, can the labyrinth of error reporting inherent with current data reporting from the American Community Survey be articulated visually? By employing dasymmetric mapping and geovisualization techniques to demographic data supplied by the American Community Survey, this research shows that transit accessibility measures for Chicago can be more accurately portrayed with dasymmetric mapping relative to choropleth techniques, and that the inherent errors of the underlying sample data can be simply understood visually.

Elizabeth Ford-Baldner Speech-Language Pathology (Dr. Van Mersbergen)

A Preliminary Study on the Establishment of Vocal Effort Ratings

Vocal effort is the perceived exertion of voicing. Patients with voice disorders frequently complain of increased effort, but currently there exists no empirically validated scale for the measurement of vocal effort. This study investigated the use of a psychophysical scale, the Borg CR-10, for vocal effort ratings. 30 participants with voice disorders and 28 healthy controls underwent acoustic and aerodynamic voice measures with task-specific vocal effort ratings using the Borg CR-10. The results indicate that the Borg CR-10 is not sensitive to the presence of a voice disorder, and therefore cannot be used as a clinical diagnostic tool for vocal effort. However, the scale does correlate moderately well with other measures of severity, and may be clinically indicated for such use. Future research directions are discussed including task-specificity of effort ratings, considerations during PTP protocols, intensive examiner and examinee training, and use of the Borg CR-10 for within-group separation of voice disorder diagnosis.

Session F: Heritage Room, 2nd Floor, Holmes Student Center

Benjamin Maloney Geography (Dr. Greene)

The Impact of Churches on the Assessed Value of a Parcel: A Hedonic Model Study in Houston, TX

The hedonic regression model is a revealed preference method that is used in order to estimate the value. The model breaks down the item under analysis into its constituent parts or characteristics and ultimately calculates the contribution of each part to its value. This demands that the item is able to be broken down into parts that a consumer would value and/or affected by its characteristics. Therefore, the hedonic model could potentially be applied to items like vehicles, furniture and PCs. Because a house can also be broken down into component parts with different individual values; such as the number of bedrooms, bathrooms, the square footage,
and number of fireplaces, the most common use of the hedonic model is found within the real estate market. While the structural components of a home are the most commonly used variables in the regression, other considerations include the neighborhood characteristics, such as the presence of bike lanes, and environmental effects like the overall air quality, distance to the nearest park or even proximity to the local garbage dump. Few papers have examined how the presence of a church impacts the value of a home (Carroll et al., 1996; Do, 1994; Babawale and Adewunmi; 2011). This article adds to research by investigating 2,500 parcels across two different study areas within the city of Houston, TX using 2013 tax data through the use of the Ordinary Least Squares Regression, Spatial Lag Model, and a Geographically Weighted Regression along with LISA result mapping.

Devin Moeller  Geography (Dr. Murphy)

The Energy Return on (Energy) Investment of Gas Extraction in the Marcellus Shale

The recent development of hydraulic fracturing and horizontal drilling have led to the increased extraction of natural gas from shale resources in the U.S. The Marcellus Shale in Pennsylvania specifically has witnessed a large boom in gas production over the past decade. But the rapid development of this resource has led to a number of environmental, economic, and energetic questions, including, how does the energy return on energy invested (EROI) of shale gas compare to that of conventional gas production? There is no existing literature detailing the EROI of shale gas extraction, but there are a number of LCA studies that estimate the greenhouse gas emissions from shale gas extraction. We utilized this literature to develop our EROI framework. Specifically, we used this literature to develop both a process-based model that estimates the direct energy costs associated with shale gas extraction, beginning with well-pad preparation and ending with site reclamation, and an economic input-output model to estimate the indirect energy costs. As such, this work represents a hybrid-EROI estimate, utilizing both process-based and economic input-output LCA methodologies. We estimated the energy produced by a typical gas well in the Marcellus Shale directly from the production data collected by the Pennsylvania Department of Environmental Protection. Preliminary results show an EROI ranging from 17:1, based on a lower estimate of average lifetime well production, to many times that, based on a higher average lifetime well production.

Sandhya Radhakrishnan  Economics (Dr. Wilcox-Gok)

Measuring the Efficiency of Hospital Mergers in the 21st Century

Hospital mergers have been a topic of interest to policy makers, anti-trust agencies, health economists and also to the recipients of healthcare services, especially with the rising healthcare expenditures in recent years. Can mergers be one solution by which a relatively inefficient hospital (inefficient due to low levels of service or high cost of service) made more efficient by consolidation with more efficient hospitals? There are number of ways by which economists can evaluate efficiency gains (or lack thereof) due to mergers. Existing empirical methods may be inadequate because they impose much structure or because they presuppose hospital mergers behaving like competitive businesses, which is generally not the case, especially for charity or government hospitals. The purpose of the proposed research is to reexamine an existing topic from a fresh approach with the help of new methodologies and tools and draw a logical conclusion using real time data. Further analyses include efficiency comparisons of merged hospitals of various sizes, ownership types, and urbanization levels. The merged hospitals are then compared to a group of hospitals that did not undergo any merger (control group) so as to identify the effect of mergers, if any. Unlike previous studies, my research analyzes the merged hospitals for a longer period following the merger and also focuses on the hospitals that are acquired (usually the smaller hospitals) by bigger hospital chains. The data for this study are obtained from American Hospital Association and Irving Levin Associates for the years 2001 to 2011.

Peiyong Yu  Economics (Dr. Groves)

The impact of eminent domain for private development on property values

This paper investigates the impact of two eminent domain cases for private development on property values in Rochester, New York. Findings indicate that the Midtown Plaza (MP) redevelopment project has positive policy externalities across the city: the citywide housing prices increased by 10.7% and homeowners gained a 3.2% property value rise when they moved one mile closer to the MP after the policy announcement. However, homeowners lost 44% of their property values if they lived in the MP neighborhood and lost another 7.3% of their property values if they lived within 0.5 mile radius of the MP neighborhood. The citywide housing prices dropped by 8.2% after the MP demolition started. Homeowners living within 0.5 mile radius of the MP neighborhood gained an 8.7% property value rise after the start of MP demolition. The citywide housing prices dropped by 6.8% after the start of Brooks Landing (BL) site demolition and homeowners suffered a 1.4% property loss if they moved one mile closer to the BL site under demolition.
Conference Luncheon

12:00 - 12:45    Conference Luncheon
                 Blackhawk, Lower Level, Holmes Student Center

Lunch is free with your lunch ticket. Please drop them off in the box when you enter.

Keynote Speaker

1:00 - 2:00    Keynote Speaker: James McLurkin
               Sandburg Auditorium, Holmes Student Center
               Lunch is free for the first 100 registrants with a lunch ticket. Please drop them off in the box when you enter.

“My goal is to understand where intelligence comes from, how it works, and how to construct artificial intelligence on real robots.”

As a child, James McLurkin was constantly building with LEGO bricks, cardboard boxes, or any other materials he could access. Today, he continues this tradition using Mother Nature as a model, researching and developing algorithms and techniques for constructing and programming large swarms of autonomous robots. A leader in the field of robotics, McLurkin is an assistant professor at Rice University in the Department of Computer Science. His research focuses on developing distributed algorithms for multi-robot systems, which are software that produce complex group behaviors from the interactions of many simple individuals. These ideas are not new: ants, bees, wasps, and termites have been running this type of software for 120 million years. His research group has one of the largest collections of robots in the world, with over 200 robots in use. The SwarmBots were originally created during McLurkin’s five-year tenure as lead research scientist at iRobot, one of the world’s leading robotics companies, and were the largest swarm in the world at the time. He holds a BS in electrical engineering with a minor in mechanical engineering from M.I.T., a MS in electrical engineering from the University of California, Berkeley, and a MS in computer science from M.I.T. He is currently pursuing a PhD in computer science at the M.I.T. Computer Science and Artificial Intelligence Laboratory.

Sigma Xi Posters

Sigma Xi is an international, multidisciplinary research society whose programs and activities promote the health of the scientific enterprise and honor scientific achievement. There are nearly 60,000 Sigma Xi members in more than 100 countries around the world. Sigma Xi chapters, more than 500 in all, can be found at colleges and universities, industrial research centers and government laboratories.

Sigma Xi publishes the award-winning American Scientist magazine, awards hundreds of grants annually to promising student researchers and sponsors a variety of programs that serve science and society. Primary programmatic interests include research ethics, science and engineering education, the public understanding of science, international research networking and the overall health of the research enterprise.

Membership in Sigma Xi is by invitation. Those who have shown potential as researchers are invited to join as associate members. Full membership is conferred upon those who have demonstrated noteworthy achievements in research.

2:30 - 3:30    Afternoon Poster Session & Sigma Xi Poster Judging
               Regency Room, Main Level, Holmes Student Center

               All posters will be available during the afternoon session. Sigma Xi posters will be judged during this time.

1    Christine Knudson Geology & Environmental Geosciences (Dr. Walker)

    Magmatic water content of Pacaya Volcano, Guatemala, determined from a thermodynamic model for the plagioclase-liquid hygrometer
Pacaya Volcano is an active composite volcano located in southern Guatemala, about 30 km from the nation's capital, Guatemala City. This volcano has variable eruptive styles ranging from non-explosive to moderately explosive. Pacaya's modern cone is accessible, and the bulk rock compositions have been well documented. Volcanic rocks from Pacaya are mostly basaltic to basaltic andesite and tend to be porphyritic, containing approximately 20-30% crystals. Data from olivine hosted melt inclusions suggest relatively low water contents for a subduction zone volcano, particularly compared to neighboring composite volcanoes along the Central American Volcanic Arc (Walker et al., 2003). The goal of this research is to use plagioclase phenocrysts in basaltic lavas from Pacaya as a secondary method to verify the unusually low magmatic water contents as reported in previous work. Water contents were estimated using the plagioclase-liquid hygrometer (Lange et al., 2009). Plagioclase crystals were selected from thin sections made of bulk rocks from five different eruptive events. Phenocrysts were analyzed using the electron microprobe at Northern Illinois University. The plagioclase-liquid hygrometer from Lange et al. (2009) is a semi-empirical model based in part on thermodynamic data. Their model works for plagioclase compositions of An93-An37, and for liquid compositions of 46-74 wt. % SiO2. This method requires an independent measurement of plagioclase crystallization temperature. The crystallization temperatures were estimated using the MELTS software package (Ghiorso and Sack, 1995).

2 Alex Haberlie Geography (Dr. Ashley)

Warm-Season Convective Initiation Climatology for the Atlanta, Georgia Region.

Hazardous weather impacts in and around large cities are becoming increasingly visible and important to a steadily increasing urban population. Existing hazardous weather studies have illustrated a regional maximum in thunderstorm activity around cities. However, no study has specifically examined the convective behavior that contributes to these maxima. This study seeks to quantify one of the thunderstorm hazards that could disproportionately impact an urban population—convective initiation (CI). To do this, an automated analysis method was developed to interrogate 17 years (1997-2013) of radar data for evidence of CI event clustering around urban areas. The method used synoptic classification and late morning conditions to stratify days that could produce land cover induced CI. Once these days were picked, each radar scan was analyzed using an object-oriented, three dimensional, clustering procedure to extract persistent thunderstorm objects and their initiation points. Only points that were spatially disconnected from existing convection were considered to further control for CI forcing mechanisms not related to land cover. The resulting climatology suggests that urban areas and even land cover boundaries can induce CI on synoptically benign days in the Southeast United States. The implications of these findings are then discussed.

3 Brandon Semel Anthropology (Dr. Irwin)

More Fiber Means More Dirt? The Role of Geophagy in Diademed Sifakas

Geophagy has been observed in an increasing number of primate species, with six main hypotheses existing regarding its function: 1) toxin adsorption, 2) antacid action, 3) diarrheal alleviation, 4) parasite removal, 5) nutrient supplementation, and 6) altitude-related iron enhancement. We quantified geophagy and diet characteristics of diademed sifakas (Propithecus diadema) living in disturbed and undisturbed rainforest habitats at Tsinjoarivo, Madagascar. Geophagy was common (0.44 bouts/day or 33.3 sec/day; 0.30% of daily feeding time), and average bout duration was 76.51 sec. Seasonal variation in geophagy (lean season, 22.5 sec/day; fruiting season, 44.9 sec/day) mirrored variation in total food mass consumed. Foliage, slightly richer in minerals, and fruits, slightly lower in minerals, made up the bulk of the diet during the lean and fruiting seasons, respectively. The toxin adsorption hypothesis is not cleanly supported as geophagy is least common in the season richest in both seeds and leaves and subsequent correlations were weak. Mineral supplementation is not supported; while geophagy is highest during higher fruit consumption, higher overall food intake more than compensates for fruit's lower mineral concentrations. There was a moderate correlation between monthly soil consumption and mass of dry matter consumed (R^2=0.00-0.56 for each of 4 groups), but a higher correlation was found with amount of fiber (NDF) consumed (R^2=0.31-0.73). It is unclear whether alkaline soils could act as a viable buffer for hindgut fermenters. Further study is necessary to evaluate possible functions in alleviating diarrhea or mitigating parasitism.

4 Devi Kalyan Karumanchi Chemistry

Early Diagnosis of Diabetes Mellitus through the Eye

Diabetes mellitus is an endocrinial metabolic disorder characterized by high blood sugar levels which gives rise to complications in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body. Currently, there are several methods used for the diagnosis of diabetes – A1C, FPG and OGT tests. Though, these tests give accurate results in diabetic patients, they have their exceptions. They do not take into consideration, the involvement in various organs of the body.
post-translational modifications especially glycation which forms fluorescent advanced glycation end-products (AGEs). We have used steady state and time resolved fluorescence measurements to study the spectroscopic changes in alpha crystallin with increase in time of glycation. The AGE fluorescence lifetimes are extremely sensitive to the local biochemical environments which differ in healthy and diabetic tissue. It would also serve as a baseline for discriminating fluorophores which trigger auto-fluorescence for the detection of diabetic eye disease. Fluorescence measurements from non-diabetic and diabetic human donor lenses matched the spectral profiles created using glycated alpha crystallin as a model. Overall, this study will help us to establish a diagnostic tool for early detection of diabetes mellitus.

5  Stephen Strader & Alex M Haberlie Meteorology, Geography

Driving Blind: Weather-related Vision Hazards and Motor Vehicle Crashes

Visibility-related weather hazards have significant impacts on motor vehicle operators due to decreased driver vision, reduced roadway speed, amplified speed variability, and elevated crash risk. This research presents a national analysis of fog-, smoke-, and dust storm-associated vehicular fatalities in the U.S. Initially, a database of weather-related motor vehicle crash fatalities from 1994-2011 is constructed from National Highway Traffic Safety Administration data. Thereafter, spatiotemporal analyses of visibility-related (crashes where a vision hazard was reported at time of event) and vision-obscured (driver's vision was recorded as obscured by weather and a weather-related vision hazard was reported) fatal vehicular crashes are presented. Results reveal that the annual number of fatalities associated with weather-related vision-obscured vehicular crashes is comparable to those of more notable and captivating hazards such as tornadoes, floods, tropical cyclones, and lightning. The majority of these vision-obscured crash fatalities occurred in fog, on State and U.S. Numbered Highways, during the cool season, and during the morning commuting hours of 5 to 8 AM local time. Areas that experience the greatest frequencies of vision-obscured fatal crashes are located in the Central Valley of California, Appalachian Mountain and Mid-Atlantic region, the Midwest, and along the Gulf Coast. From 2007-2011, 72% of all vision-obscured fatal crashes occurred when there was no National Weather Service weather-related visibility advisory in effect. The deadliest weather-related visibility hazard crashes during the period are exhibited, revealing a spectrum of environmental and geographical settings that can trigger these high-end events.

6  Kristopher Kordek Geography


Population distribution in the United States follows a pattern of development known as urban sprawl. The trend of urban sprawl and its associated development of pervious land cover types such as natural and agricultural land to impervious land cover types such as roads, parking lots, and structures has had significant impacts on watershed hydrology and river ecosystems. As a watershed becomes increasingly developed, the discharge of the watershed increases and in effect the frequency and intensity of flood events increases. Using the Des Plaines River Watershed as a case study, a model was made to demonstrate that the use of population density as a measure of percent impervious cover is a viable proxy to show its correlation with river discharge. Population densities of the watershed were correlated against the watershed's discharge for the decades between 1940 and 2010. The model indicated with a significance value of < 0.001 and an R² value of 0.92 that population density within the Des Plaines River Watershed was positively correlated with the discharge of the Des Plaines River. The use of population density in this model as a proxy for percent impervious cover when land cover data is unavailable provides a robust approach for revealing how variations in level of development impacts watershed hydrology.

Paper Session 3

Most sessions will not have a chair to monitor time (except Session A & D). If there are three presenters in the session, allow up to 15 minutes for each paper. If there are four presenters in the session, allow up to 12 minutes for each paper. You may allow for questions following your presentation or our closing reception

2:30 - 3:30  Paper Session 3

Session G:  Illinois Room, 2nd Floor, Holmes Student Center

Scott Abel History (Dr. Jones)
Asian Seafaring Communities and the Blood-Red Seas: Maritime Violence and the Waters surrounding the Malay Peninsula, 1825-1885

The seafaring communities along the coasts and rivers of Malaya depended on the sea for a critical means of communication and trade with the rest of the world. Maritime violence thrived during the nineteenth century as people of various backgrounds took to the seas in search of plunder, threatening the livelihoods of other seafarers who lived in fear of pirate assault. Malayan society, with its weak political centers during the mid-nineteenth century, provided opportunities for pirates to attack vessels vulnerable at sea. They attacked vessels throughout the waterways off Malaya with little chance of punishment by the authorities. In Malaya, particular seafaring communities exploited the changes caused by colonialism, globalization, and technological advancement through operating from or near major British colonial ports, which allowed for greater success when using maritime violence from the period 1825 to 1885.

Krista Albers History (Dr. Jacobsen)

*The Secret Arsenal*: The Home Front and Defoliant Use in the Vietnam War

Abstract: Between 1961 and 1971 the government used chemical defoliants, most notably Agent Orange, in order to destroy food supplies and ambush point for enemy guerrilla fighters. The use of these chemicals was questionable because it went against the 1925 Geneva Accords and today is known to cause health problems for veterans on both sides, Vietnamese civilians, and the children of those exposed. This paper will briefly provide a history of these chemicals, but more so look at the information that was available to the general public and how this may have varied across the United States.

Isabelle Squires History (Dr. Fuerer)

Imelda’s “Dularawan”: Total Theatre and Cultural Exhibitation in the Postcolonial Philippine Nation

My paper examines how the radical immigrant miners of Zeigler, Illinois preserved radical sentiment in Southern Illinois during the mid 1920s, despite the decline of both the coal industry in the region and radicalism within the United Mine Workers of America (UMWA). In particular, it focuses on a little known court case involving thirteen members of UMWA Local 992 of Zeigler, Illinois. The case, “The People vs. Henry Corbishly et. al.,” saw a remarkable collusion between the Bell and Zoller Coal Company, the UMWA, the Ku Klux Klan and the courts to suppress the rights and voice of the radical immigrant laborers within UMWA Local 992. The Zeigler miners used their Communist connections, particularly in William Z. Foster’s Trade Union Educational League and the International Labor Defense, to publicize, fund and support their struggles. Their efforts bridged the gap between the defeats to organized labor in the early 1920s and the radical “dual unions” of the late 1920s and 1930s, which found a strong base of support in Zeigler. This paper differs from previous literature in that the paper pertains to grassroots trade union activism during the 1920s, which is a period often neglected by historians due to the perceived lack of success of the movement before the “popular front” of the mid 1930s. In addition, the majority of the existing literature neglects thorough analysis of Zeigler and the aforementioned case, despite the remarkable window that they provide into the everyday realities and tribulations of immigrant miners during the 1920s.

Robert Bulanda Anthropology (Dr. Russell)

The Organization of Indigenous Resistance to Neoliberal Extractive Industry Development in the Cordillera of the Northern Philippines

Over the past half-century, the Philippines has experienced great social change as social movements have arisen in response to the national government’s aggressive implementation of neoliberal development policies. The recent history of the Philippines features an illustrious culture of mass-based organization, as local populations protest national development strategies promote rapid economic growth and integration into world markets at the expense of local social and environmental concerns. The organization of these movements has subsequently led to a proliferation of officially-recognized non-governmental organizations (NGOs). An anti-large scale mining social movement in the Philippines formed in reaction to the liberalization of the national mining industry with the Mining Act of 1995. The Mining Act of 1995 opened the country’s rich mineral resources to 100 percent ownership by foreign corporations. Protest movements throughout mineral-rich and developing areas of the country illustrate the clash between local, indigenous concerns and national development policies. Within this context, this paper investigates the development of organized social activism among indigenous peoples and communities in response to the imposition of neoliberal development and the Mining Act of 1995. The research focuses on Baguio City in the Cordillera of the Northern Philippines and investigates the strategies of organizing social movements to bring local, indigenous concerns into the national and international development and environmentalist discourses.
Learning Beyond the Highlighter: Improving Summary Writing of Scientific Research

Abstract: Summarizing helps students understand information from texts (Dunlosky et al., 2013; Voss & Wiley, 2001) and better monitor their comprehension (Thiede & Anderson, 2003). Writing a summary requires students to accurately represent the “gist” of entire sections of a paper (Brown & Day, 1983) which is dependent on the structure of the text being summarized (Armbruster, Anderson, & Ostertag, 1987). An empirical journal article is organized around the hypotheses, the design used to test the hypotheses, the findings and how they support or fail to support the hypotheses. In prior research we found that students have trouble selecting the most important information that accurately captures the gist of the journal article. In this study, we tested the effectiveness of a short tutor designed to teach students how to write effective summaries. Students in an upper level psychology class were asked to summarize three empirical journal articles that were already required reading for the class. Prior to writing, participants in the experimental condition received a short tutorial that focused on the type of information that is important to attend to during summary writing. Control participants received the tutorial after summarizing. Results showed that control participants summarized the methods rather well but only mentioned about 25% of the key information from the other sections. The tutorial helped students include more information about the hypothesis and results. Future research could examine how improved summarization skill effects the quality of integrative writing assignments (e.g., essay exams and research proposals).

A Comparison of Mobile Assisted Language Learning Trends between Higher Education and the K-12 Settings

The world is reshaping with mobile technologies. Emergent mobile devices have brought numerous opportunities and challenges into education. Mobile Assisted Language Learning (MALL) has proved to be effective in various education scenarios and offers various learning environments such as face-to-face, online, or blended learning. The area of study involving the use of MALL is gaining more popularity and needs further research. Various studies about MALL were conducted in different countries all over the world, including native language (L1) and second or foreign language (L2) learning. The purpose of this study was to investigate the trends of MALL in higher education and the K-12 settings by conducting a meta-analysis of peer-reviewed journals from 2000 - 2013. This literature review identified and compared the current research themes, methodologies, and the application of mobile devices in both higher education and K-12 settings. The findings showed not only the trends of MALL in both settings but also the gaps and barriers in the literature. Recommendation for future research is suggested.

A Conceptual Framework for Assessment and Factors Related to K-12 Student Achievement

Abstract: This study reviewed the historical context for the “school effectiveness” movement, which seeks to examine how K-12 schools can improve student achievement levels, particularly among those from marginalized backgrounds. It also examined various variables available in the scholarly literature that have been demonstrated to show a relationship with K-12 student achievement and provided several established frameworks for categorizing these variables. Specific variables within the categorization system of Hattie (2009) are examined with respect to their relative effects on student achievement. Additionally, sources of data where correlates of student achievement might be found are discussed, including an instrument designed to assess school climate--the 5Essentials Survey.

A Multilevel Modeling Approach to Understanding Transgenerational Status Attainment: How Student and School Level Characteristics Predict Future Educational And Occupational Outcomes

Abstract: American society has historically perpetuated the idea of an education-based meritocracy where independent success is built on hard work, creativity and persistence. The public school system is meant to exemplify this ideal and to promote social equality through equal access to education (Mann 1832; Hallinan, 2001). Yet, the public school system has historically marginalized a large body of students and has managed to reproduce the social stratification it sought to remedy. The primary research goals
of this study will be to examine the relationship between transgenerational disadvantage, postsecondary academic attainment and occupational prestige in adulthood. This study will analyze family and student background effects, academic achievement and school effects in order to understand educational and occupational attainment. Furthermore, to investigate the culminating effects of educational attainment on occupational outcomes using occupational prestige scores as a measure of class status in adulthood. The purpose of which is to understand how family background and educational attainment translates into occupational outcomes in adult life. The Longitudinal Study of American Youth (LSAY) dataset will help us understand transgenerational social status reinforcement through the examination of high school student achievement and how that translates into occupational prestige in adulthood. More specifically, this study will examine the following research questions: 1. What effect does family background, cognitive ability and school level characteristics in high school have on post-secondary educational attainment? 2. Does the relationship between educational attainment moderate the relationship between family background and occupational prestige, controlling for school level effects?

Session I:  Heritage Room, 2nd Floor, Holmes Student Center

Kory Allred  Geography (Dr. Luo)

Ice-walled Lake Plain elongation by wind-induced currents in DeKalb County, Illinois

Abstract: Ice-walled lake plains (IWLPs) are rounded, flat-topped mounds that formed in stagnant ice environments along the margins of the Laurentide Ice Sheet. We conducted detailed morphometric and statistical analyses of the shape, size, and orientation of more than 400 IWLPs identified from aerial photos aided with LiDAR data in DeKalb County, Illinois. Wind induced currents preferentially erode the shorelines perpendicular to the dominant wind direction. The results of our analysis indicate that elliptical IWLPs with a perimeter greater than 3050 meters have preferred orientations roughly normal to the paleo-wind direction as indicated by contemporaneous parabolic dunes located 50 km to the west. The orientations of the IWLPs with a perimeter less than 1220 meters are scattered and show no apparent trend. The orientation of large IWLPs in DeKalb county are consistent with wind-induced lake elongation observed in modern permafrost thaw lakes, suggesting that the prevailing wind also played an important role in controlling the orientation of IWLPs during the last ice age and led to the preferred orientation we see today.

Jason Coenen  Geology & Environmental Geosciences (Dr. Scherer)

Micropaleontological Analysis of Sediments from Beneath Subglacial Lake Whillans and the Upstream Sectors of the Whillans and Kamb Ice Streams, West Antarctica

In January of 2013 the WISSARD (Whillans Ice Stream Subglacial Access Research Drilling) project recovered sediment cores from Subglacial Lake Whillans (SLW) in West Antarctica. We report preliminary micropaleontological analyses of SLW sediments, augmented by analyses of sediments previously recovered from beneath the upstream camps of the Whillans Ice Stream (WIS) and Kamb Ice Stream (KIS). Samples are being analyzed for diatoms, sponge spicules, and organic-walled microfossils. Absolute abundance (particles per gram dry sediment) of identifiable diatoms and diatom fragments in different size classes were calculated to compare and contrast each environment. Sponge spicules are being analyzed for taphonomic effects from subglacial transport and shearing. Palynomorphs are analyzed for abundance and diversity. In SLW the upper 30 cm is softer and more water-rich than the underlying sediments. However, little variation in microfossil and fragment abundance or taphonomy is noted, which is in agreement with the stratigraphic homogeneity evident from geochemical and geological analyses performed to date. SLW contains 1.52x106 to 1.13x107 diatoms per gram, compared with 6.43x106 to 4.63x108 at upstream WIS and 6.13 107 to 1.58x108 at KIS. The abundance and preservation of the diatoms and spicules at SLW suggests relatively long distance transport from the marine sediment source, with evidence of high shear strain, following the subglacial shearing index of Scherer et al. (2005). Upper Miocene diatoms dominate all of the samples, though older and younger diatoms are noted as well. The WIS samples exhibit the highest diversity of diatoms, including Paleogene freshwater diatoms. KIS sediments have the highest abundance of whole diatoms, but they are characterized by low diversity, indicating local erosion of an Upper Miocene deposit. Palynomorphs in all of the samples demonstrate a sizable contribution of Eocene terrigenous material. The quantitative analysis of microfossils preserved in these sediments is revealing a complex set of subglacial processes. Constraining the heterogeneity of subglacial sedimentary environments and sediment transport is providing important data for understanding and modeling current and past WAIS behavior.

Anna Kordek  Anthropology (Dr. Porter)

Hanging with the guys: do male-biased sex ratios lower stress and alter behaviors in male bonobos?

Primate social organization is influenced by a variety of ecological factors; however, group composition and social structure influence individual behaviors. Social hierarchies, sex ratios, and group size can affect the frequency of stress-related behaviors such
as scratching as well as agonistic and affiliative behaviors. In Pan paniscus (bonobos), social groups are characterized by female dominance and a female-biased sex ratio, and these features influence male bonobo behavior. In this study I examined agonistic behaviors and cooperative behaviors of male bonobos to determine if rank, sex ratio, and group size influence stress, agonism, and sociosexual behaviors of male bonobos at the Columbus Zoo. In total I collected 250 hours of observation on 6 different males in June through August, 2013. I used a General Linear Mixed Model to test for correlations between subgroup composition and stress-related behaviors. The results show that there is a positive correlation between group size and scratching behaviors (F=4.82, Num DF= 2, Den DF= 44, p= 0.01). In addition, males in groups which had more females than males exhibited more frequent sexual behaviors (F=4.59, Num DF= 1, Den DF= 45, p=0.04). These results suggest that males in large groups are more stressed and that males use sexual behaviors to reduce stress in groups with sex ratios biased towards females.

Sylvia Orellana Anthropology (Dr. Porter)

Balancing the Scales: Diurnal Temporal Variation in the Feeding and Foraging Patterns of Saguinus fuscicollii

One of the primary goals of primatology has been to determine the ecological factors that impact the distribution and abundance of primate populations as well as the life history and social behavior of individuals. Biological functions, such as growth and reproduction, are dependent upon the nutritional content of the food resources that a primate consumes and the efficiency of food processing and nutrient absorption. Because obtaining food is essential for survival, it is likely an important selective pressure that influences primate biology and behavior. Saddleback tamarins (Saguinus fuscicollii) are small-bodied Neotropical primates that consume a highly frugivorous diet. Additionally, tamarins also consume flowers, exudates, insects, and small vertebrates in order to obtain the nutrition necessary for survival. Exudate processing is facilitated by dental and gastrointestinal specializations that allow primates to gain access to and absorb the nutrients in exudates. Saddleback tamarins lack both of these types of specializations, yet they regularly consume exudates. In order to better understand the feeding and foraging strategies employed by tamarins three questions were explored. Is tamarin feeding and foraging behavior variable based on the time of day? Is there a relationship between the time of day that a particular food type is eaten and the ability of the tamarin to balance its diet? Do tamarins consistently eat foods in a particular sequence throughout the day? Examining the feeding and foraging patterns of these small primates might shed light regarding how physiology dictates if and when food items should be consumed.
Closing Reception & Networking
3:30-4:30

Practice your “Elevator Pitch” with other graduate students! You will not always talk about your research with peers in the same field, so practice communicating across disciplines. Snacks & refreshments will be provided.

Excerpts from Nancy Collamer’s article, The Perfect Elevator Pitch To Land A Job, from Forbes.com

If you’re looking for a job, one of the first tasks on your to-do list should be crafting an ideal “elevator pitch.” It’s the 30-second speech that summarizes who you are, what you do and why you’d be a perfect candidate.

You should be able to reel off your elevator pitch at any time, from a job interview to a cocktail party conversation with someone who might be able to help you land a position.”

Nine Steps to Develop Your Elevator Pitch
1. Clarify your job target – explain your perfect position
2. Put it on paper – edit it down to the key points
3. Format it to answer three main questions: Who are you? What do you do? What are you looking for?
4. Customize your pitch to their needs
5. Make your pitch understandable to someone outside your field
6. Practice saying it out loud and edit for authenticity
7. Practice and get feedback
8. Plan for variations – shorter, longer, audience
9. Be confident in your words and actions

Read the article in detail at http://www.forbes.com/sites/nextavenue/2013/02/04/the-perfect-elevator-pitch-to-land-a-job/

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Thank you for attending and participating in this year’s Conference! Look for the call for next year’s presentations on Facebook, NIUToday, flyers around campus and emails within your department.

Please encourage your fellow students to participate. You are always welcome to submit as a session of three or four students. If you submit individually, you will be grouped by topic, methodology, or other similarities.

For more information, contact Samantha Goss (sgoss2@niu.edu) or visit our website www.niu.edu/gsra
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