4th ANNUAL

SYMPOSIUM ON UNDERGRADUATE RESEARCH & CREATIVE EXPRESSION

APRIL 20, 2010

IOWA STATE UNIVERSITY
A Message from the University Honors Program

Welcome to Iowa State University’s fourth annual Symposium on Undergraduate Research & Creative Expression. The Symposium provides undergraduates from all academic disciplines, both Honors and non-Honors students, with an opportunity to share their research with the university community and other guests through oral presentations. The Symposium represents part of a larger effort of Iowa State University and the University Honors Program to enhance, support and celebrate undergraduate research activity.

The students selected for this year’s Symposium and their mentors represent all the Colleges at ISU: Agriculture & Life Sciences, Business, Design, Engineering, Human Sciences, Liberal Arts & Sciences, and Veterinary Medicine.

We hope that you enjoy the day!

Susan Yager
Faculty Director

Laurie Fiegel
Administrative Director

Dana Schumacher
Asst. Director for Undergraduate Research & Scholarship
Symposium Coordinator

University Honors Program, 2130 Jischke Building,
Iowa State University, Ames IA 50011-1150
SYMPOSIUM OVERVIEW

8:30- 9:00 am  Registration and Refreshments

9:00- 9:30 am  Welcome & Opening Remarks, Gallery
Iver Anderson, Ames Laboratory

9:30-10:50 am  SESSION I (concurrent presentations in 5 rooms)
I A – Math, Physics, Computer Science & Technology
   Memorial Union, Room 3219
I B – Cultural & Economic Studies
   Memorial Union, Room 3505
I C - Psychology
   Memorial Union, Room 3512
I D – Media & Marketing
   Memorial Union, Room 3538
I E – Biology, Microbiology & Biochemistry
   Memorial Union, Room 3558

10:50 – 11:30 am  Break and Brunch, featuring artists in the 2010 FOCUS juried competition
   Gallery, Memorial Union

11:30 am- 1:00 pm  SESSION II (concurrent presentations in 5 rooms)
II A – Energy & the Environment
   Memorial Union, Room 3219
II B - Design
   Memorial Union, Room 3505
II C – Food & the Future
   Memorial Union, Room 3512
II D – Institutions & Education
   Memorial Union, Room 3538
II E – Business & Industry
   Memorial Union, Room 3558

1:00 – 1:20 pm  Break, Gallery

1:20-2:40 pm  SESSION III (concurrent presentations in 5 rooms)
III A – Animal Science
   Memorial Union, Room 3219
III B – Cities & Government
   Memorial Union, Room 3505
III C - Biology, Biochemistry & Disease
   Memorial Union, Room 3512
III D – Animal Science & Ecology
   Memorial Union, Room 3538
III E - Engineering
   Memorial Union, Room 3558
SESSION I.A  MATH, PHYSICS, COMPUTER SCIENCE & TECHNOLOGY

Memorial Union, Room 3219  
9:30 - 10:50 am  
Moderator: Cliff Bergman, Dept. of Mathematics

I.A.1  Taking Hold of Sound: Developing a High Resolution Sensor-Glove Controller for Music  
JEFFREY KOSINSKI, Graphic Design, College of Design; MARK WIEMER, Mechanical Engineering, College of Engineering (Mentor: Christopher Hopkins)

I.A.2  Towards Automated Verification of Parameterized Systems  
DAVID SAMUELSON, Mathematics, College of Liberal Arts (Mentor: Hridesh Rajan)

I.A.3  Minimum Rank: Concept and Application  
KAELA RASMUSSEN, Aerospace Engineering and Mathematics, College of Engineering and LAS (Mentor: Leslie Hogben)

I.A.4  D⁰ Meson Decay Vertex Reconstruction Simulations in the PHENIX Silicon Vertex Detector  
MATTHEW LOCKNER, Physics, College of Liberal Arts & Sciences (Mentor: Craig Ogilvie)

SESSION I.B  CULTURAL & ECONOMIC STUDIES

Memorial Union, Room 3505  
9:30 - 10:50 am  
Moderator: Eugenio Matibag, Dept. of World Languages and Cultures

I.B.1  Media Influence on the Negative Portrayals and Perceptions of African Americans  
SARAH BRACY, Public Service and Administration, College of Agriculture & Life Sciences (Mentor: Chad Harms)

I.B.2  A Comparison of Women’s Roles Among the Missouri River Tribes and the Cherokee  
CASSIDI THOMPSON, Anthropology, College of Liberal Arts & Sciences (Mentor: Christina Gish Berndt)

I.B.3  Comparative Study of the Economic Development Process of Botswana and Namibia from 2000 to Present  
NIMOTA NASIRU, Construction Engineering, College of Engineering (Mentor: Ebby Luvaga)

SESSION I.C  PSYCHOLOGY

Memorial Union, Room 3512  
9:30 - 10:50 am  
Moderator: Jason Chan, Dept. of Psychology

I.C.1  Attitudes and Experiences  
AUDRIELLE GLEN, Psychology, College of Liberal Arts & Sciences (Mentor: Carolyn Cutrona)

I.C.2  Race and Socioeconomic Status: Does it Make a Difference on Viewers' Perceptions of Ambiguous Behavior?  
MELISSA KNIGHT, Psychology and Criminal Justice, College of Liberal Arts & Sciences; SAMANTHA TUHN, Psychology and Statistics, College of Liberal Arts and Sciences (Mentors: Deah Quinlivan & Gary Wells)
I.C.3  The Effects of Victim Pretrial Publicity on Jurors' Verdicts for a Defendant  
SAMANTHA TUHN, Psychology and Statistics, College of Liberal Arts & Sciences;  
MELISSA KNIGHT, Psychology and Criminal Justice, College of Liberal Arts and Sciences  
(Mentors: Deah Quinlivan & Gary Wells)

I.C.4  Pay Me Now – Pay Me Later: The Effect of Immediate Consequences on Criminal Confessions  
ANDREA ARNDORFER, Psychology; Criminal Justice, College of Liberal Arts & Sciences;  
COURTNEY MERGEN, Psychology, College of Liberal Arts and Sciences (Mentor: Stephanie Madon)

SESSION I.D  MEDIA & MARKETING  
Memorial Union, Room 3538  
9:30 - 10:50 am  
Moderator: Samantha Cross, Dept. of Marketing

I.D.1  Consuming Context Clues  
PAIGE MCQUEENEY, Marketing & Advertising, College of Business & LAS (Mentor: Laura Smarandescu)

I.D.2  Deceptive Reality: Using Media to Implant False Memories  
FAYE GILBERT, Advertising/Studio Arts, College of LAS/Design (Mentor: Joel Geske)

I.D.3  The Myth of Rational Advertising  
COLLETT MOORHOUSE, Advertising/Marketing, College of LAS/Business (Mentor: Joel Geske)

I.D.4  The Role of Personal Perspective in Consumer Judgment  
JOSH LAVILLE, Journalism and Mass Communication; International Studies, College of Liberal Arts & Sciences (Mentor: Laura Smarandescu)

SESSION I.E  BIOLOGY, MICROBIOLOGY & BIOCHEMISTRY  
Memorial Union, Room 3558  
9:30 - 10:50 am  
Moderator: David Oliver, Dept. of Genetics/Development & Cell Biology-AGLS

I.E.1  Examination of Natural Plant Extracts for Antimicrobial Agents  
ALLISON SCHLAPKOHL, Microbiology and Genetics, College of Agriculture & Life Sciences (Mentor: Gregory Phillips)

I.E.2  Assessing Pollination of Muskmelon (Cucumis melo) in Iowa  
XIMENA CIBILS-SEWART, Biology and Entomology, College of Agriculture & Life Sciences (Mentor: Mark Gleason)

I.E.3  Development of a New Genetic System for Isolation of Mutants in Essential Bacterial Genes  
NICOLE BENZONI, Microbiology, College of Agriculture & Life Sciences (Mentor: Gregory Phillips)

I.E.4  Cloning, Expression, Purification, and Characterization of Ebola VP35 Proteins  
CRAIG BROWN, Biochemistry, College of Liberal Arts & Sciences (Mentor: Gaya Amarasinghe)
BREAK & REFRESHMENTS FEATURING 2010 FOCUS JURIED EXHIBIT & ARTISTS
Memorial Union Gallery, 10:50 – 11:30 a.m.

FOCUS is an annual celebration of the arts in which the Lectures Program and the Student Union Board (SUB) fund creative projects in the visual and performing arts proposed by Iowa State students. FOCUS aims to encourage and reward the artistic endeavors of all Iowa State students, regardless of their academic focus. Students may apply for funding to create projects to be displayed, performed, projected, or read. There is also a separate juried exhibition to which nonfunded visual arts projects may be submitted. Funding for FOCUS grants is made possible through the Government of the Student Body; awards are determined by a committee of students, faculty, and staff representing a broad range of the arts.

Works selected for the 2010 juried FOCUS exhibit are on display in the Gallery; several of the artists are present to talk with the Symposium audience:

- **Behind These Blue Eyes**
  - Joshua Cross
  - Integrated Studio Arts

- **The Ironic Chainsaw**
  - Devin Sloan
  - Integrated Studio Arts

- **Sterling Silver**
  - Mariah Marquis
  - Integrated Studio Arts

- **Speedy**
  - Carl Swenson
  - Integrated Studio Arts

- **Container for Cancer and Ika-geso**
  - Elizabeth Mason
  - Integrated Studio Arts

- **Grasp and Wine Not?**
  - Tommy Thurston
  - Landscape Architecture

- **Test Tubes, Castration Rings & Light Tube**
  - Kevin Mond
  - Architecture

- **Hands**
  - Rachel Wright
  - Integrated Studio Arts

- **Ice Cream**
  - Allison Pederson
  - Graphic Design
PROGRAM—Session II

SESSION II.A  ENERGY & THE ENVIRONMENT

Memorial Union, Room 3219  11:30 am - 1:00 pm
Moderator: Gene Takle, Dept. of Geological and Atmospheric Sciences

II.A.1 The Development of a Novel Zinc Oxide Nanostructure for Use in Dye Sensitized Solar Cells
CARIN LIGHTNER, Chemical Engineering, College of Engineering (Mentor: Liang Dong)

II.A.2 Use of Wind Tower Measurements for Improving Wind Energy Forecasts
KRISTY CARTER, Meteorology, Music, College of Liberal Arts & Sciences; AARON ROSEMBERG, Aerospace, College of Engineering; ROBERT HANSON, Engineering Undeclared, College of Engineering (Mentor: Gene Takle)

II.A.3 Viability of Weather Dissemination via Social Network Technologies
JUSTIN WITROCK, Meteorology, College of Liberal Arts & Sciences (Mentors: William J. Gutowski & Somer A. Erickson)

II.A.4 Mechanochemical Processing of Na2S+P2S5 Amorphous Materials
SETH BERBANO, Materials Engineering, College of Engineering (Mentor: Steve W. Martin)

SESSION II.B  DESIGN

Memorial Union, Room 3505  11:30 am - 1:00 pm
Moderator: Ingrid Lilligren, Dept. of Art & Design

II.B.1 Birth Control Decision Aids Development Process
BECKY MURPHY, Graphic Design, College of Design; MELISSA DILLING, Graphic Design, College of Design; GINA ASSMANN, Interior Design, College of Design; MING-YEE LI, Graphic Design, College of Design

II.B.2 Designer Perceptions of Piracy in Fashion and Jewelry Design
HEATHER SINCLAIR, Apparel Merchandising, Design, and Production, College of Human Sciences (Mentor: Sara Marcketti)

II.B.3 Rome Children's Book
MELISSA DILLING, Graphic Design, College of Design (Mentor: Debra Satterfield)

II.B.4 The Story of a Collector: Anne Zimmerman
AMANDA LENSCH, Apparel Merchandising Design and Production, College of Human Sciences; KELSEY LEIGHTON, Apparel Merchandising Design and Production, College of Human Sciences (Mentor: Sara Marcketti)

SESSION II.C  FOOD & THE FUTURE

Memorial Union, Room 3512  11:30 am - 1:00 pm
Moderator: Lester Wilson, Food Science & Human Nutrition

II.C.1 Framework for the Understanding of Soil Moisture Patterns Using Self-Organizing Neural Networks
LINDA GEIGER, Ag Engineering and Global Resource Systems, College of Engineering; TREVOR RICHARDSON, Mechanical Engineering, College of Engineering; KRISTIN CRAWFORD, Aerospace Engineering, College of Engineering; JOE GOERING, Mechanical Engineering, College of Engineering (Mentor: Amy Kaleita)
II.C.2 Soybeans in Space! Studying The Effects of Supplemental LED Light To Maximize Soybean Yield in Closed Systems
BRANDON WILSON, Agronomy, College of Agriculture & Life Sciences; TYLER SWENSON, Mechanical Engineering, College of Engineering; REBECCA MEERDINK, Genetics, College of Agriculture & Life Sciences (Mentor: Amy Kaleita)

II.C.3 The Influence of Taste Perception on Plasma Metabolites and Hormones
CHRISTOPHER MILLER, Dietetics, College of Human Sciences (Mentor: James Hollis)

II.C.4 Historical Trends in Ictalurid Catfish Commercial Harvest in the Upper Mississippi River
REBECCA BURCH, Animal Ecology, College of Agriculture & Life Sciences (Mentor: Michael C. Quist)

SESSION II.D INSTITUTIONS & EDUCATION
Memorial Union, Room 3538 11:30 am - 1:00 pm
Moderator: Dawn Sweet, Dept. of Psychology

II.D.1 A Case Study in Attitudes to an Elementary Spanish Immersion Program
LISA PUTZ, Spanish, French, International Studies, College of Liberal Arts & Sciences (Mentor: Marcia Rosenbusch)

II.D.2 Exploring Quality of Education in Iowa: Impacts of Hispanic Migration
SHANE ROBERTS, Community and Regional Planning, College of Design (Mentor: Monica Haddad)

II.D.3 Comparison of Personal Finance Knowledge Among College Students
TING LI ZHOU, Accounting, College of Business (Mentor: John Wong)

II.D.4 Recycling Feasibility Study for Iowa State University
KEVIN MARQUARDT, Psychology and Environmental Studies, College of Liberal Arts & Sciences (Mentor: William Simpkins)

SESSION II.E BUSINESS & INDUSTRY
Memorial Union, Room 3558 11:30 am - 1:00 pm
Moderator: Clyde Walter, Dept. of Logistics, Operations & MIS

II.E.1 Critical Chain VS Critical Path (PERT)
CARLOS RAMIREZ, Industrial Technology, College of Engineering (Mentor: Kevin Watson)

II.E.2 A Meta-Analysis of Simulation Based Literature on the Performance of Push and Pull Systems
BRITTANY MCLEMORE, Industrial Technology, College of Liberal Arts & Sciences (Mentor: Danny Johnson)

II.E.3 DBR, SDBR, and CONWIP in Practice: Creating an Effective Production System
ALEXANDER CLEMONS, Industrial & Manufacturing Systems Engineering, College of Engineering; RYAN PAGE, IMSE, College of Engineering; JESSICA LOAN, IMSE, College of Engineering (Mentor: Kevin Watson)

II.E.4 Sustainable Practices for a Sustainable Business Environment
ELIZABETH REED, Accounting, College of Business (Mentor: Sue Ravenscroft)
SESSION III.A  ANIMAL SCIENCE

Memorial Union, Room 3219  1:20-2:40 pm
Moderator: Steven Lonergan, College of Animal Science

III.A.1  Influence of Biochemical Characteristics on Beef Inside and Outside Semimembranosus Color and Protein Degradation
JUSTINE HOSCH, Animal Science, College of Agriculture & Life Sciences (Mentor: Steven Lonergan)

III.A.2  Effect of Stress on Fish Leukocyte Formula
SAMIR A-AGHA, Animal Science/Pre-Veterinary, College of Agriculture & Life Sciences (Mentor: Dusan Palic)

III.A.3  Trends in Dairy Cattle Fertility from 1957 to 2007: Comparison of Jersey and Holstein Cattle
NICOLE WALLJASPER, Animal Science/Pre-Veterinary, College of Agriculture & Life Sciences (Mentor: P. Jeffrey Berger)

III.A.4  Exploration of K-Casein and B-Lactoglobulin and their Role in Milk Production and Cheese Yield
KATIE WEBER, Animal Science, College of Agriculture & Life Sciences (Mentor: P. Jeffery Berger)

SESSION III.B  CITIES & GOVERNMENT

Memorial Union, Room 3505  1:20-2:40 pm
Moderator: Riad Mahayni, Dept. of Community & Regional Planning

III.B.1  Al Samha: Understanding the Impact of Urban Design on Women in the UAE
HEDAYA AL HAMMADI, Community and Regional Planning, College of Design (Mentor: Carlton Basmajian)

III.B.2  Reverse Commuting in the Chicago Metropolitan Area Highway System
JOEL MENDEZ, Community and Regional Planning, College of Design (Mentor: Carlton Basmajian)

III.B.3  Contract Management Failures in Government Acquisitions: A Case Study of
MICHAEL KOSTBOTH, Political Science, College of Liberal Arts & Sciences (Mentor: Matthew Potoski)

III.B.4  De-concentrating Affordable Housing through Housing Choice Voucher Programs
MONIQUE HAWKINS, Community and Regional Planning, College of Design (Mentor: Francis Owusu)
SESSION III.C BIOLOGY, BIOCHEMISTRY & DISEASE

Memorial Union, Room 3512 1:20-2:40 pm
Moderator: Karin Dormin, Dept. of Statistics & GDCB

III.C.1 The Effect of Electric Fields on Adult Hippocampal Neural Progenitor Cells
SAGAR CHAWLA, Biology, College of Agriculture & Life Sciences
(Mentor: Don Sakaguchi)

III.C.2 Structural and Biochemical Studies of Reston Ebola Virus VP35 Protein
MINA FARAHBAKHSH, Biochemistry, College of Liberal Arts & Sciences
(Mentor: Gaya Amarasinghe)

III.C.3 Identification and Biochemical Characterization of VP35 Inhibitors
DAYNA PETERSON, Biochemistry, College of Liberal Arts & Sciences
(Mentor: Gaya Amarasinghe)

III.C.4 Analysis of Dystrophic Muscle by Two Dimensional Differential in-Gel
JENNA DIXON, Animal Science/Pre-Veterinary, College of Agriculture & Life Sciences
(Mentor: Joshua Selsby)

SESSION III.D ANIMAL SCIENCE & ECOLOGY

Memorial Union, Room 3538 1:20-2:40 pm
Moderator: Matthew Ellinwood, Dept. of Animal Science

III.D.1 The Effect of Patch Burn-Grazing on Ant Diversity in Southern Iowa Grasslands
LAURA WINKLER, Animal Ecology & Entomology, College of Agriculture & Life Sciences
(Mentor: Diane Debinski)

III.D.2 Chemical "Fingerprints" of Lions
RACHEL OWEN, GRS/Agronomy, College of Agriculture & Life Sciences
(Mentor: Jacek Koziel)

III.D.3 Assessment of Potential Associations of Canine Distemper with Vaccination or Genetic Susceptibility
CHRIS THOMSON, Animal Science/Pre-Veterinary, International Agriculture, College of Agriculture & Life Sciences (Mentor: Matthew Ellinwood)

III.D.4 Understanding Temperature-Dependent Sex Determination in Painted Turtles
AMANDA HARRIS, Animal Science, College of Agriculture & Life Sciences
(Mentor: Nicole Valenzuela)

SESSION III.E ENGINEERING

Memorial Union, Room 3558 1:20-2:40 pm
Moderator: Eric Cochran, Dept. of Chemical & Biological Engineering

III.E.1 An Experimental Test Design for the Study of Fan Noise
JASMINE DRAPER, Mechanical Engineering, College of Engineering
(Mentor: Adin Mann)
| III.E.2 | **Conceptual Study of a Personal Winged Flight System**  
NUKU DOAMEKPOR, Aerospace Engineering, College of Engineering (Mentor: Thomas Rudolphi) |
| III.E.3 | **The Visualization of Armor Variation**  
RYAN HALL, Electrical Engineering, College of Engineering (Mentor: Cory Stiehl) |
| III.E.4 | **Free Fatty Acids Cause Changes in E. coli Membrane Composition**  
MATTHEW STEBBINS, Chemical Engineering, College of Engineering (Mentor: Laura Jarboe) |
Taking Hold of Sound: Developing a High Resolution Sensor-Glove Controller for Music  
Jeffrey Kosinski; Mark Wiemer (Session I.A.1)

Human beings are naturally drawn to the art of creating sound. Paramount to the creation of music is the invention and adoption of instruments. In the current age of digital information, much which is created for music stems from analog sources. Despite the possibilities digital interfaces give to users, music creation in this realm has been primarily focused on “single-shot” productions. Currently, most digital music is created to be played back once-- not performed live to an audience. Current digital instruments lack in tactile response and overall connection to the user, dissimilar to their analog cousins. Our aim is to promote the art of live performance using digital means. Making digital music repeatable and more uniquely refined is significant. To complete this task, a microprocessor will be employed to communicate with a computer-hosted synthesizer. A musician wearing a glove with embedded sensors will produce digital music. Information about the user’s gestures is relayed from the glove to the computer and vice versa. This project will lead to an instrument to enrich live music creation in the digital world.

Towards Automated Verification of Parameterized Systems  
David Samuelson (Session I.A.2)

Checking the correctness properties of a computer communication protocol is an integral part of the protocol's development. Verification through testing/simulation increases confidence for deployment in infrastructure critical to society, commerce, defense, and the individual. Some protocols are open-ended in the number of participants. For example, peer-to-peer file sharing protocols such as the BitTorrent protocol allow an unbounded number of peers to exchange files. The problem with verifying such open-ended protocols is the following: how much testing is enough? For instance, if we test that the BitTorrent protocol correctly shares files with five peers involved, does this mean that the protocol works correctly when 20 peers are involved? What about when 100 peers are involved? To solve this problem, we have developed an automated technique for discovering exactly how much testing is enough. Given the specification of a protocol, our technique generates the number of participants "k" that are necessary to test the system. If the protocol works correctly for "k" participants, then it is guaranteed to work correctly for any larger number of participants. In this presentation I give a brief introduction to parameterized systems, a survey of current techniques, and explain the benefits of our method.

Minimum Rank: Concept and Application  
Kaela Rasmussen (Session I.A.3)

The graph of an n by n symmetric matrix A, G(A), has vertices \{1, ..., n\} and edges determined by the nonzero off-diagonal pattern of the matrix. The pattern of off-diagonal entries can have a dramatic affect on what ranks are possible. The minimum rank of a graph is the minimum rank of all possible matrices that have the same graph. Maximum rank is not studied because the maximum rank of any order n graph is n. Once the minimum rank is determined, every rank between the minimum rank and n is realized by some matrix having the same graph.

The zero forcing number of a graph, Z(G), provides the bound that the minimum rank of a graph is greater than or equal to the difference between the order n and Z(G). Minimum rank is used to minimize the amount of communication between groups in communication complexity. This is useful for many applications such as Unmanned Air Vehicles (UAVs). This presentation will cover a few methods for finding the zero forcing number and minimum rank of graph families, the concept of field independence, and the applications of minimum rank.
D⁰ Meson Decay Vertex Reconstruction Simulations in the PHENIX Silicon Vertex Detector
Matthew Lockner (Session I.A.4)

The Silicon Vertex detector (VTX) is an upgrade project for the PHENIX experiment at the Relativistic Heavy-Ion Collider (RHIC) at Brookhaven National Laboratory, NY. This upgrade is a large-scale collaborative project, budgeted at approx. $9 million, involving more than 500 researchers in over 70 institutions spanning the globe. RHIC performs high-energy collisions of gold ions, providing experimental data on the "quark-gluon plasma," a state of matter thought to exist within the first microsecond following the Big Bang, in which quarks are deconfined rather than bound in hadronic matter.

The VTX upgrade will increase our ability to diagnose the properties of the plasma. We describe the main physics goals of the VTX and the expected performance of the device after it is installed in late 2010.

Media Influence on the Negative Portrayals and Perceptions of African Americans
Sarah Bracy (Session I.B.1)

The American public is exposed to millions of media messages a day. In those messages the general public form opinions, ideas, dislikes, preferences and perceptions of a variety things based on their exposures. The perception of race, culture and norms are often heavily influenced by these messages and can be a guiding tool in how other races may form their opinions about that targeted race. When these messages are negative representations of a race, problems arise in the form of misrepresentation and discrimination.

African Americans tend to fall victim to this type of negative portrayal in the media. Through analyzing the Media Dependency Theory and the Agenda Setting Theory, using tools from reception and comparative analysis studies, collecting data from self evaluation surveys on media impacts and cultural awareness, and reviewing past studies on this particular topic, these findings will further explore and explain why the occurrences of poor perception of African Americans happen and why media holds a large responsibility for that.

A Comparison of Women’s Roles Among the Missouri River Tribes and the Cherokee
Cassidi Thompson (Session I.B.2)

In this project I compare and contrast the similar gender constructions found among the Mandan, Hidatsa, and Arikara and the Cherokee. I will focus on the protohistoric period and have used published ethnographic research and secondary theoretical material to conduct this research. The Missouri River Tribes historically lived along the Missouri River Valley and the Cherokee originally inhabited southern Appalachia. Despite geographic separation, both cultures possess very similar characteristics regarding gender roles and relations. I will evaluate ways these roles differ among each group and demonstrate how these roles place similar expectations on the women of each group. I will evaluate how the origin stories and myths of these distinct groups contributed to the cultural construction of these accepted roles. My focus will be on the roles women fulfill in these societies, and how they are justified by their origin stories. I will also look at other similarities found among the groups that impact gender relations, including kinship and residence patterns, religion and ceremonial rituals, and trade. The goal of this research is to reexamine how the roles of American Indian women have traditionally been viewed and develop a new interpretation and perspective on the lives of American Indian women.
Comparative Study of the Economic Development Process of Botswana and Namibia from 2000 to Present
Nimota Nasiru (Session I.B.3)

In September 2000 member countries of the United Nations adopted eight Millennium Development Goals (MDGs), a commitment to making substantial progress towards addressing the most pressing problems in developing countries by 2015. These goals have become very central to the way government entities and development agencies pursue development efforts by providing a unified gauge for assessing development efforts of poor countries in their progression toward meeting these eight goals. The primary focus of the study is to analyze the economic development process of Botswana and Namibia, two countries from sub-Saharan Africa, from 2000 to present, with emphasis on Goal #2: achieving universal primary education and Goal #6: combating HIV/AIDS, malaria and other diseases. Their current progress on the two MDG’s combined with their individual Human Development Index (HDI) ranking should provide for a good analysis. It is the researcher’s goal at the end of this study to evaluate those factors that have had the greatest influence on the growth and development of each country and provide recommendations on how each country can ensure continued progress in their economic development process.

Attitudes and Experiences
Audrielle Glen (Session I.C.1)

An insufficient amount of research has been conducted on African Americans' attitudes toward gay, lesbian and bisexual (GLB) persons. In many studies it has been concluded that on average, African Americans are more likely to have negative attitudes toward GLB persons than are members of other races. One of the major reasons used to explain this finding is religion. It is believed that religion plays a large role in the degree to which a person is homophonic or not. A second factor that might affect attitudes is experiences of discrimination. Empathy concerning the pain of being rejected by mainstream society might diminish the negative feelings of African Americans toward gay and lesbian people. Religious commitment and history of discrimination will be tested as predictors of attitudes towards gay and lesbian individuals among African Americans. Many studies have surveyed college students regarding attitudes towards gay and lesbian individuals. However, in the present study I will be surveying participants from a predominantly Black church to investigate how negative or positive their attitudes toward GLB persons are and whether their attitudes are related to religious commitment and personal history of discrimination. To make the study purpose less obvious, the measure of attitudes toward GLB persons will be embedded in a measure that assesses attitudes towards several stigmatized groups (GLB, disabled and illegal immigrants).

Race and Socioeconomic Status: Does it Make a Difference on Viewers' Perceptions of Ambiguous Behavior?
Melissa Knight; Samantha Tuhn (Session I.C.2)

A wild life refuge officer shot and killed a Black man as he reached over to get his registration. The officer later stated he thought the man was reaching for a gun. Immediately after the incident, there were complaints from the public that the officer’s reaction stemmed from racial bias. If a White man demonstrated the same behavior would this same incident have occurred? The current study examines the influence of race and socioeconomic status (SES) on people’s perceptions of ambiguous behavior. This experiment utilizes a 2 (Black v. White) x 2 (low SES v. high SES) between-participants design, in which participants view one of four videos. The videos are identical—a person exits a convenience store and jumps into a car speeding away—the only differences are regarding race (Black or White person) and SES (High or Low - clothing and car). After the video, all participants filled out questionnaires about the video and the man’s actions. It is hypothesized that participants will produce more incriminating explanations for the low SES/Black video than for the high SES/White video. Implications of this study and future directions will be discussed.
**The Effects of Victim Pretrial Publicity on Jurors' Verdicts for a Defendant**  
Samantha Tuhn; Melissa Knight (Session I.C.3)

Jurors who receive pretrial publicity convict a defendant more frequently than jurors who do not receive pretrial publicity (Steblay et al., 1999). Research has focused on pretrial publicity about a defendant. This study expands the current literature by providing pretrial publicity about a victim. A victim's attractiveness level (high or low) and morality level (high or low) was manipulated for the pretrial publicity that was presented to mock student jurors to assess the effects of those factors on jurors' verdicts for the defendant. We hypothesized defendants would receive more guilty verdicts and harsher sentences from jurors when the victim's attractiveness and morality level is high than when the victim's attractiveness and morality level is low. Participants randomly received one of four victim pretrial publicity articles, which consisted of a victim’s photograph and background information, along with two unrelated mock newspaper articles. Participants received a 30-minute distractor task, read a mock murder trial, and then indicated their verdict and recommended sentencing length for the defendant. Results will be discussed in detail. This research will hopefully influence future laws regarding what information about the victim can be released to the public by the news media.

**Pay Me Now – Pay Me Later: The Effect of Immediate Consequences on Criminal Confessions**  
Andrea Arndorfer; Courtney Mergen (Session I.C.4)

Confessions are among the most persuasive forms of evidence in criminal trials, and interrogations are designed to increase suspects’ willingness to confess to crimes. Drawing on research showing that immediate more than distal consequences influence behavior, researchers hypothesized that suspects confess to crimes to escape the immediate consequences associated with continued denials during an interrogation even though doing so increases their risk for worse consequences later. Participants were assigned to one of three conditions that manipulated the consequences faced for responses to an interview that assessed whether they had ever committed 21 different crimes. Participants in the confession condition answered repetitive questions after they denied having committed a crime, but risked meeting with a police officer when they confessed to the crimes. Participants in the denial condition answered the repetitive questions after they confessed to a crime, but risked meeting with the police officer when they denied the crimes. Control participants did not have any consequences. Results indicated that confession rates were highest in the confession condition. These findings suggest that police interrogations capitalize on people’s tendency to focus on the here and now. This bias becomes stronger as suspects repeatedly face immediate, negative consequences for continued denials during interrogations.

**Consuming Context Clues**  
Paige McQueeney (Session I.D.1)

This research examines contextual effects on consumption behavior. Previous research examining context effects in food consumption has shown that kitchenscapes, tablescapes, platescapes, and foodscape provide contextual cues that influence the amount of food consumed. Data from a field experiment provides evidence for the influence of these irrelevant cues. We examined how the shape of a glass influences the amount of wine that was poured for consumption. Also, when an irrelevant abundance suggesting cue (i.e., a full water pitcher) was present, the amount of wine poured was greater than when a limitation suggesting cue (i.e., a half full water pitcher) was present. The second study looks at the effect of individual differences in the extent to which individuals use contextual information in consumption.
Deceptive Reality: Using Media to Implant False Memories
Faye Gilbert (Session I.D.2)

People are constantly bombarded with media messages that can affect the way we think and act, but can they also affect our memories? A pilot experiment was conducted testing 40 Iowa State University college students to measure the extent to which false memories could be implanted. To do this, three major past events were used; September 11th, 2001, the 2008 Presidential Elections, and Hurricane Katrina. First, Participants were surveyed to determine their recollection of facts about the three events. Participants were then exposed to media related to the events; some of which had been purposefully edited to depict specific false information in hopes of creating false memories. Participants were given two hours to process and store information before retaking the same, identical, survey. The before and after surveys were then compared and showed that a large number of participants had, in fact, created false memories regarding the events. The results demonstrate the vast power the media can have on us. How can we know what is true and what is not when people can be so susceptible to the media? Currently, a more extensive experiment is underway with a larger sample size to verify and expand upon previous results.

The Myth of Rational Advertising
Collett Moorhouse (Session I.D.3)

In this exploratory study, two message designs (verbal and visual) were tested to determine whether ads using verbal or visual cues were more effective through using EEG attentional measurements. Results showed that attention to both visual and verbal advertisements takes place in the right hemisphere of the parietal lobes. Processing for verbal advertisements takes place in the left frontal lobe, while processing for visual advertisements takes place in both the right and left side of the frontal lobe.

The Role of Personal Perspective in Consumer Judgment
Josh LaVille (Session I.D.4)

This line of work is related to the role of psychological distance in judgment. A new stream of research in psychology, known as Construal Level Theory suggests that individuals construe events differently based on their psychological distance to the event, with events that are closer (in terms of distance, time, self vs. other) being perceived as more concrete and vivid than events that are distant, which are construed at a higher level of abstraction. Together with my faculty mentor, Dr. Laura Smarandescu, I am looking at the role of personal perspective (viewing oneself from a first person view vs. viewing oneself from a third person, or an observer’s perspective), as a form of psychological distance that has not been yet been investigated in a consumer context. Libby (2007), who first looked at psychological distance shows that individuals are more likely to vote when they take a third person perspective than when they view themselves from a first person perspective. We hypothesize that individuals make more pragmatic/feasibility-focused judgments from a first person perspective as opposed to more ideal/value-focused judgments from a third person perspective.
Examination of Natural Plant Extracts for Antimicrobial Agents
   Allison Schlapkohl (Session I.E.1)

Although plants are continually exposed to bacterial pathogens, they nonetheless possess effective
defense mechanisms to protect themselves against microbial infection. Their ability to resist bacterial
infection is attributed, in part, to the antimicrobial activity found in a large number of small molecule
compounds most plants typically produce. Plants produce these compounds at varying concentrations
and many may possess unique activity toward bacteria. There is an urgent need to discover new
antibiotics, and plants hold the potential to derive antibiotics to protect human and animal health. To
explore the possibility of discovering new plant-derived antimicrobials, we have screened both crude
fractions and newly synthesized natural compounds using strains Escherichia coli, a Gram-negative
bacteria. To heighten the sensitivity of the screening, we are also using a mutant E. coli that has increased
permeability to small molecules. We have focused primarily on species of the medicinal plant
Hypericum (St. John’s wort) for screening. Using in disk diffusion assays as an indicator of antibacterial
activity, we have identified multiple compounds that inhibit growth of E. coli to varying degrees.

Assessing Pollination of Muskmelon (Cucumis melo) in Iowa
   Ximena Cibils-Sewart (Session I.E.2)

Due to the current shortage of commercial honeybees (Apis mellifera) in the U.S, wild pollinators are
critically important to producers of many high-value crops. Muskmelon crops depend on insect
pollination for proper fruit formation, but little is known about the contribution of wild insects to
pollination. To assess diversity and relative abundance of wild pollinators in muskmelon, we observed
pollinators in muskmelon flowers near Gilbert and Muscatine, Iowa, during the summer of 2009. At both
locations, insects in the order Hymenoptera were most numerous, followed by Diptera and Coleoptera.
The number of pollinators was highest during the peak bloom period for the crop. Pollinator activity was
substantially higher in the afternoon (between 1:00 – 3:00 p.m.) than in the morning (7:00 – 10:00 a.m.).
This timing differs from published observations of wild pollinators on summer squash in which pollinator
activity peaked in the morning. Our study provides the first published information about wild pollinators of
muskmelon in Iowa.

Development of a New Genetic System for Isolation of Mutants in Essential Bacterial Genes
   Nicole Benzoni (Session I.E.3)

In cells within all three domains, certain proteins are incorporated into the cells’ inner membrane. Proper
translocation of these transmembrane proteins is essential for cell viability. This process begins with
recognition of newly made proteins during translation. The signal recognition particle (SRP), a
ribonucleoprotein complex, targets a hydrophobic sequence in the inner membrane protein (IMP) as it
emerges from the ribosome. The Sec-translocon will later insert the IMP properly at the cytoplasmic
membrane. In Escherichia coli the SRP is fairly simple. It is composed of a single protein named fifty-
four homolog (Ffh, named as such because of its common lineage with the human SRP54 component)
paired with 4.5S RNA. Despite its essential role, the SRP is not fully understood. Using genetics to
study phenotypes of ffh gene mutants is a powerful approach to better understand SRP’s function.
Isolating Ffh mutants can be difficult, however, as the gene product is essential to bacterial viability. Our
lab is developing new genetic systems that will facilitate isolation and characterization of new Ffh alleles
that will reveal important new insights into SRP function and membrane protein localization.
Cloning, Expression, Purification, and Characterization of Ebola VP35 Proteins
Craig Brown (Session I.E.4)

The Ebola virus is highly pathogenic and causes severe hemorrhagic fever with high fatality rates of 50-90%. Treatments for Ebola viral infection, including vaccines or antivirals, are currently unavailable. One protein playing a multifunctional role in Ebola virus pathogenesis is VP35. The crystal structure of the C-terminal interferon inhibitory domain (IID) was recently solved and has been used to understand the molecular basis for many of the functions of VP35, including dsRNA binding and interferon inhibition. It has also been shown that VP35 plays a pivotal role in the formation of the viral RNA-dependent RNA polymerase, but this function has not been pinpointed to a particular domain of VP35. We are carrying out a series of structural and biochemical studies to better understand how oligomerization occurs in the full length protein.

The Development of a Novel Zinc Oxide Nanostructure for Use in Dye Sensitized Solar Cells
Carin Lightner (Session II.A.1)

Solar energy has great potential to provide for increasing global energy needs. Conventional solar cells offer high efficiencies but at even higher costs and with little flexibility. Dye-sensitized solar cells (DSCs) have great potential to reduce the costs of solar energy and help provide for increasing energy needs. We demonstrate the fabrication of a zinc oxide (ZnO) based nanostructure developed to improve the efficiencies of DSCs. ZnO fibers were produced by electrospinning and subsequent calcination (heating). ZnO nanoparticles were then attached to the fibers and ZnO nanorods were grown on the fibers. Previous research has shown that similar structures in different materials have improved DSC efficiencies. The development of a new ZnO nanostructure opens further avenues of research in high efficiency DSCs and other nano/micro-electronic research.

Use of Wind Tower Measurements for Improving Wind Energy Forecasts
Kristy Carter; Robert Hanson; Aaron Rosenberg (Session II.A.2)

America has set a goal to have 20% of its electrical power produced by wind by the year 2030. In order to reach this goal, power companies must rapidly expand their wind energy operations. Wind turbines generate a significant amount of wind energy, however, much of it is wasted due to poor forecasting. Because the energy companies are forced to sell energy in advance, accurate forecasting models will save money for both the company and customers. We are working with wind data from three towers managed by the University of Missouri. The towers are located in Northwest Missouri: Mound City, Maryville, and Blanchard. From the data, we are using the average wind speed and wind direction at three heights, 65m, 97m, and 117m, to generate graphical representations of wind activity over multiple 54 hour periods. Our analysis will help us further understand the effects of terrain, location, and height on wind characteristics, allowing for the development of more accurate forecasting models. Our analysis of tower data will be used by graduate students and Meteorology Program faculty to evaluate their wind speed forecasts. These results will assist the Department of Energy in achieving their 20% by 2030 goal.
Viability of Weather Dissemination Via Social Network Technologies

Justin Wittrock (Session II.A.3)

Social networking is a recent product of the ever-increasing advancement in online technology and society’s penchant for new modes of communication. Although social network sites are now used to share a broad array of content and are having global impact on topics as significant as national elections, few studies have been conducted to determine the viability of disseminating weather information via social network technologies. Social networking may serve as a useful mechanism for the rapid communication of weather information, especially for severe weather phenomena. The purpose of this study is to determine views by the general public on the practicality and feasibility of using social network sites as a source for weather information distribution. This purpose is fulfilled by conducting a web-based survey given to a group of people that are within the age range of 18 to 65. It is found that people favor using social network sites for weather information if they are given more control in receiving information. Further studies are needed to gain a better understanding of the public’s view toward social network sites as a source for weather information so that more people can be quickly informed of an impending weather hazard.

Mechanochemical Processing of Na2S+P2S5 Amorphous Materials

Seth Berbano (Session II.A.4)

In the next decade, hybrid electric vehicles and electronic devices will strain global lithium reserves. Researching different types of batteries is necessary to have low cost energy storage. Sodium is a cheaper alternative to lithium and is desirable in load leveling cells for wind energy generation. Japan has assembled Na/S cells requiring impractical operating temperatures (300 C). This research approaches the challenge with three goals: (1) develop an electrolyte that operates at room temperature, (2) develop solid electrolytes, which are safer than conventional liquid polymer electrolytes, (3) employ inexpensive processing. With support from the International Materials Institute for New Functionality in Glass, I travelled to Osaka Prefecture University (OPU) in Japan and learned about mechanochemical processing. At Iowa State University, testing began on sodium electrolytes analogous to lithium electrolytes studied at OPU. Compositions of 1:1, 1:2, and 2:1 have been milled. X-ray diffraction shows amorphous materials have been fabricated from crystalline powders. Infrared and Raman spectra of milled samples closely matches melted glass sample spectra. Future research involves measurement of ionic conductivities and a possible exchange to Gyeongsang University in Korea to fabricate and test batteries.

Birth Control Decision Aids Development Process

Becky Murphy; Gina Assmann, Melissa Dilling; Ming-Yee Li (Session II.B.1)

Using the same method for the diabetes decision aid study, the Design Information Research Group is developing new decision aids for birth control. The team will use the information we attain from this study to create more efficient and accessible decision aids for women and doctors. This will eventually help women make informed contraceptive decisions and assist in facilitating better communication with medical professionals.
Designer Perceptions of Piracy in Fashion and Jewelry Design
Heather Sinclair (Session II.B.2)

Design piracy plays a part in all of our lives whether we are aware of it or not. Piracy is the blatant copying of a design without trying to pass it off as someone else’s design, but acting as if it was your own. This study’s purpose was to explore jewelry and fashion designers’ perceptions of and efforts to either encourage or discourage the practice of piracy. Past historical efforts have been made by The Fashion Originators’ Guild of America to work towards the protection of designs, but have failed. Today, possible legislation could help designers to gain protective rights, but has largely stalled in Congress. I conducted interviews and a survey to gain knowledge and information. Results from this study suggest piracy is an institutionalized and persistent problem, that is not easily resolved.

Rome Children's Book
Melissa Dilling (Session II.B.3)

For this project, I am researching children's books and how to best write and design a book that is not only interesting to a first grader, but also helps him or her to learn to read and to learn about a different country's culture. In order to meet these goals, I am researching children's books that have won awards and are top books for this age group. I am also looking at the Dolch list, which lists the words that first graders are currently learning. This is significant because my finished book will help first graders understand a little bit more about Italy and how children in Italy live differently than American children.

The Story of a Collector: Anne Zimmerman
Amanda Lensch; Kelsey Leighton (Session II.B.4)

Anne Zimmerman was a passionate collector of high fashion pieces and generously donated to ISU’s Textiles and Clothing Museum in 2007. Garments in her collection represented iconic fashions of the 1940’s to 1980’s. The purpose of this study was to examine a select number of pieces from the Zimmerman collection and determine how the garment and garment designer fit within American and European 20th Century fashion history. Sources used included the garments themselves and Vogue magazines from 1945-1988. Secondary sources included biographies on the designers and other general 20th Century fashion books. The research included a short bibliography of each designer with an analysis of each corresponding garment. Visual examples were also used to support the written commentary of how each piece represents its respective decade.

Framework for the Understanding of Soil Moisture Patterns Using Self-Organizing Neural Networks
Linda Geiger; Kristin Crawford; Joe Goering; Trevor Richardson (Session II.C.1)

Field and soil monitoring plays an important role in many applications. While soil moisture probes have simplified the collection of soil moisture data, it still remains a time-consuming process. Using a combination of statistical and visualization techniques, we will provide the user with a more complete understanding of the spatial patterns and temporal dynamics contributing to soil moisture. Understanding these influences can save time by requiring less data collection. Our objective is to further develop a tool combing principle component analysis with self-organizing maps to give a graphical display of the soil property relationships and a ranking of the input variable's importance in the prediction model. Preliminary results have shown that the inclusion of slope and curvature are strong factors, but supplemental data can be used to improve prediction and modeling accuracy. Other variables include: electromagnetic inductance, topographic wetness index, nitrogen, carbon, and pH. With an understanding of these factors and a framework to validate and display these results, it will be possible to have a model for soil moisture patterns in a given field and specified season using variable data input.
Soybeans in Space!  Studying The Effects of Supplemental LED Light To Maximize Soybean Yield in Closed Systems  
Brandon Wilson; Tyler Swenson; Rebecca Meerdink (Session II.C.2)

One constraint in space missions is food and water requirements. Therefore, developing the technologies to grow plants in space would be advantageous. To maximize plant yields in space, the use of efficient lighting is important. One crop that has been targeted for growth in manned space missions is soybeans. Overhead lighting setups provide light to the top of a soybean’s canopy; however, light does not reach the bottom of the canopy, inhibiting plant growth. To optimize lighting efficiency and plant yields, Light Emitting Diodes (LEDs) will be tested as a supplemental light source in closed-canopy soybean production. IA 1081 soybean plants will be grown in 2 m2 plots with fluorescent lamps overhead and blue and red LEDs placed between rows. Two control plots, one with an equal amount of lighting overhead and one with overhead lighting equal to the lighting used for the experimental plot, will be used for comparison. This setup will allow for both an energy consumption comparison and plant yield comparison. The Photosynthetic Active Radiation (PAR) and Leaf Area Index (LAI) will be measured weekly for both plant systems. At maturity grain yield will be measured for both plots. It is hypothesized that LED lights will increase grain yields to a point where the benefits will outweigh the additional energy consumption.

The Influence of Taste Perception on Plasma Metabolites and Hormones  
Christopher Miller (Session II.C.3)

The sight, smell and taste of food initiate a physiological response that prepares that body to digest, absorb and metabolize nutrients from food. This is known as the cephalic phase response. While this response is small and transient, it is not trivial and is important for post-prandial metabolic control. Consequently, differences in the cephalic phase response to different foods could contribute to the development of chronic disease such as type 2 diabetes or cardiovascular disease. In this study, nine healthy male participants, aged 18-40 and with Body Mass Index of 21-28, visited the laboratory on four occasions separated by at least one week. Participants reported to the laboratory first thing in the morning after an overnight fast and an indwelling catheter was inserted into their arm. Participants then remained seated for 30 minutes in a room, separated from any food cues. After this period, an initial blood draw was taken, followed by a 10-minute period before another blood draw was taken. Participants then sham feed (participants chewed a food but expectorated before swallowing) for three minutes. Following sham feed, five more blood draws were taken at 0, 3, 5, 7, and 10 minutes. Blood was then analyzed for insulin, pancreatic polypeptide, and plasma metabolites.

Historical Trends in Ictalurid Catfish Commercial Harvest in the Upper Mississippi River  
Rebecca Burch (Session II.C.4)

Ictalurids compose a substantial portion of the recreational and commercial fisheries in the upper Mississippi River (UMR), but long-term patterns have received little attention in the scientific literature. The purpose of this investigation was to examine spatial and temporal trends in commercial harvest of ictalurids in the UMR. The study focused on four species: channel catfish *Ictalurus punctatus*, flathead catfish *Pylodictis olivaris*, blue catfish *I. furcatus*, and black bullhead *Ameiurus melas*. We described trends in yield and market value, and evaluated the influence of numerous factors on commercial catfish harvest in Pools 3 to 26 of the UMR between 1953 and 2001. Spatial and temporal variations in commercial harvest of catfish appeared to be driven by different factors through time. Early factors included habitat loss and overexploitation, and later factors included loss of the market share and increased market competition with farm-raised catfish. Ictalurid catfish have maintained a consistent proportion of the total commercial harvest in the UMR, and decreases in catfish harvest may indicate larger declines in commercial fishing.
A Case Study in Attitudes to an Elementary Spanish Immersion Program
Lisa Putz (Session II.D.1)

Language and the development of a second language is gaining importance as the world gets smaller. Many find that knowing a second language opens doors to international opportunities. To encourage second language acquisition, some schools in the nation are opting to provide immersion programs as part of their world language instruction. While these programs come in different forms, the objective of all is the same: to provide young children with a strong foundation in the target language by using the language as a medium of instruction. This research project looks at an elementary Spanish immersion program located in Minnesota and seeks to determine what the attitudes of administrators, educators, and parents are to the program. A qualitative study that consists of face-to-face interviews, the project adds to the existing body of research by giving an in-depth perspective on how the practical application of immersion works in real life situations.

Exploring Quality of Education in Iowa: Impacts of Hispanic Migration
Shane Roberts (Session II.D.2)

Quality of public education varies depending on factors such as school location, educational funding, and teacher experience, to name a few. In recent years Iowa, has seen an influx of Hispanic immigrants, leading to a more diverse public school system. Using data provided by the Iowa Department of Education (IDOE) from the 2008-2009 academic year, this presentation will focus on exploratory spatial data analysis. The main goal is to understand the relationship between variables related to ethnicity and quality of education in the school districts of Iowa.

Comparison of Personal Finance Knowledge Among College Students
Ting Li Zhou (Session II.D.3)

This study is designed to explore the current state of knowledge among college students with regards to personal finance and how they manage their money. This study begins with a review of past research by Danes and Hira (1987) on the financial knowledge and financial management among college students in the United States. This study will compare the contemporary college students’ knowledge of personal finance. The findings in this study cover knowledge on personal finance and will be helpful in providing input to academic and professional groups addressing the need to better personal finance education for the future. We will use the questionnaire and results from the Danes and Hira study as the benchmark.

Recycling Feasibility Study for Iowa State University
Kevin Marquardt (Session II.D.4)

Increased interest from Iowa State University students, faculty, and staff, has spurred various clubs and departments to form committees that have implemented expanded recycling efforts which suggest further research. With the recycling rate at 13%, waste diversion rate at 83%, and President Geoffroy’s commitment to sustainability through the Live Green! Initative, the university is in a position to reduce its impact. Research was collected on recycling programs at peer universities to form a basis of comparison with Iowa State University. Two waste sorts, in 2008 and 2009, showed that between 75% and 79% of the waste stream offered opportunities for reduction. An observational study, suggested that the availability of recycling containers are important for occupants to engage in recycling. The first online survey determined 86.5% of respondents were in favor of a campus-wide recycling program, while a follow-up survey determined 89% of respondents said they would take part, if the current recycling efforts were expanded. It is recommended that the administration of Iowa State University further investigate through conducting a pilot study, increasing awareness, and continually adjusting the program so the Iowa State University community feels engaged in the Live Green! Initiative.
Critical Chain VS Critical Path (PERT)
Carlos Ramirez (Session II.E.1)

This study will focus on the comparison of PERT (Program Evaluation and Review Technique)/CPM (Critical Path Management) and CCPM (Critical Chain Project Management) with respect to resource scheduling and project completion times. These techniques are utilized in project planning, but a debate has arisen as to which method is more effective. Using the computer simulation software ProModel, analysis of results achieved by scheduling simulated project networks derived from previously published independent studies will help determine which project management method results in higher on-time completion rate percentages.

A Meta-Analysis of Simulation Based Literature on the Performance of Push and Pull Systems
Brittany McLemore (Session II.E.2)

There is a great deal of debate over the relative superiority of pull versus push production control systems. Many advocates of JIT and/or kanban production control believe pull systems are always superior to push systems, while some MRP users believe push systems are applicable in some production environments. Others believe a hybrid system that combines the principles of push and pull will give superior performance. We perform a meta-analysis of the existing simulation based research literature that compares the performance of push, pull, and hybrid production control systems to better understand the environments, conditions, and factor settings that determine when each production control system is appropriate.

DBR, SDBR, and CONWIP in Practice: Creating an Effective Production System
Alexander Clemons; Jessica Loan; Ryan Page (Session II.E.3)

Efficiently producing goods or services is a challenge that any organization faces. Through the analysis of three production system methods, a specific method was expected to be found to achieve a higher level of efficiency for a certain set of production tasks. Drum Buffer Rope (DBR), Simplified Drum Buffer Rope (SDBR), and Continuous Work in Progress (CONWIP) were the three production systems chosen for this study. These were chosen due to their relative ease of implementation by an organization in relation to other production systems, as well as the applicability of the results to analyzing more complex production systems. The software tool ProModel 7.1 was used for the creation of production layouts to test the three production systems and analyze the results of their output. After performing various trials in ProModel, each production system showed strengths and weaknesses depending on the specific situation.
Sustainable Practices for a Sustainable Business Environment
Elizabeth Reed (Session II.E.4)

Organizations today must make a commitment to being sustainable in order to remain competitive. The issue of sustainability is relevant in today’s economic and political environment and has received widespread national attention. It is essential that the “Go Green” attitude that has been sweeping the nation is not just a trend.

The objective for this research project is to create a report outlining a variety of energy-efficient and "green" alternatives that businesses could implement in order to create a more sustainable work environment. The report will explore energy efficient alternatives that will fit in to three levels of implementation, based on the initial cost to the company: low cost, medium cost, and high cost. For each level, a cost-benefit analysis of implementing these alternatives will be included.

Businesses will be able to use this research to increase the energy efficiency of their offices. In the future, one may be able to study the actual costs, benefits, and other changes that a company experiences after implementing the energy efficient alternatives included in this project.

Influence of Biochemical Characteristics on Beef Inside and Outside Semimembranosus Color and Protein Degradation
Justine Hosch (Session III.A.1)

The beef semimembranosus (SM) muscle, also known as the Top Round, often appears a two-toned color, with the inside portion of the SM (ISM) often appearing paler than the outside sector of the SM (OSM). Because of the size, thickness, and location of the SM, the ISM has a slower chill rate and more rapid pH decline than OSM at early postmortem, resulting in increased muscle protein denaturation. Therefore, we hypothesize the protein denaturing condition within the ISM will negatively influence postmortem proteolysis by diminishing calpain activity. The objective of this study was to determine the influence of biochemical characteristics of beef ISM and OSM and postmortem protein degradation, which would ultimately effect the tenderness and quality of the product.

Effect of Stress on Fish Leukocyte Formula
Samir A-agha (Session III.A.2)

Leukocytes are part of the immune system that plays an important role in organismal defense against a disease. In mammals, the role of white blood cells (neutrophils, lymphocytes, monocytes) is vital, and it has been established that lower vertebrates such as fish also have an immune system composed of similar white blood cells that aid in the fight against infections. However, compared to the mammalian immune systems, not much is known about how the white blood cells function in fish. Understanding the responses of leukocytes of these aquatic creatures will allow a better understanding of what kinds of disease prevail as a result of a deficient immune system. Specifically, we will study the effects of stress and increased level of corticosteroid hormone on leukocytes. The application of corticosteroid or inducing stress causes a significant decrease of lymphocyte population known as lymphocytopenia, and increase in number of neutrophils (neutrophilia). When stress by corticosteroids is induced, two main things occur in the system: (1) reduction in the ability of the body to produce a normal immune response by reducing the numbers of lymphocytes and the capacity to produce antibodies; and (2) alteration of the levels of reproduction hormones that influence maturation, having a negative effect in reproduction.
Trends in Dairy Cattle Fertility from 1957 to 2007: Comparison of Jersey and Holstein Cattle

Nicole Walljasper (Session III.A.3)

Daughter pregnancy rate is the amount by which daughters of a particular sire are expected to exceed or fall short of a herd's average 21-day pregnancy rate. Pregnancy rate allows herd managers to measure how quickly their cows become pregnant after having calved. In this project specifically, daughter pregnancy rate is being used to show changes in fertility in Jersey and Holstein dairy cattle. Genetic trends in dairy cows will be discussed. Data from a national database will be used to establish changes in dairy cattle fertility from 1957 to 2007. This research will assist dairy producers to maintain and improve cow fertility.

Exploration of K-Casein and B-Lactoglobulin and their Role in Milk Production and Cheese Yield

Katie Weber (Session III.A.4)

K-Casein and B-Lactoglobulin are milk proteins that play a role in clotting milk. These protein levels have been rising consistently since the 1970s, yet the cheese making industry has noted that cheese yield has remained constant. Previous studies have shown that milk protein levels of cows change during various stages of lactation but the protein ration is not sensitive to dietary factors. Certain French breeders report genotype of K-Casein in their brochures. From that information, it can be concluded that different genotypes of K-Casein are desired for different purposes in the milk production and cheese making. Further research will look to link protein levels of K-Casein and B-Lactoglobulin with predictable cheese yield.

Al Samha: Understanding the Impact of Urban Design on Women in the UAE

Hedaya Al Hammadi (Session III.B.1)

The study examines women’s experience of the built environment of Al Samha, a suburb located in the United Arab Emirates outside Abu Dhabi. Al Samha is a microcosm of what is taking place in the UAE. New, western-style communities are displacing traditional neighborhood design and building practices. The purpose of the study is to understand the built-form of the neighborhood and its impact on women’s activities. Traditional UAE neighborhoods maintained functional lives for women by providing open spaces, gathering areas, and privacy. New neighborhoods like Al Samha force most women's activities inside the house, which separates women from the outside world. This case study involves several research methods. First, a literature review explored evolution of traditional neighborhoods in the Gulf area. Second, using a snowball sample technique seven women were selected for open-ended interviews. Finally, careful observations of the neighborhood were made, including measurements of public spaces, streets, and residential lots. The study found that adding traditional design features to the new neighborhoods would respond to resident's needs and could potentially improve the lives of UAE women.

Reverse Commuting in the Chicago Metropolitan Area Highway System

Joel Mendez (Session III.B.2)

The decentralization of employment from central cities has been increasing over time. This is the case for the City of Chicago which has several areas of high employment located throughout its suburbs. I believe that reverse commuting has been increasing over the past years thanks to this decentralization of employment. I will analyze the relationship between reverse commuting and the deterioration rate of the Chicago metropolitan area highway system. I will identify three highway arterials for my research that connect the city of Chicago to some of its major suburbs. I will select these arterials by analyzing the most recent traffic counts and determining which arterials show signs of reverse commuting. I will then research construction projects that have been implemented in the past that focus on maintenance and congestion mitigation for these same arterials. Analyzing the patterns and statistical correlation between these two variables would then determine the strength of relationship between reverse commuting the deterioration rate of the Chicago metropolitan area highway system.
Contract Management Failures in Government Acquisitions: A Case Study of Deepwater  
Michael Kostboth (Session III.B.3)

This presentation will use the case of the Coast Guard's Deepwater program to highlight problems with large scale government contracting. The government has a constant problem of needing to procure equipment, processes, and platforms that they cannot produce themselves. In the case of the Coast Guard it is attempting a massive recapitalization project to modernize their fleet of ships and aircraft. However the problems that bedevil government acquisitions have dealt serious damage to the Deepwater project. By analyzing the failures of oversight and contract management this presentation seeks to demonstrate how government contracting could be more efficient and lead to better outcomes.

De-concentrating Affordable Housing through Housing Choice Voucher Programs  
Monique Hawkins (Session III.B.4)

This research is being conducted to help support the argument that best way to de-concentrate affordable housing is through housing choice voucher programs. Instead of creating project-based housing units, which concentrate low-income families in one area, voucher programs gives these families the opportunity to live in areas that are not primarily low-income, resulting in the de-concentration of affordable housing.

Past and present data will be collected to show areas that once had highly concentrated affordable housing and whether or not housing choice vouchers were used to help de-concentrate affordable housing in those areas. ArcGIS will be used to analyze the data and compare the location and concentration of affordable housing in different areas.

The Effect of Electric Fields on Adult Hippocampal Neural Progenitor Cells  
Sagar Chawla (Session III.C.1)

Electric fields (EF) have been shown to have an effect on the growth of differentiated cells. Yet the influence of an EF on adult neural progenitor cells (NPC) has not been carefully considered. To determine the affect of an EF on NPC differentiation and process growth, NPCs were placed in a continuous EF. The continuous EF favored differentiation of NPCs into neurons over glia (oligodendrocytes and astrocytes). Furthermore, process outgrowth was promoted perpendicularly to the applied field. This is the first study to show that EFS alter the differentiation of adult NPCs. Further investigation into affects of EFs on the behavior of NPCs may provide important applications to brain repair and regeneration.

Structural and Biochemical Studies of Reston Ebola Virus VP35 Protein  
Mina Farahbakhsh (Session III.C.2)

Ebola virus (EBOV) infections are often characterized by severe hemorrhagic fever and there are currently no approved treatments. Viral protein 35 (VP35) is one of seven EBOV-encoded structural proteins critical for viral pathogenesis, including viral replication and immune suppression. Our lab recently demonstrated that dsRNA binding is important for VP35-mediated antagonism of host immune responses. The Reston Ebola virus (REBOV) is unique as it is the only member of the Filovirus family that is not lethal to humans. In an attempt to identify differences between pathogenic and non-pathogenic strains, we performed structural and biochemical studies of REBOV VP35 protein and compared them with corresponding data for Zaire Ebola virus (ZEBOV). These studies reveal that the crystal structure of REBOV VP35 IID is structurally similar to ZEBOV VP35 IID. However, REBOV VP35 interferon inhibitory domain (IID) has slightly diminished dsRNA binding in comparison to its ZEBOV equivalent, which ultimately results in lower IFN antagonism. Our results provide a framework to examine differences between different filoviruses that display a range of host specificities and virulence.
Identification and Biochemical Characterization of VP35 Inhibitors
Dayna Peterson (Session III.C.3)

Ebola viral infection often causes severe hemorrhagic fever and is highly fatal, but there are no approved treatments. Ebola viral protein 35 (VP35) is involved in host immune suppression and viral replication. Therefore, identifying chemicals that can modulate VP35 function may result in reduced VP35-mediate host immune suppression and lead to decreased viral replication. Recently, our lab solved the crystal structure of the VP35 C-terminal interferon inhibitory domain and identified critical residues that are important for viral replication and immune suppression. Using the structure and corresponding functional studies as a basis, recent collaborative computational studies have identified a series of potential ligands that are targeted at functionally important regions. The goal of my current project is to test the ability of these potential ligands to bind VP35 protein using structural and biochemical methods. Through these efforts, we expect to identify inhibitory molecules that can function as antiviral drugs against Ebola virus.

Analysis of Dystrophic Muscle by Two Dimensional Differential in-Gel Electrophoresis.
Jenna Dixon (Session III.C.4)

Duchenne muscular dystrophy (DMD), the most common, fatal, X-linked disease, is caused by a defect in the dystrophin gene. While dystrophin deficiency is the causative factor in this disease, changes in the expression of other proteins may also contribute to disease pathology. The objective of this investigation was to determine the extent to which dystrophin deficiency impacts the muscle proteome. We performed two dimensional differential in-gel electrophoresis (2D-DIGE) (pH 4-7) on gastrocnemii taken from 6 week old male mice (n=6 mdx; n=6 C57). Of a total of 2200 spots detected, 41 spots (representing unique isoforms or modified proteins) were found to be differentially expressed (p<0.1; 24 spots with p<0.05). Of these, 30 spots were increased and 11 were decreased in mdx compared to control. Using mass spectroscopy and MALDI-TOF, the identity of the proteins represented was confirmed in 36 spots. These proteins represent a variety of cell functions including apoptosis, mitochondrial function, and cell growth and differentiation. Further analysis of these proteins may allow for the identification of novel pathways and lead to the development of innovative strategies to minimize disease progression.

The Effect of Patch Burn-Grazing on Ant Diversity in Southern Iowa Grasslands
Laura Winkler (Session III.D.1)

Insects are an important part of the ecological systems across the globe, and ants (Hymenoptera: Formicidae) in particular play essential roles in moving soil, dispersing seeds and decomposing of plant and animal material. Ants occupy many different niches in tall-grass prairies: in trees (arboreal), above ground (foliar) and underground (subterranean). Land management, and particularly the use of fire in prairies, has been shown to shift the abundance of ant species, but little experimental work has been conducted to understand the specific mechanisms driving such responses. Our research focuses on comparing the responses of the ant community to three different prairie management treatments: grazed, patch-burn grazed, and burned (grazed and burned pastures are burned once every 3 years; patch-burn grazed pastures have a subsection burned annually). We hypothesize that patch-burn gazing may result in a shift in ant species distribution patterns compared to those found in grazed or burned prairies. We expect to find a decrease in the diversity of arboreal species (as compared to grazed pastures) and an increase in the diversity of plant or soil dwelling species (as compared to burned pastures).
Chemical "Fingerprints" of Lions
Rachel Owen (Session III.D.2)

Chemicals in lion urine and spray emit aerial odors signifying territorial markings. Signals can last up to six months, alerting of a lion’s presence and its physical health and strength. In Africa, human-wildlife conflicts are becoming prevalent, and resulting in fatalities. As a vulnerable species, efforts must be made to conserve this wildlife population. By knowing the chemical compounds responsible for territorial markings, ecologists could shift lion migration patterns and protect humans, livestock, and the lion population. Our research provides a novel approach to analyzing the chemical compounds of lion urine, territorial marking residues, and air in lion cages. Urine samples have been exposed to air for various amounts of time, allowing observations to be made on the persistence of compounds for up to 62 days. Sampling was completed with solid-phase microextraction (SPME) and analyses were completed on a gas chromatograph-mass spectrometer. Preliminary analyses show that at least three compounds, heptanal, octanal, and nonanal, in drying urine are still emitted at Day 62. The same chemicals are present in air samples and territorial marking residues. Opportunities are available to further test this hypothesis and the results may lead to an advance in protecting endangered felines around the world.

Assessment of Potential Associations of Canine Distemper with Vaccination or Genetic Susceptibility
Chris Thomson (Session III.D.3)

Canine Distemper (CDV) is a viral disease causing respiratory, gastrointestinal, and central nervous system problems. A rare sequella associated with the human disease Measles, caused by a virus in the same family (morbilli), may be related to the phenomena observed in the closed canine colony that is the subject of this study. Hence, this study has potential application to humans as well.

We aimed to assess the correlation of CDV with incidences of cerebellar/seizure/post ictal signs in individuals in our canine colony. We conducted an epidemiological study, comparing two possible modes of infection: by assessment of vaccine product and of potential genetic contribution. The vaccine may be the cause of these adverse side-effects through direct infection at vaccination or by causing problems after the primary immune response. My research involved two lines of inquiry: correlating historical record-based information and retrospective testing (epidemiology) and experimental monitoring of prospective case data. We find there is a potentially stronger correlation to the dam suggesting maternal transfer, rather than through the vaccination, however, our data remains largely inconclusive. Additionally, our findings lay the foundation for any future research concerning CDV within the closed environment of our colony, should there be a recurrence.

Understanding Temperature-Dependent Sex Determination in Painted Turtles
Amanda Harris (Session III.D.4)

While sex is determined at conception by sex chromosomes (GSD) in most vertebrates, many reptiles like Chrysemys picta, experience sex determination by environmental influences like temperature. This environmental sex determination, called temperature-dependent sex determination (TSD), occurs in the approximate middle third of development, termed the thermosensitive period (TSP). Though predicting sex ratios of C. picta hatchlings at constant incubation temperatures has been reliable under controlled conditions, it is not an accurate predictor in a natural, fluctuating, environment (Georges 1989, Valenzuela 2001). This study uses C. picta as a model to decipher what genes may be responsible for sex determination in TSD organisms.
An Experimental Test Design for the Study of Fan Noise
Jasmine Draper (Session III.E.1)

Fan noise in high performance laptop computers and other compact electronics has been increasing because of increased cooling requirements. International standards exist for equipment and measurement techniques to evaluate the performance and noise produced by these cooling fans. The project has focused on developing the testing equipment and procedures to implement this international standard. Details of the design and construction of the plenum testing apparatus is described. Material selection had the most significant effect on development of the plenum. Selected materials and fasteners deviated from those specified in the international standard in order to simplify the plenum assembly and use. To test the system and procedures, a noise study was performed with a fan that has published sound and air flow performance data. The measured and published values were compared over a range of fan operating conditions, ranging from flow rates at 100%, 80%, and 20% of the maximum flow rate. Once fully constructed and tested, the system can be used for other types of fans to assist future studies in fan noise research.

Conceptual Study of a Personal Winged Flight System
Nuku Doamekpor (Session III.E.2)

This is an introductory study to design a personal winged lift generating system for free-falling persons and the costs of designing and creating a lift generating system of this type. A baseline of current personal lift generating systems will be determined through a review of current technologies applicable to personal lift generation. The baseline of current systems will aid in the creation of a conceptual design of the aircraft. In parallel to the conceptual design, design constraints will be added as a guideline for later development. From the initial concept, a design will be created with individual attention given to propulsion, aerodynamics, structures and flight dynamics of the aircraft. With the conceptual design created, a cost analysis will be calculated on the final design to see if the cost is feasible enough to move forward with the design.

The Visualization of Armor Variation
Ryan Hall (Session III.E.3)

The objective of this research is to develop non-destructive evaluation techniques that are sensitive to variations in ceramic armor that might lead to weaknesses. Ceramic armor is being considered as a more cost-effective, yet equally strong replacement for current tank armor. Manufacturers, such as BAE, send armor specimens with known defects to labs like the CNDE (Center for Nondestructive Evaluation) to see if the defects can be detected. The purpose of this testing is to develop techniques that can detect any deficiencies in the armor once they are mass produced. The CNDE performs many tests, including ultrasound technology in order to detect these deficiencies. In order to better visualize the data, statistical techniques are being developed to help find defects. Data collected includes the x-y coordinate and the intensity, which is the severity of the deficiency. The data is arranged into an excel file and subjected to statistical analysis. Post analysis includes developing a means to visualize the final data, since analyzing data points from a visual representation is easier than trying to sort through thousands of numbers. Graphs are being developed for each layer, and a color scheme is used to categorize the intensity of each data point.
Free Fatty Acids Cause Changes in E. coli Membrane Composition
Matthew Stebbins (Session III.E.4)

Fatty acids serve many industrial purposes in industry, including food preservatives and monomers for plastics. E. coli bacteria show potential for catalyzing fatty acids from glucose, yet low concentrations of fatty acid inhibit E. coli growth. The purpose of this study was to examine how fatty acids may affect cellular membranes. 10 mM of hexanoic acid was added to MG1655 cells grown in MOPS media with 2% glucose. Using a modified Blotts and Dyer method, cell membrane fatty acids were extracted and analyzed using gas chromatography. The results showed an decrease in C17 cyclopropanated fatty acids and an increase in 16:1 and C18:1 fatty acids compared to the control cells, suggesting that octanoic acid affects cellular membrane composition. These findings suggest hexanoic acid may affect membrane fluidity, and, therefore, play an effect in fatty acids inhibition to E. coli. Further work includes measuring how hexanoic and decanoic acid affect cell membrane composition, as well as fluorescent polarization to measure membrane fluidity.
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