Metropolitan State University of Denver

May 3rd, 2013

Undergraduate Research Program • Applied Learning Center

Sponsored by

Metropolitan State University of Denver
Undergraduate Research Program

Dr. Pamela Ansburg, Dr. Janos Fustos, and Dr. Jeffrey Forrest
Faculty Associates for the Undergraduate Research Program

Karina Hultgren
Undergraduate Research Program Coordinator

Dr. Rhonda Eaker
Director, Applied Learning Center

Dr. Mark Potter
Academic Vice President for Academic and Civic Collaboration

Members of the Undergraduate Research Program Advisory Council

Dr. William Carnes (Management)
Dr. Jacob Welch (Theatre)
Dr. Ford Lux III (Biology)
Dr. Andrew Holt (Accounting)
Dr. Benjamin Moritz (Honors Program Director)
Dr. Christopher Jennings (Technical Communications)
Dr. Devi Kalla (Mechanical Engineering Technology)
Dr. Daniel Krasner (Philosophy)
Dr. Lunden MacDonald (Center for Faculty Development)
Dr. Alexis Newton (Nursing)
Dr. Kamran Sahami (Physics)

Undergraduate Research Program Mission

The Undergraduate Research Program promotes, supports, and celebrates faculty and student engagement in undergraduate research activities. These undergraduate research experiences enhance students' preparedness and competitiveness for future employment and the pursuit of advanced degrees.

Table of Contents

METROPOLITAN STATE UNIVERSITY℠ OF DENVER

Peter Morville, who is considered the founding father of website architecture, has said, "What we find changes who we become."

I would also like to add that *how you do that finding* is equally transformative.

Each one of you—under the guidance of a committed professor—has applied your education and added to the world's body of new knowledge in some way. More importantly you have learned how to learn—to ask complex questions and find answers. Whether you studied water ecology or English lit, you have gained skills and habits of mind relevant to future graduate studies and the 21st century workplace.

Congratulations on your hard work. And stay curious! The more questions you ask, the more contributions you will make.

Stephen M. Jordan, Ph.D.
President

Welcome to Metropolitan State University of Denver's 2nd Annual Undergraduate Research Conference! I am excited to recognize the outstanding work of our students and their professors, who have been engaging students in important research for many years.

The Association of American Colleges and Universities (AAC&U) has identified undergraduate research as one of 10 high-impact education practices because it involves students directly in their learning and helps them progress toward graduation in a timely fashion. According to the AAC&U, the goal of this kind of faculty-student collaboration is "to involve students with actively contested questions, empirical observation, cutting-edge technologies, and the sense of excitement that comes from working to answer important questions."

MSU Denver is a member of the National Science Foundation's (NSF) Council on Undergraduate Research (CUR), which defines undergraduate research as "an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline." Although clearly connected to the NSF, and therefore naturally supportive of the science, technology, engineering and mathematics (STEM) disciplines, one of the wonderful aspects of CUR is its endorsement of undergraduate research and creative activities across all disciplines.

Today, we have an opportunity to see and be inspired by the products of our faculty and students. I thank everyone who worked so hard to bring their research to fruition. I know that we will all learn from their presentations.

Vicki Golich, Ph.D.
Provost and Vice President for Academic and Student Affairs

Award Finalists

Oral Presentation Award Finalists

David Haddad and Julia Woodward, Anthropology
Faculty Mentor: Dr. Rebecca Forgash, Dr. David Hill, Dr. Ronald Beckett, and Dr. Gerald Conlogue
The Philippi Mummy Project Historical Analysis

Jennifer Jennings, Biology
Faculty Mentor: Dr. Robert Hancock
The Phototactic Response of Planktonic Marine Crab Larvae to the Wavelength and Intensity of Light

Caitlin McConnell, Psychology
Faculty Mentor: Dr. Lesley Hathorn
Penchant for A Verbosity: Does Reading Ability Translate to Writing Skill?

Nick Nelson, Biology
Faculty Mentor: Dr. Andrew Bonham and Dr. Douglas Petcoff
Investigation of Extracellular Microenvironments and Small Molecule Chemistry for the Maintenance and Differentiation of Pluripotent Embryonic Stem Cells to Foster Neural Specification

Sharon Wharton, Human Development
Faculty Mentor: Dr. Lisa Badanes
Stressed and Depressed: The Role of Self-Compassion in College Students' Well Being

Poster Presentations Award Finalists

Rebecca Addison, Chemistry
Faculty Mentor: Dr. Rosemarie Walker
Analysis of the Combinatorial Effects of a Dual PI3K/mTOR Inhibitor PF-04691502 with the MEK Inhibitor PD-0325901

Lucero Herrera, Psychology
Faculty Mentor: Dr. Courtney Rocheleau
Olfactory Stimuli and Memory Performance

Jennifer Kane, Leslie Wall, and Kaitlin Hornbostel , Nutrition
Faculty Mentor: Dr. Michelle Tollefson and Dr. Jennifer Weddig
The effect of immediate and continued skin-to-skin contact on breastfeeding duration and exclusivity

Caitlin McConnell, Psychology
Faculty Mentor: Dr. Lesley Hathorn
Reading Compensation: Reading Rate as a Predictor of Student Success

Jacob Paschall, Biology
Faculty Mentor: Dr. Mark Mazurek
Reducing the Flash-Lag Effect Using Spatial Reference Cues

Keynote Presentation

David Gingerich, *Senior Staff Engineer with Lockheed Martin Space Systems and Affiliate Faculty Member at Metropolitan State University of Denver*

"Help Wanted: Researchers, social scientists and engineers to transform terrestrial-bound human beings into a space-faring species"

Long ago, the first life on Earth evolved from living exclusively in ancient, primordial oceans to thriving on dry land. The next major evolutionary step of homo sapiens will be consciously transporting ourselves from our ancient home on Earth to our future home in the galaxy. In his keynote address, Mr. Gingerich will discuss how successfully establishing human society in outer space will require a great deal of non-technical, human-centered research. As humans change from a terrestrial-only species we must expect that the cultures and social organizations we've built on Earth will be transformed. How that transformation takes place, how quickly and successfully we send humans into long space voyages and off-Earth colonies, and how well these pioneers become self-sufficient and thrive depends on how successfully we transform our human bodies, cultures, and societies to live and grow in a hostile, unfamiliar, and extraordinarily desolate environment. This keynote address will review the enormous opportunities for undergraduate research to contribute to this evolution as our species takes its first steps away from our water-planet and into the 'dryland' of outer space.

For the last decade Mr. Dave Gingerich has served as the Certified Principal Engineer for Flight Software on nine, highly successful NASA space exploration missions. With more than 30 years of experience at Lockheed Martin, he has worked almost exclusively on the development, test, integration and operation of space exploration spacecraft to Mars, the Sun, two comets & an asteroid, our moon, Jupiter, and an astrophysics observatory.

Pursuant to his love of teaching and discussing all matters of space exploration, Mr. Gingerich is also an Affiliate Faculty member of the Aviation and Aerospace Sciences Department at Metropolitan State University of Denver and an Adjunct Associate Professor in the Space Operations Management, Masters of Science degree program at Webster University in Denver. At Metro State University, he currently teaches four courses in the Space Commercialization Certificate program. At Webster University he serves as the local area Space Mentor and conducts courses on Space Systems Engineering, Orbital Mechanics, Hazards of Spaceflight, Space Mission Operations and Fundamentals of Space.

Conference-at-a-Glance

8:00 am - 3:00 pm
Closed for lunch (11:45am - 1:00pm)

Conference Participant Sign-in
North Classroom (NC) Building - Atrium
Light Refreshments will be provided in the morning.

8:45 am - 10:00 am

Conference Session I
Oral Presentations - NC Building
Room #1202 - Humanities/Social Sciences
Room #1312 - Humanities/Social Sciences
Room #1314 - Humanities/Social Sciences
Room #1323 - Natural Sciences
Room #1325 - Technology

10:15 am - 11:30 am

Conference Session II
Oral Presentations - NC Building
Room #1202 - Humanities/Social Sciences
Room #1312 - Humanities/Social Sciences
Room #1314 - Humanities/Social Sciences
Room #1323 - Natural Sciences
Room #1325 - Technology
Poster Presentations - NC Building Atrium

11:45 am

Lunch
Turnhalle, Tivoli Student Union

12:15 pm - 1:15pm

Keynote Speaker: David Gingerich
Help Wanted: Researchers, social scientists and engineers to transform terrestrial-bound human beings into a space-faring species.
Turnhalle, Tivoli Student Union

1:30 pm - 2:45 pm

Conference Session III
Oral Presentations - NC Building
Room #1202 – Oral Presentation Award Finalists
Room #1312 - Humanities/Social Sciences
Room #1314 - Humanities/Social Sciences
Room #1323 - Natural Sciences
Room #1325 - Natural Sciences

3:00pm - 4:15 pm

Conference Session IV
Oral Presentations - NC Building
Room #1202 - Humanities/Social Sciences
Room #1312 - Humanities/Social Sciences
Room #1314 - Business
Room #1323 - Natural Sciences
Room #1325 - Technology
Poster Presentations - NC Building Atrium

4:30 pm - 5:15 pm

Awards Ceremony and Closing Reception
Turnhalle, Tivoli Student Union, *Light refreshments provided.*

Acknowledgements

We would like to extend our thanks and appreciation to the following offices and individuals for their contribution to the success of the conference.

Applied Learning Center Staff
Award Abstract Reviewers
MSU Denver Alumni Relations
All Volunteers
Session Moderators
Auraria Library (especially Lorrie Evans/Katy Brown)
Keynote Speaker: David Gingerich

Special thank you to the following individuals who have volunteered their time to serve as award judges to select conference award recipients.

Jim Garrison*
Business Manager
Rocky Mountain Microfilm and Imaging

Judy George*
Vice President
Kirby Company of Denver

David Gordon
Director, CDOT
Colorado Division of Aeronautics

Debbie Klein, JD, LLM
Adjunct Professor, Colorado Women's College, University of Denver

Don Manuell
Chief Information Officer (Retired)
Hunter Douglas

Joe Sanchez
Mechanical Engineer
Northrop Grumman Corporation

Leonard Smith*
Principal and Owner
Telesis Consulting, LLC

Joseph Thibodeau, Esq.
Shareholder, Joseph H. Thibodeau, P.C/Chairman, Colorado Aeronautical Board

David Wood*
A320 Standards Captain
United Airlines

*MSU Denver Alumna/Alumnus

Undergraduate Research Conference Planning Committee

Dr. Pam Ansburg (Psychology)
Dr. Janos Fustos (Computer Information Systems)
Dr. Jeffrey Forrest (Aviation/Aerospace Science)
Dr. William Carnes (Management)
Dr. Amy Eckhert (Political Science)
Dr. Bridget Murphy-Kelsey (Psychology)
Dr. Scott Lubinski (Theatre)
Dr. Ramon Del Castillo (Chicana/o Studies)
Dr. Carmen Ripolles (Art)
Simon Ayesse (Student Govt. Assembly)
Dr. Katherine Hill (Psychology)
Dr. Andrew Bonham (Chemistry)
Dr. Sheryl Zajdowicz (Biology)
Dr. Diane Davis (Mathematics)
Dr. Maria Akrabova (Spanish)
Dr. Kamran Sahami (Physics)
Dr. Rachel Delaney (Art)
Dr. Karen Lollar (Speech Communication)
Dr. Lunden MacDonald (Center for Faculty Development)

Keynote Speaker Selection Committee

Dr. Sheryl Zajdowicz (Biology), **Chair**
Dr. Bethany Fleck (Psychology)
Dr. Tanya Gatlin (Aviation/Aerospace Science)
Dr. Mark Mazurek (Biology)
Dr. Bridget Murphy-Kelsey (Psychology)

Conference Awards Committee

Dr. Katherine Hill (Psychology), Chair
Dr. William Carnes (Management)
Dr. Andrew Bonham (Chemistry)
Simon Ayesse (Student Govt. Assembly)

Moderator Coordinator

Dr. Diane Davis (Mathematics)

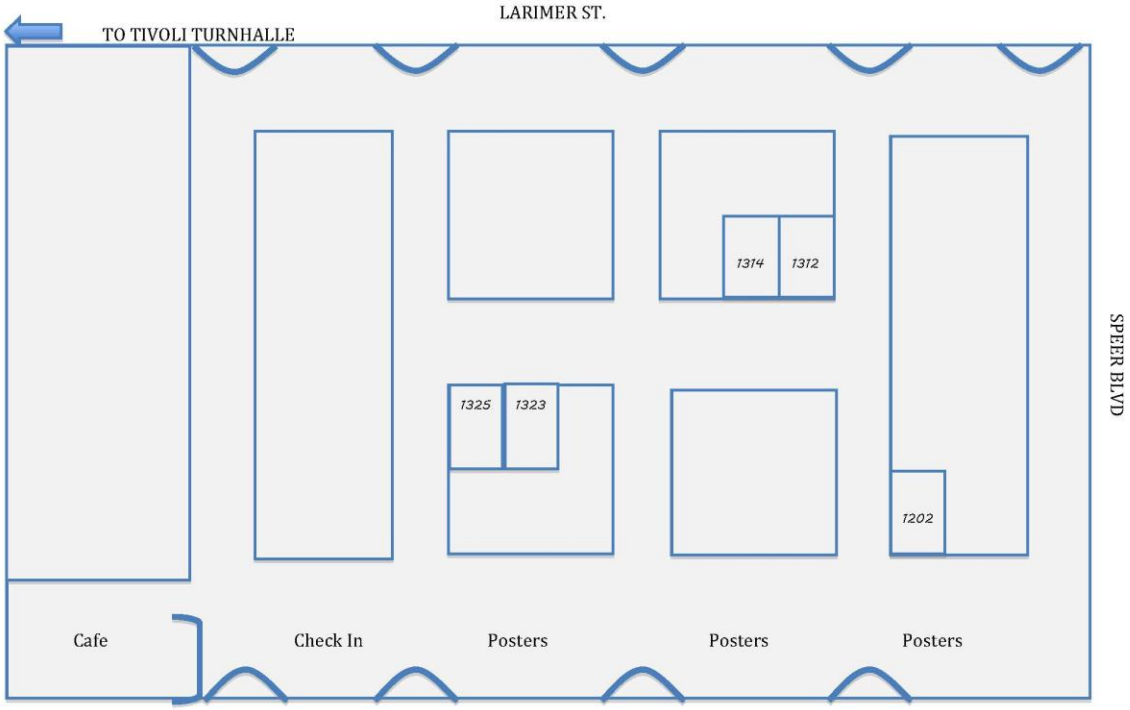
Scheduling/Conference Program

Dr. Janos Fustos (Computer Information Systems)

Conference Map

METROPOLITAN STATE UNIVERSITY OF DENVER

Undergraduate Research Conference



MAP OF NORTH CLASSROOM BUILDING
POSTER AND ORAL PRESENTATION LOCATIONS

Presentation Abstracts

(*listed alphabetically by primary student's last name)*

Spanish Learning And Test Taking

Yesenia Acevedo – Psychology

Faculty Mentor: Lesley Hathorn

Past studies have investigated different strategies in which a foreign language would be more easily acquired during adulthood. Participants studied words that were easy when they were given a small amount of time to study and prioritized items with high point values when they were given enough time to study (Price, et. al., 2009). The purpose of Experiment 1 was to test the effect that labeling has on the test performance. It was expected that the participants would learn more words that were labeled as "Easy" or "Useful". The participants for Experiment 1 included 75 students. The test consisted of 40 questions that included 10 words, which were labeled as "Useful Words", and 30 words were labeled as "Other Words". The test included two columns that were labeled as "Easy Words" or "Difficult Words". The labels of Easy and Difficult were counterbalanced. The words were consistent for all groups. Results differed with the hypothesis. There was not a significant difference in the amount of words learned ($t(73) = .70$, $p = .176$). Participants learned more words from the "Other" category than the Useful category. For the words labeled as "Other", the participants learned more words from the left column than from the right column $t(74)=2.95$, $p<.004$.
For Experiment 2, data collection is currently in progress. Participants are studying words one at a time on a computer screen to remove the left-right bias. In addition, feedback is manipulated between the groups. It is expected that the participants that study during their tests will learn more words in comparison to the group that does not.

(Oral Presentation, Session II, Room 1314, 10:15am)

Analysis Of The Combinatorial Effects Of A Dual PI3K/Mtor Inhibitor PF-04691502 With The MEK Inhibitor PD-0325901 (Award Finalist)

Rebecca Addison – Chemistry

Faculty Mentor: Rosemarie Walker

Despite new treatment options for advanced metastatic colorectal cancer (CRC), the five year survival rate remains poor. A substantial portion of CRCs are found to have mutations along the RAS/RAF/MEK/ERK and PI3K pathways. Targeting these pathways in combination may lead to more effective therapies. For the *in vitro* studies, proliferation assays were performed to determine IC50 values to PF502 and synergy. Apoptosis was evaluated by caspase3/7 and clonogenic assays. Downstream targets were assessed by western blot analysis. For the *in vivo* studies, tumor growth inhibition was evaluated following treatment. Synergy was seen with all cell lines tested regardless of sensitivity to PF-502. Western blot analysis revealed enhanced down regulation of effector molecules and up regulation of apoptotic molecules. In PDTX models, the combination treatment demonstrated reduction in tumor growth. The combination of a PI3K/mTOR and a MEK inhibitor demonstrated synergistic anti-tumor effects against CRC models.

(Poster Presentation, Session I (10:15-11:30am), Poster #35)

The Impact Of Trade On Diplomacy: U.S. Chinese Relations

Jesse Altum – Political Science

Faculty Mentors: Amy Eckert, Robert Hazan, Andrew Thangasamy

Trade is a historically important component of international relations that has influenced diplomatic relations and been a means to build stronger ties between countries. In the globalized world international trade more important than ever in the development of relations between nations. Nations can begin to look at trade and measurements of trade as a mechanism for forecasting diplomacy as they have done with economic development and technology advancements. Scholars recognize trade as a fast-paced process allowing for constantly renewed data on willingness to cooperate, or not, between specific nations. Monetary levels of trade and foreign direct investment are strong measures of confidence between two nations that can be quickly started or halted by either party. Diplomatic relations between nations are often seen as slower paced but more official means of communication. Diplomacy and trade were strongly correlated in the development of US - Chinese relations in1972 when President Nixon opened the conversation for the cooperation of US corporations with the Chinese government and eventually with the US government. As trade has continued between the US and China, the respective governments have taken part in stronger diplomatic efforts building confident relations. Diplomacy can be identified as cooperation between the nations in the United Nations (UN), treaties between both nations, and the measure of diplomatic trips of government officials to each nation. Trade is measured through trade balances, gross domestic product, and claims of trade damages, which the World Trade Organization (WTO) provides. Both measurements are divisible into positive and negative directions to compare the relationship between trade and diplomacy and analyze if positive or negative trade can predict positive or negative diplomacy.

(Oral Presentation, Session I, Room 1314, 9:15am)

Investigation Of Chiral Ester Resolution From Lipase

Liudmila Antonik, William Barela – Chemistry

Faculty Mentors: Sue Schelble, AnnaMarie Drotar

This research summarizes the investigation of chiral esters of the form of 1, and the study the stereochemical outcome of hydrolysis of 1 using a lipase to form two enantiomerically resolved products, 2 and 3. These products are the unhydrolyzed ester (3) and the selectively hydrolyzed alcohol. The study is based on work by Ulf Hanefeld using novozyme lipase.[1] The work described here includes the investigation of multiple lipase sources and esters (1) where various substituent groups (X) are on the benzene ring. The paper reports the methods for formation of several racemic esters of type 1 and the effectiveness of chiral resolution of these compounds with various lipases. Theories about the effects of electron withdrawing and donating substituents (X) are based on mechanisms in the literature.[2] Finally, analytical methods for ascertaining structures and effective hydrolytic resolution are described.

(Poster Presentation, Session I (10:15-11:30am), Poster #37)

The Art Of Deception

Jackeline Arce-Castro – Management

Faculty Mentor: Donald Chang

Deceptive pricing is an art that has long been used in the retail industry to attract and lure consumers. Many types of deceptive pricing exist causing the Federal Trade Commission to implement a guide against deceptive pricing to protect consumers from deceit. One type of sale tactic is to list a sale price

comparing the former price of an item. The former price is honest only if it was presented to the public under that price for a regular time period. The former price is fictitious if it was made-up, inflated to make an item look like a bargain, or was being offered to the public for a short-period of time before the sale was announced. Another type of deception includes providing misleading suggested retail prices. When retailers provide offers that are lower than the suggested retail price then these offers are only valid if the majority of retailers in the area are selling items at the higher price. If the high price is false then the retailer is misleading the public and acting in an unethical and untrue way. Retailers are also commonly known to make bargain offers available only when other items are purchased as well. Familiar bargains include 2-for-1 sales, Buy One Get One Free sales, half-off sales and various other similar types of sales. These bargains can mislead consumers who are not fully aware of the conditions of the sale, and in many cases these bargains omit the conditions of the items included in the sale.

(Oral Presentation, Session IV, Room 1314, 3:00pm)

Identification Of Bacterial 16S Ribosomal Sequences In Alpine Soil At Rocky Mountain National Park

Tessa Arends and Margaret Balas,– Cellular and Molecular Biology

Faculty Mentors: Joanne Odden, Jason Janke, Joanne Odden

Alpine tundra and forest soils are exposed to long-term seasonal climatic changes that could affect soil bacterial communities essential to the mountain ecosystem. To investigate bacterial species present seasonally, we cloned and sequenced bacterial 16S ribosomal DNA present in soil samples collected at Rocky Mountain National Park. Soil was collected at three sites: two alpine tundra sites (one organic soil and one mineral soil) and one site located in the Englemann spruce forest. DNA was extracted from all soil samples and PCR amplified using universal bacterial 16S rDNA primers. For each of the nine soil samples, we built clone libraries from the amplified PCR products using the TOPO TA cloning kit (Invitrogen). Randomly selected clones from each collection were screened for inserts and sequenced. We have obtained DNA sequence for 90 bacterial clones. Through sequence analysis, we classified 63% of our clones and found that 37% of our clones show no strong similarity to sequences in GenBank. The most common taxa detected across these soils belonged to the phyla Proteobacteria (20.0%), Actinobacteria (14.4%), Acidobacteria (7.7%), and Verrucomicrobia (4.4%), while the least common taxa detected belonged to the phyla Chloroflexi (3.3%), Planctomycetes (3.3%), Firmicutes (2.2%), Bacteroidetes (2.2%) and endophytic bacteria (2.2%). Seasonal shifts in clone abundance were most notable for the phyla Actinobacteria and Proteobacteria, specifically genus *Bradyrhizobium* spp. These changes in abundance may indicate sensitivity of these taxa to seasonal environmental conditions.

(Poster Presentation, Session II (3:00-4:15pm), Poster #23)

Shakespeare At The Block Party: Measuring Different Levels Of Aggression Between Two Sub-Genres Of Rap Music

Paulo Arroyo – Psychology

Faculty Mentor: Lesley Hathorn

Rap music has been portrayed as violent, and also viewed as encouraging aggression in its listeners (Rubin, West, & Mitchell, 2001). These traits of violence, aggression and misogynistic lyrics are all common in the sub-genre of rap categorized as "gangsta"/hardcore." But there are rap artists who choose to not use these three elements to sell records. This sub-genre of non-aggressive rap lyrics has been called "conscious/backpack rap." When one juxtaposes the contrast between the two sub-genres, consideration to the context in terms of where this genre of music came from must be taken into account. This may possibly provide insight as to why some performers choose to use these lyrics. They depict their

subjective experiences. Participants were randomly sampled from a metropolitan college totaling 49. Participants for the aggressive lyrics group were exposed to two rap songs that contained aggressive and/or violent lyrics. The participants for the non-aggressive group listened to two rap songs that possessed no aggressive and/or violent lyrics. Based on our hypothesis, we expected to see a difference in the means of both groups. Participants were given the Aggression Questionnaire written by Dr. Buss and Dr. Perry (Buss & Perry, 1992). An independent samples t-test was ran as a means of comparing the two distinct results produced by both conditions. The results showed that there was no statistical significance between the two sub-genres of rap music; $t(47) = .70$, $p = .488$ thus we fail to reject the null. Future research and implications of the study were discussed.

(Poster Presentation, Session II (3:00-4:15pm), Poster #9)

Gender Hijackers: The Contemporary Butch Lesbian

Jessica Asay – Women's Studies

Faculty Mentor: Arlene Sgoutas

This oral presentation will answer questions about the political power of the contemporary butch lesbian gender identity. Many scholars have focused on documenting the experiences of individual butch lesbians and their experiences of female masculinity. There are gaps in the literature regarding the political power of the butch lesbian gender identity, a lack of attention to the trans butch lesbian, and an illogical inclusion of the transman. This paper addresses the question, is the butch lesbian gender identity a potentially politically powerful identity? And if so, how and why? This paper also argues for the inclusion of the trans butch lesbian and the exclusion of the transman in future research and discussions on this topic. Using queer theory and prior writings about this topic, this paper discusses the various ways in which contemporary butch lesbians resist heteronormativity, subvert and redefine masculinity, and challenge the patriarchy. Past arguments were lacking when they accused the butch lesbian of attempting to be like a man, and current discourse is starting to re-examine previously dismissed ideas about what it means to challenge the patriarchy and how different people are doing it successfully through gender identity. Future research on this topic might include a more in depth look at the dangerous and counterproductive exclusion of trans butch lesbians from the discussion.

(Oral Presentation, Session I, Room 1312, 9:00am)

The Effects Of Altitude On Decomposition: A Validation Study Of The Megyesi Method

Christiane Baigent – Anthropology / IDP Forensic Science

Faculty Mentor: Catherine Gaither

Establishing post mortem interval (PMI) is crucial to any death investigation. Complex interactions between human remains as an individual somatic environment and the greater ambient environment in which they exist make every death scene distinctive; however, the overarching laws governing the decomposition of human remains can be generally quantified, making the interaction with the environment in which they are situated the greatest variable. The Megyesi method was developed to provide forensic anthropologists with a quantitative method for determining PMI. The method regards decomposition as a semi-continuous variable to which a point-based scoring system can be applied to obtain a total body score (TBS). Taking into account both TBS and the average temperatures to which the remains were exposed (accumulated-degree-days), Megyesi and several subsequent geographically distinct validation studies have had success in accurately calculating PMI. There is, however, currently a lack of published, comprehensive information pertaining to the effects of altitude on human decomposition. Utilizing freshly killed pigs (*Sus scrofa),* a concurrent study of decomposition rates at

high-altitude and low-altitude sites was conducted utilizing the Megyesi method in order to determine its local utility. Preliminary results suggest that the method is not effective for accurately calculating PMI at either site suggesting that an unaccounted for variable is acting upon decomposition rates within the geographically distinct Front Range region of Colorado. Additionally, the scavenger activity associated with both sites diverged from expected outcomes suggesting that numerous additional studies are necessary in order to understand the complex interaction between local agents affecting decomposition.

(Oral Presentation, Session I, Room 1323, 8:45am)

The Role Of Hydrodynamic Movement In Evoking Territorial Displays In The Dusky Farmerfish (*Stegastes Nigricans*) In An Arabian Sea Atoll

Aaron Bakker – Biology

Faculty Mentor: Robert Hancock

Many animals in nature vigorously defend areas called territories that contain resources like food, shelter and breeding sites. The herbivorous damselfish (*Stegastes nigracans*) typically inhabits coral reef and coral-rubble field territories where they farm algae and display stereotypic territorial behaviors (threat displays, chasing, etc.) in response to intruders. By presenting various visual cues such as shape, colors and/or movements, intruders induce these behaviors. During January of 2013 in a shallow lagoon off of the coast of Kadmat Island in the Laccadive Archipelago in the Arabian Sea (India), we presented three-dimensional models to territory-holding adult *S. nigracans* and captured on video resulting agnostic and non-agnostic displays. Compared to experimental controls which consisted of territory holders that were video recorded in absence of a model intruder, fish that were challenged with intruder models exhibited more stereotypic agnostic behaviors. We further evaluated the role of hydrodynamic movement in relation to a model's ability to evoke a behavior. Agnostic behaviors were grouped into different sub-groups so we could identify different factors. Aggressive behaviors showed a strong correlation with the degree of movement of the model. Other agnostic behaviors declined or showed no change with model movement. This study clearly indicates that intruder movement, in addition to (static) visual cues contributes to the overall degree of threat posed by intruding fish.

(**Poster Presentation, Session I (10:15-11:30am), Poster #27)**

Religious Belief And Scientific Belief

Ryan Balke – Psychology

Faculty Mentor: Lesley Hathorn

Past research has examined the connection between religious zeal and defensiveness of a worldview (Greenberg, Solomon, & Pyszczynski, 1997; McGregor & Marigold, 2003). However, there has been little research on the effects of religious belief on non-scientific belief. The purpose of this study was to determine if there was a correlation between religious belief and acceptance of non-scientific theories. For this study, non-scientific theories were defined as beliefs that fall outside of the generally accepted norms of scientific research, such as beliefs in paranormal activity or complementary and alternative medicine. Religiosity was defined as belief in a higher power. Participants (N = 120) from an introductory psychology classes at Metropolitan State University of Denver consisted of 75 women, 45 men. Pearson correlations indicated significant correlations between religiosity (M = 3.95, SD = 1.42) and paranormal beliefs (M = 3.49, SD = 1.07), $r(118) = .271$, $p < .001$, between religiosity and complementary and alternative medicine beliefs(M = 4.17, SD = .74), $r(118) = .209$, $p = .05$, and between paranormal beliefs and complementary and alternative medicine beliefs $r(118) = .513$, $p = .01$. Results indicate that general religiosity and non-accepted scientific theories are positively correlated. Greater research will be needed to indicate the specific religious beliefs that are correlated with the non-accepted scientific theories.

(Oral Presentation, Session II, Room 1314, 10:30am)

Investigating Predicted, Novel ATF3 And MAX Protein-Protein Interactions Using DNA Bio-Sensors

Elina Baravik – Biology

Faculty Mentor: Andrew J. Bonham

The Encyclopedia of DNA Elements (ENCODE), a project sponsored by the National Human Genome Institute, is a collaborative effort to identify all areas of transcription, transcription factor binding, chromatin structure and histone modification in the human genome. One recent ENCODE study utilized high-throughput CHIP-sequencing and DNase I footprinting to investigate protein-protein interactions across the genome. Of note, this study discovered a large number of novel protein-protein interactions that have never been observed in prior work. As a continuation and validation of this effort, we are characterizing the novel binding interaction identified between ATF3 and MAX, two transcription factor proteins deeply involved in cell regulation and function. These proteins natively bind to DNA, MAX directly and ATF3 indirectly, and we are probing the impact of their interactions with each other on their DNA binding affinity and specificity. To do so, we are using DNA-based bio-sensors that give off fluorescent signal proportionate to the extent of DNA-binding activity. We designed these bio-sensors from first principles, expressed and purified the protein targets, and have begun to investigate their binding interactions. This work will confirm if the proposed physical interaction is indeed valid, and will shed light on the mechanism by which they bind to the DNA and each other. Ultimately, this data will enrich the depth of the ENCODE project and provide a greater understanding of novel cellular pathways involved in cell growth and development.

(Poster Presentation, Session I (10:15-11:30am), Poster #14)

The Existence Of The Crone In Modern Day Media

Robin Becker – Women's Studies

Faculty Mentor: Judith Wonstolen

This oral presentation will explore the archetype of the Crone and her portrayal in mass media advertising. Previous research has touched on the lack of older women in advertising as well as the importance of Crone archetype and her impact on society. Western culture's view of youth is highly valued and overemphasized which creates a moral and emotional dilemma for anyone over forty. This creates a society where there is no middle ground; you are either young and valued or older and invisible. The lack of literature lies in the connection of the crone and her media representation. The question explored in this paper, does any representation of the Crone exist in advertising and what does it look like? What defines a Crone? As well as what is the general societal view of Cronehood? Through a content analysis the research shows the lack of women between the ages of forty to sixty in fashion magazine advertising. A key component also explored is the importance of utilizing the Crone as a way to make women ages forty and older more visible and better represented in society. This is especially important because in the United States the baby boom generation is the fastest aging population. By embracing the archetype of Crone, women over forty can remain visible in society. Along with the crone becoming a gateway to a better mass media visual of older women in advertising.

(Oral Presentation, Session IV, Room 1202, 3:00pm)

Getting Class Started With YouTube Video Clips

Lisa Beckman, Jillian Sterns – Human Development

Faculty Mentor: Bethany Fleck

This study describes a way that YouTube was used to introduce students to daily topics. Participants in this study were students enrolled in four Developmental Educational Psychology hybrid-format courses. A full list of videos, related chapter topics, and in-class discussion questions are presented including student preference data for each video. Pre and post measures were given to assess the effectiveness of each video, as well as complete video preference surveys. Analysis of survey data and student quiz scores indicated that students had a positive experience with the integration of YouTube clips but that it did not affect their learning. Additional analysis and implications will be discussed.

(Poster Presentation, Session II (3:00-4:15pm), Poster #2)

Promoting Academics And Character Education (PACE) Outcome Data Analysis

Lisa Beckman, Kristin Broussard, Lily Rutledge-Ellison, Ashley Stamps, Mitch Wolf – Human Development

Faculty Mentor: Bethany Fleck

The Boys and Girls Club of Metro Denver requested help from the MSU Human Development Club in analyzing data related to the PACE (Promoting Academics and Character Education) program. The PACE program serves middle-school children who have been suspended from Denver Public Schools. During their suspension the students attend PACE where they are exposed to character building and other various scholarly activities. The primary goal of PACE is to reintegrate middle-school students with behavioral referrals back into the classroom and reduce school suspensions. The statistical analysis conducted provides the PACE program with an overall picture of who the students are, associations between risk scores and incidents, and demographic information.

(Poster Presentation, Session I (10:15-11:30am), Poster #2)

Sex And Musking Behavior In Sympatric Garter Snakes (*Genus Thamnophis*)

David Bertolatus, Chris Reigel, Eric Gangloff, Jeniffer Gagliardi-Seeley

Faculty Mentor: Jennifer Gagliardi-Seeley

Despite an abundance of studies documenting the antipredator behaviors of garter snakes (genus *Thamnophis*), no study has quantitatively examined musking in free-ranging snakes. Musking, or cloacal discharge, is a common defensive behavior across many snake species that involves the release of foul-smelling lipids, feces and urates, in order to render the animal distasteful to potential predators. Previously, we examined musking behaviors in two species of free-ranging snakes, the western terrestrial garter snake (*T. elegans*) and the plains garter snake (*T. radix)*. We found that musking behavior was not correlated with size or environmental factors. Currently, we examined whether there is an influence of sex on musking behavior in both *T. radix* and *T. elegans*.

We predicted that females will musk more than males because previous studies have identified that female musk glands are larger and the musk odor more pungent. Snakes were captured by hand at three locations in the Denver metropolitan area. Musking behavior was determined from visual and olfactory cues and recorded as a binary yes or no event.

Sex was determined by inspection of the cloaca and eversion of the hemepenes in males. Overall, *T. radix* musked significantly more often than *T. elegans*. Female *T. elegans* musked more often than males;

however, this was not evident between sexes of *T. radix*. Examination of these antipredator behaviors in sympatric species helps illuminate the function, proximate causes, and evolutionary significance of such behaviors.

(Oral Presentation, Session I, Room 1323, 9:15am)

Autonomous Soil Investigator

Matt Bird, Josh Gillham, Max Lichtenstein, Scott McGimpsey, Matt Wicke – Electrical Engineering Technology / Computer Science

Faculty Mentor: Megan Paciaroni

The development of strategies for managing forests and forest fires has been impeded by the difficulties in gathering data from a wide geographic region in rough terrain with a high concentration of obstacles. Autonomous robotic tools for investigating forest environments could greatly reduce the cost of geostatistical forest surveys. However, the feasibility of effective robotic solutions is largely unexplored. In this paper, a four-wheeled rover for accomplishing this goal is presented. The Autonomous Soil Investigator (ASI) was designed, implemented, and tested in a simulated forest environment. The goal is to develop a versatile, compact, cost-effective soil sample collector that can function with minimal human supervision. The ASI utilizes four independently controlled wheels, an arm with three degrees of freedom, an omnidirectional camera, and four swiveling range-finding units. These subsystems operate in concert to estimate its location, navigate its environment, traverse the terrain, and collect samples. Each subsystem was designed as a module and tested independently. These subsystems were combined and tested for interoperability using a decision-making algorithm that contextually changes the system's behavior. While the ASI is capable of navigating this particular simulated environment, it also demonstrates a high sensitivity to changes in conditions. Larger obstacles or different concentrations of landmarks severely impair the ASI's ability to perform its tasks. While there appears to be a limit on mobility in certain types of forests, ASI-like systems could greatly expand the scope of research in well-suited environments.

(Oral Presentation, Session II, Room 1325, 10:30am)

History In Video Games: The Good, The Bad And The Ugly

James T. Blackburn – History

Faculty Mentor: Matthew Makely

Historical accuracy is now a focal point of video games. These games are reaching mass audiences in numbers and touching them on a personal level that history professionals dream of. From major developers to modding communities, a passion for history is driving the development of games and mods for games. This focus impacts professionals in the field of history from teachers to professors to museum personnel. New challenges accompanied by new opportunities are unavoidable to the history professional. The information in these games reaches millions of consumers.

There are vibrant and no holds barred conversations regarding historical events and eras constantly ongoing in internet forums dedicated to these historical games and mods. Purported facts are put forward, then either supported or refuted by other individuals. Many cite reputable historians and their works. Others cite frauds, phonies and imbeciles. Through this wild west style peer review, games and mods are constantly changed and updated towards a goal of a more authentic representation of a historical event or era.

The end result is that the dissemination and common knowledge of history has already changed.

The emergence of the passion for, and production of, historical material by video game developers and modders, as well as the passion of the consumers highlights both the exceptional triumphs and the

exceptional failures of history professionals. History professionals have made available enough information and analysis that video game developers and modders can and have recreated reasonable facsimiles of past events, places, and eras.

(Oral Presentation, Session IV, Room 1202, 3:45pm)

Success And Failure: The Speeches Of MLK, JFK, & Jimmy Carter

Lauren Blehm – Political Science

Faculty Mentor: Robert Hazan

Political rhetoric has been employed in both informal and formal situations throughout the history of the United States; from the soapbox in the public square to the stone steps of the U.S. Capitol. The twentieth century saw some of the most important speeches of American history preformed and memorialized. The first is without question Martin Luther King Jr.'s speech at the Great March on Washington in Washington, D.C. on August 28, 1963. This speech has become known as the "I Have a Dream Speech" and has had staggering historical significance. The next important speech was John F. Kennedy's inaugural address on Jan 20, 1961, which gave us the reverberating line, "Ask not what your country can do for you, but what you can do for your country." These two speeches have had a tremendous impact on political discourse, though their ability to shape future discourse has been tainted with the rapid technological shift. A third speech marked a similar occasion- a nation in tumult- but without success. Jimmy Carter's Energy Speech in April of 1977 was aimed at presenting American's with the harsh reality of their current energy crisis, and became known as the "malaise speech," even though Carter never specifically used the word malaise. In this paper I present the context for these speeches, the ways in which they were crafted and delivered, and their aftermath and legacy in order to assess why the first two speeches (MLK and JFKs) succeeded, and the third (Carters) failed.

(Poster Presentation, Session I (10:15-11:30am), Poster #13)

Uncertainty In The Flash Lag Effect

Mary Bowers, Mike Clark – Biology

Faculty Mentor: Mark Mazurek

The flash lag effect is a visual illusion that occurs when a flashed stationary object appears to be behind a moving object that it is actually adjacent to. Study of the flash lag effect gives us information on the processes underlying how the brain makes sense of visual stimuli. One aspect of visual perception that hasn't been thoroughly examined is uncertainty. In our study we analyze and measure the difficulty of determining the position of a moving and flashed bar. By examining reaction time and accuracy with the flash lag effect we gain insight into how visual perception works. In our experiment a moving and flashed bar are displayed at various distances from each other. To increase uncertainty we have the bars displayed at three different distances from the center. We can measure the level of uncertainty and the amount of flash lag that occurs at varying bar positions. Our research goes beyond previous studies and allows us to better understand the underlying processes that are involved in this perceptual illusion. We will also question the subjects to see how they perceive the experiment. Whether or not they consciously perceive the decrease in accuracy will tell us how much our results come from brain processes or if the subjects are guessing. If our subjects are unaware of the uncertainty, it shows us that the brain is creating a perception. This is one aspect of the experience of motion perception that has not previously been analyzed through the flash lag illusion.

(Poster Presentation, Session I (10:15-11:30am), Poster #24)

Delineating New Species And Clades In Springsnails

Corbin Bradford – Biology

Faculty Mentor: Hsiu-Ping Liu

The Amargosa River basin (southeastern California and southwestern Utah) contains numerous populations of minute springsnails that have been historically treated as a single species (*Pyrgulopsis micrococcus*), but recent molecular studies have shown that these belong to multiple morphologically similar species. The primary objectives of this study were to use two different mitochondrial DNA (mtDNA) markers, cytochrome c oxidase subunit I (COI) and NADH dehydrogenase subunit I (NDI), to further analyze the taxonomic status of *Pyrgulopsis micrococcus* populations in this region. Samples conforming to *P. micrococcus* were collected on two different research trips in December 2011 and December 2012; and DNA was extracted from at least two specimens from each of the 12 sampled populations, amplified, sequenced and then analyzed. The phylogenetic analyses of these sequences revealed 6 distinct lineages, one of which was not previously known.

(Poster Presentation, Session II (3:00-4:15pm), Poster #20)

Ascl1 And Lmo4 Interactions That Drive Gene Regulation In Neurogenic Development

Kyra Brandt, Matt Stoddard – Chemistry

Faculty Mentor: Andrew Bonham

The development and growth of neurons in the human brain is highly controlled to ensure proper maturation. These processes are largely regulated by proteins known as transcription factors that turn on and off specific genes. Interactions between these proteins are known to have large functional consequences, but the detailed kinetic and thermodynamic parameters that ultimately decide cell state remain unclear for many protein systems. This is of particular interest to understand differentiation and genetic disease, such as the mechanisms by which the proteins Ascl1 and Lmo4 direct neuronal commitment. To explore the common mechanisms by which these systems control gene expression, we have generated sensitive, DNA-based biosensors for the assessment of the DNA-binding activity of these significant proteins. Ascl1 binding activity was probed using novel DNA biosensors and found to have an affinity of 108 nM. Investigations have begun on the effects of Ascl1's binding partner, Lmo4, to understand how these interactions control DNA binding specificities. Using these sensors to investigate recombinant protein systems will provide a greater mechanistic understanding of the effect of these interactions on their regulatory activity and functional consequences in the cell.

(Poster Presentation, Session I (10:15-11:30am), Poster #15)

Do We Have Freewill? A Review Of The Empirical Evidence Supporting Determinism And Freewill

Kristin Broussard, Seneca Widvey – Psychology

Faculty Mentor: Aaron Richmond

The existence of consciousness in humans and the conception of the brain as the origin of this conscious experience have been philosophically described for several millennia (Doty, 1998). However, the debate as to whether the human mind functions deterministically or by mechanisms of a free will and choice remains inconclusive. In the deterministic view, freewill is but an illusion and the mechanisms through which behavior is enacted are the “consequence of the past history of the system” (Doty, 1998, p.1071). Conversely, evidence supporting the argument that humans may willfully exert control over their actions

has been provided in Libet's (1999) research identifying "veto power", or the potential to willingly halt the unconscious processes leading to a motor action. We will present a review of the empirical literature regarding the question of freewill versus determinism in terms of motor action. Specifically, the purpose of our review is to provide support for each of the arguments for and against the existence of free choice in motor action, as well as a rebuttal to each of the argumentative points.

(Oral Presentation, Session I, Room 1202, 8:45am)

Developmental Contributors To Gender-Based Rejection Sensitivity And Academic Disidentification In STEM Women

Kristin Broussard, Majken Berglund – Psychology

Faculty Mentors: Bridget Murphy-Kelsey, Anna Ropp

Fewer women major in undergraduate or graduate programs that are STEM focused, such as chemistry, engineering, and mathematics (Steele, 1992; 1997). The purpose of this review is to examine possible developmental factors that may contribute to the underrepresentation of women in STEM fields. The gender-based rejection-sensitivity (Gender RS) model and academic disidentification have recently been proposed to elucidate this is issue. The Gender RS model posits that people who expect rejection as both a possibility and as being a costly outcome focus on protecting themselves from this rejection (London, Downey, Romero-Canyas, Rattan, & Tyson, 2011). Research has found that for women in competitive academic fields that historically excluded women, concerns about gender bias had a powerful influence on how women cope with evaluative situations. Academic disidentification is an outcome related to Gender RS, and a major factor in explaining why women avoid STEM fields (Ceci et al., 2009). Standardized test scores can be affected negatively by a decrease in self-confidence, due to being a member of a group that is publically stigmatized (Crocker, Karpinski, Quinn & Chase, 2003). This decline in performance for women can lead them to academically disidentify from aspirations to major in a natural science or mathematical courses of study because they fear they will not be successful (Cokley, 2002; Crocker et al., 2003). An understanding of developmental influences may ultimately inform parents, teachers, and women about how to lessen Gender RS and academic disidentification, which in turn may increase the number of women in STEM fields.

(Oral Presentation, Session II, Room 1202, 10:30am)

Building A 3D Future: An Investigation Into Affordable 3D Printing

Ian Brown – Mechanical Engineering Technology

Faculty Mentor: Devi Kalla

In the past 20-25 years 3D printing technology has generally been reserved for professional companies and 3D printers have generally ranged in the 20,000-30,000 dollar range. 3D printing is an additive manufacturing technology; this process is the layer-by-layer creation of objects. This process has been used to do rapid prototyping and small-run production in a variety of industries for over two decades, but with recent developments of this process, the development of new machines and the decline in costs of these machines has begun to move additive manufacturing into more mainstream part production.
The problem with 3D printing technology at this point in time is the cost of technology at this time. Commercial 3D printers at this time can cost as much as $20,000 for an entry level 3D printer and while the resolution of prints is higher, the industry lacks a true affordable entry-level printer that the normal consumer can purchase.
Recent innovations in the open-source community have answered this problem by creating 3D printers at an affordable price range in the 1000-2000 dollar range using readily available materials.

The goal of this project is to build a 3D printer capable of repetitively producing quality prints with a sturdy design, within the price range of 1500$. Predictions are that a high quality 3D printer can be built with skillful sourcing of parts and hardware for under the intended budget.

(Poster Presentation, Session II (3:00-4:15pm), Poster #36)

The Effects Of Active Reading Questions On Student Learning

Rudolph Brown, Lisa Beckman, Jillian Sterns – Psychology

Faculty Mentor: Bethany Fleck

This study empirically tested the impact that active reading questions have on student at-home study and note-taking behavior as well as the impact on overall learning. Two classes were given active reading questions to help them study while two other sections were given PowerPoint lecture notes. Analysis of survey data and student grades post-semester indicated that active reading questions and lecture notes conditions were similar in compression of course material. However, students found the course harder when they have active reading questions as compared to lecture notes for study tools. Additional analysis and implications will be discussed.

(Poster Presentation, Session I (10:15-11:30am), Poster #3)

Hydrostatic Pressure Test Stand

Kyle Bry, Brett Atherton, Rolando Faria, Phillip Le, Jeremiah Sutton, Nate Wilson – Mechanical Engineering Technology

Faculty Mentor: Mingli He

This project involves designing a hydrostatic pressure test stand for the Ansimag Department of Sundyne. This stand will need to test multiple sizes of pressure vessels and also have the capability to test multiple vessels of the same size simultaneously. The fixturing of the vessels should allow for maximum time efficiency and ease of use. We will need to operate this test stand through a computer. Possible research of a new controlling program is possible. The design requirements are proposed by the sponsoring company. The challenges include a stair type holding that will support multiple sizes, interchangeable plates for the different sizes to be measured, and utilized quick-release clamps (along railings) to hold down pressure vessels during testing while minimizing time between tests. The clamps holding capacity are 1000 lbs (drawing will be provided in the presentation). We will present and discuss the design approach, many challenges during the design, and final design and analysis. The working station will be produced in spring 2013.

(Oral Presentation, Session I, Room 1325, 9:30am)

Oxidative Stress In *Xenopus* Oocytes

Aviva Bulow, Nicole Jackson – Biology / Chemistry

Faculty Mentor: Douglas Petcoff

Xenopus laevis is a common model organism used in molecular, cellular and developmental biology. The frog has large oocytes which can be kept in culture for about a week, and are relatively easy to manipulate. Additionally, when stimulated to mature from oocytes to eggs, the oocytes show morphological signs of this maturation. It is known that oocytes stimulated to mature exhibit signs of oxidative stress. This poster looks at some interesting findings about the link between oxidative stress and maturation in an attempt to characterize said link. To measure oxidative stress in oocytes we measured intracellular levels of glutathione (GSH), this is used as their primary defense against oxidative stress. We

measured GSH levels in cells treated with progesterone (Pg), the hormone that stimulates them to mature, hydrogen peroxide, a strong oxidizer, and Butylated hydroxyanisole (BHA), an antioxidant. We also looked at maturation of cells treated with hydrogen peroxide, BHA, and extracellular GSH, all in conjunction with Pg to determine the effects of the various treatments on the rate of oocyte maturation. This project is still in progress, in the future we hope to use antioxidants other than BHA and GSH and determine the effect they have on intracellular GSH levels and on oocyte maturation. We plan on using these and other data to further elucidate the maturation pathway in *Xenopus* oocytes, an ongoing endeavor in our lab.

(Poster Presentation, Session I (10:15-11:30am), Poster #20)

Fragmentation

Jennifer Burdess – Art

Faculty Mentor: Sandy Lane

Sometimes the most profound and telling moments slip away without leaving a trace. These flashes of epiphany are impermanent. I am capturing these instances and making them tangible, then recreating the decay of memory by then subjecting my drawings to various solvents that rust and deteriorate the image. The chosen support and medium is soft pastels on Mylar. I use a saturated color palette that is neutralized in the final stages of the drawing conveying the ephemeral qualities of the memories. The color palette and the large scale of the drawings give *'Fragmentation'* a greater visual impact as well as an emotional weight. The theory of phenomenology is rooted in individual experience. Drawing from phenomenology, I focus on the idea of 'the agent of self' as it pertains to the theory and how it affects memory. The deterioration of my drawings mimics the actions of the "agent of self" which is essentially the ego's attempt to repair decaying memories. The formal qualities of color, composition and the play of light heighten the emotional response while maintaining ambiguity. Through concept and process, I am exploiting the temporal nature of memory.

(Oral Presentation, Session IV, Room 1312, 3:00pm)

Building A New Conference Management System For The Metropolitan State University Of Denver's Undergraduate Research Conference With An Open-Source Solution

Hillary Campbell – Technical Communication / IDP Web Design and Development

Faculty Mentor: János Füstös

The Metropolitan State University of Denver is now in its second year of hosting an Undergraduate Research Conference. The University has been using a web-based conference management system that includes the feature to submit research papers, abstracts, and letters-of-recommendation, as well as perform other basic functions.

The current system is a commercial product which is not optimal as a long-term solution due to the limited customization features and the monthly expenses incurred. Since the research conference has grown dramatically in the two years of its existence, the need for an efficient and customizable system is imperative for sustainability and growth of the conference.

This paper describes the project to develop an open-source conference system, built on a fully customizable platform, that includes all the features and security needed, and will be hosted on one of the University's local servers.

Some of questions explored include: Can we impose limitations to the submissions, such as file-type? Can we create a rename feature for documents? Can we have one common email address? How do we secure the submissions and system? Can we create reports and notifications? Is there a sufficient calendar

feature? Can the administration interface be customized? How will this system handle the review process? The result of the project will be a system that is beneficial to the University, cost-effective, sustainable and expandable for long-term use.

(Oral Presentation, Session IV, Room 1314, 4:00pm)

Trichopteran Gut Content Analysis As A Biological Indicator In Recent Wildfire Areas In Colorado

Melissa Carlile, Christy Wilt – Biology

Faculty Mentor: Jennifer Gagliardi-Seeley

Wildfires can decrease water quality and damage community ecosystems. Previous research has focused on population declines, resilience, succession, and recovery. This study seeks to find additional information on the effects of burned areas on stream quality and macroinvertabrates. Trichoptera are an invertebrate that are considered to be fairly resistant to pollution and habitat damage. Trichoptera are abundant in North America and are among the many macrointertebrates that are surveyed to assess water quality. In this study the Trichopteran diet is analyzed to understand the food materials available to them in recent wildfire areas, and the effect of wild fires on trophic relationships of this larval insect order. Additionally, it will be determined if a correlation in Trichopteran diets and water quality in wildfire areas can be made. Multiple wildfire areas were selected on the Colorado front range. A series of samples were taken from recent burn areas, post-fire restoration areas, and a control/unaffected area. The prediction is that Trichopteran gut content can be analyzed to further understand the ecological ramifications of wildfire water quality and recovery status. This may give management a better understanding of how to aide in the recovery of recent burn areas.

(Poster Presentation, Session II (3:00-4:15pm), Poster #21)

Utrastructure And Functional Significance Of Papillae On The Pedipalps Of Camel Spiders (Arachnida, Solifugae)

Patrick Casto, Paula Cushing, Suzanne Royer – Biology

Faculty Mentor: Robert Hancock

Arachnids in the order Solifugae, commonly called "camel spiders," are peculiar desert dwelling arachnids whose biology is poorly known. They hold their pedipalps anteriorly while moving through the environment. Their pedipalps are covered in sensory setae. This research is an ongoing project to elucidate the function of specific sensory setae on solifugid pedipalps called papillae. Only males of certain species in the families Eremobatidae, Solpugidae, and Karschiidae have these specialized setae, located on the ventral surface of their pedipalps. This sparked our curiosity to figure out the functional significance of the papillae. We used scanning and transmission electron microscopy and specimens from the family Eremobatidae. Papillae are hypothesized to function as mechanoreceptors and possibly chemoreceptors. From this research, we found neuronal components characteristic of both mechanoreceptors and of chemoreceptors.

(Oral Presentation, Session III, Room 1325, 1:30pm)

Who Bit Me? A Culicidological Survey Of The South Indian State Kerala And The Lakshadweep Islands

Michael Clark – Biology

Facutly Mentor: Robert Hancock

The focus of this study was to survey the different species of mosquitos present during the dry season and identify important anthropogenic influences on their relative abundance in the state of Kerala and nearby islands. Mosquitoes were surveyed using various techniques including BG Sentinel traps, human biting catches, aspiration from resting sites, and photography. Sites were examined throughout Kerala and on the Lakshadweep islands of Kadmat and Agatti in the Arabian Sea. Species that were of particular interest were Aedes aegypti and Aedes albopictus, vectors for dengue and chikungunya in Southern India, and Armigeres subalbatus, the most populous and pestiferous non- vector species. Throughout the mainland, A. subalbatus was breeding abundantly in septic tanks and polluted marshes or ponds, while on islands in the Arabian Sea Ae. albopictus was found biting. In addition, many washbasins and drinking wells contained abundant mosquito larvae. Across the state, there was little evidence that physical measures of control were being effectively taken. Chikungunya and dengue are persistent threats in South India and therefore human factors that unintentionally promote their abundance are important and reflect on the public awareness of mosquito-born disease.

(Poster Presentation, Session I (10:15-11:30am), Poster #28)

Domestic Sources Of The Helms-Burton Act

Nico Cordova – Political Science

Faculty Mentor: Sheila Rucki

This research seeks to investigate the motivation that led the United States government to implement the Helms-Burton act, formally known as the Cuban Liberty and Democratic Solidarity (LIBERTAD) act. Ratified by President Bill Clinton in 1996, the legislation tightens and expands the original embargo on Cuba. The bill presents an interesting case of U.S. policy toward Cuba in the post-Cold War world. The research begins to explain the policy outcome through a domestic politics model. The domestic politics model allows for analysis of the domestic factors that contributed to the Helms-Burton act. The findings of the research reveal that the principal lobby groups for the Helms-Burton act were directly affiliated with multi-national corporations and governmental institutions that shared an interest in eliminating the Castro government from power in Cuba. In this particular case, the research exposes how U.S. foreign policy toward Cuba was dictated by domestic influence.

(Oral Presentation, Session IV, Room 1312, 3:15pm)

Coping Styles For Sport-Related Anxiety And Gender Roles

Nicki Cupit, Kristina Sanders – Human Development and Psychology

Faculty Mentor: Pamela Ansburg

The purpose of the current research study was to determine whether gender role predicts preferred coping styles among college athletes dealing with sport performance-related anxiety. We expected that college athletes who identify as more masculine will have less anxiety related to sports due to their preferred coping style, which is an approach coping style. Thirty-six MSU Denver athletes completed the Competitive State Anxiety Inventory-2 (CSAI-2), the Sport Anxiety Test Anxiety (SAS): A Measure of Trait Anxiety, the Coping Style in Sport Inventory (CSSI), and the BEM Sex-Role Inventory. A bivariate Pearson correlation revealed three statistically significant correlations: 1) the more an athlete identified as

masculine, the more he/she used approach coping, 2) a significant negative correlation was found between identification as masculine and sport-related anxiety, both state anxiety (CSAI) and trait anxiety (SAS), and 3) identification as feminine and trait anxiety (SAS) were significantly positively correlated. Understanding possible differences between men and women in their reaction to sport-related anxiety can help athletes with implementing proper coping styles, coaching, an athlete's overall performance, and sport psychologists use of appropriate therapy techniques.

(Oral Presentation, Session III, Room 1314, 2:00pm)

La Lidia Del Toro Bravo: Una Aproximación A La Controversia - Bullfighting: An Approximation To The Controversy

Juan de Mesa – History

Faculty Mentor: Lunden MacDonald

Bullfighting is a complex and highly controversial subject that continues to generate passionate discussions in Spanish society today. This essay examines bullfights and bullfighting by looking at several arguments and viewpoints, present in the debate, either in favor or against. To give a global perspective to the reader perhaps approaching this controversial subject for the first time, attention is also given to various historical, cultural, and social elements surrounding bullfighting.

(Oral Presentation – Spanish, Session IV, Room 1202, 3:30pm)

Unamuno's *San Manuel Bueno, Mártir:* Discrepancies Between Character And Author

Juan de Mesa – History

Faculty Mentor: Lunden MacDonald

A certain level of concurrence between don Manuel, the main character in Miguel de Unamuno's novel *San Manuel Bueno: mártir*, and the author himself concerning their positions on various religious and socio-political issues has induced many Hispanic Literature students and many readers to identify Don Manuel as Unamuno's *alter ego.* The purpose of this essay is to argue that such an interpretation is inaccurate once the profound discrepancies between don Manuel and his literary creator are considered. To such effect, a selection of texts from *San Manuel Bueno: mártir* and other Unamuno works will be examined, compared, and contrasted.

(Oral Presentation – Spanish, Session IV, Room 1202, 3:15pm)

Erasing Erasure: Parameterized Type Introspection In Java

Griffin DeJohn – Mathematics / Computer Science

Faculty Mentor: Judith Gurka

The Java programming language provides basic facilities for type introspection, allowing programs to examine the types of objects at runtime. But because Java's implementation of generic programming relies on erasure, performing type introspection on an instance of a parameterized type reveals only the object's raw type. There is no distinction between a List<String> and a List<Integer> at runtime, because the type arguments are absent. Type arguments to generic methods and classes are used by the compiler to statically reason about the type safety of generic code, and then they are discarded—"erased"—to maintain backward compatibility with programs written before generics were introduced. I use the more advanced introspection features provided by Java's Reflection API to work around this limitation. The Reflection API allows programmatic access to field values, even in the presence of restrictive access level

modifiers. It also models program elements, such as classes and their fields, and preserves type parameters. My algorithm treats these models as maps, navigating them to discover the type parameters for a given object's class, superclasses, and implemented interfaces and then recursively searching for each type parameter in the type of every field in the same scope, whether declared or inherited by the object's class or an enclosing class. Once a field corresponding to a type parameter is found, its runtime value is reflectively accessed to recover the type argument.

(Poster Presentation, Session II (3:00-4:15pm), Poster #37)

Local Dialects Of The Denver Region

Dawn Deuter – Speech, Language & Hearing Sciences

Faculty Mentor: Andrew Pantos

Language attitude studies have indicated a general perception among Colorado natives that their speech is free of regional dialect traits. While extensive research has been conducted on the dialects spoken in other regions of the United States—e.g. the Great Lakes Region, New York, New England, Appalachia, the South, and California, to name a few—little research has been conducted in the interior West. Furthermore, recent dialect maps have placed Colorado in a dialect area labeled only as the 'West' implying that all speakers in a geographic region that spans over one third of the country's land mass speak English with no distinctive features. This is inconsistent with the huge body of dialect research that suggests dialect variation is much more location-specific. Accordingly, this study purports to begin the process of identifying specific local regional dialect traits of the Denver metropolitan area in seeking to answer the question as to whether or not English speakers native to Denver exhibit phonological differences, if only minor in nature, that would distinguish them from the rest of the Western dialect. The methodology will follow that established in the variationist tradition of collecting sound samples from a number of speakers and quantitatively measuring the speakers' vowel and consonant production as revealed through an analysis of sound waves and spectrograms. It is hypothesized that specific dialect traits do distinguish Denver speakers from other parts of the West.

(Oral Presentation, Session I, Room 1314, 8:45am)

One Across: Crossword Puzzles And Memory For Words

Brittany Dewald – Psychology

Faculty Mentor: Cynthia Erickson

Crossword puzzles have been intriguing leisure activities that have developed thinking and learning of new words and phrases. They can be found in newspapers and magazines and there are even books dedicated solely to crossword puzzles. What if these crossword puzzles that are meant to be fun can serve a dual purpose and can also help to improve memory? In the current study, we assessed participants' memory for words after engaging in puzzles as well as their need for cognition. We manipulated levels of processing by having participants complete puzzles and testing their recall and recognition for words after a 48 hour delay. Using a web-based random word generator, we made a list of 60 words and separated them equally between a crossword, word search, and word list. On day one, participants were instructed to complete a Need for Cognition questionnaire, study and memorize the word list, complete the crossword, and complete the word search. After 48 hours, participants returned and were instructed to complete recall and recognition tests. The results of this study have implications for understanding how memories are stored in the brain. Practical implications include the development of strategies which may help teachers and students, at any level, to learn and study for upcoming exams. In future studies, we hope to examine the effectiveness of puzzles as a teaching tool in the college classroom setting.

(Poster Presentation, Session I (10:15-11:30am), Poster #6)

Tripartite Comparison With Severe/Heavy Icing Measurement Based Systems

Matthew Dewey, Cory Wolff – Meteorology

Faculty Mentor: Sam Ng

In upper air analysis, there are three sources that relate to the extent of icing that may exist in the atmosphere. These are pilot reports, significant meteorological information, and the Current Icing Product. Pilot reports (PIREPs) are used to describe current flight conditions in which the aircraft was flying. Significant meteorological information (SIGMETs) provides "information issued by a meteorological watch office concerning the occurrence of expected occurrence of en route phenomena that may affect the safety of aircraft operations." (SIGMET information, 2000). And lastly, the Current Icing Product (CIP) is an algorithm that produces icing severity output over the continental United States and southern Canada on a three-dimensional grid.
When developing an accurate weather forecast, meteorologists first look at a wide range of Earth observing system models. If these models have a strong correlation, then the forecaster is fairly certain of the outcome for particular events. The same process is used when analyzing real time conditions that pertain to severe icing. The three parameters use information provided to co-diagnose the environment. This could pose a problem if one or more of the conceptions fail to verify leading to uncertainty of weather conditions. It is important to find a correlation between all three parameters to determine if there is significant agreement between all three methods, giving a confident assessment for atmospheric conditions. A study was undertaken to draw these comparisons, creating a triangle correlation to determine how the PIREPs, SIGMETs, and CIP relate to one another.

(Oral Presentation, Session III, Room 1323, 2:00pm)

How Comprehensive Sex Education Can Help End Sexual Violence

Michelle Donovan - Women's Studies and Psychology

Faculty Mentors: Jan Perry-Evenstad, Arlene Sgoutas

The sexual violence epidemic is occurring at alarming rates globally right now; it's one of the largest problems our globe faces. The reasons sex education is imperative to the overall health of a society go on and on, but perhaps the largest reason we need to move towards a more comprehensive sex education program in schools in all cultures is to help end the epidemic of sexual violence. Through analyzing ten different sex education programs in several different parts of the world, it becomes evident that more comprehensive programs lead to lower sexual violence rates in these countries. Not many people would disagree that this is an area where change is needed, but how important they believe the issue to be, and how they think we should go about solving the problem is where disagreement and differing ideas occur. This issue isn't prioritized as much as it needs to be, and this is alarming. Education helps eradicate ignorance, and ignorance is a large component of the rape culture we live in, both in the US as well as abroad. Sexual violence plagues all countries and all populations, and no one and nowhere is immune to it. Countries that have higher levels of comprehensive sex education have seen a decrease in their rates of sexual violence overall and there is without a doubt a strong correlation.

(Poster Presentation, Session II (3:00-4:15pm), Poster #8)

Climate Changes Influence Squirrel Behavior In A Montane Zone

Nina Dropcho, Avery Dopher - Biology

Faculty Mentor: Jennifer Gagliardi-Seeley

The vocalization behavior of tree squirrels, *Tamiasciurus hudsonicus*, was observed in a montane zone in the Arapahoe National Forest in Gilpin County, Colorado. Vocalizations reflect activity level, which can be influenced by environmental conditions. Eighteen sites were distinguished as individual home ranges in a montane zone, contained within two trail loops (Loop A and Loop B). Vocalizations from squirrels within these home ranges were reported as either short bursts lasting less than 5 seconds (<5s) or longer bouts lasting more than 5 seconds (>5s). Vocalization data was collected from early September through late November, a time when squirrels prepare themselves and their middens for increased torpor and seasonal changes. Analyzing vocalizations over a time period, an ANOVA was significant for <5s vocalizations in Loop A, but not in Loop B. A Chi Square for <5s means was significant for both loops. Temperature and precipitation reports for August through November were collected after data was analyzed. Spikes in short burst vocalization activity reflected spikes in environmental conditions such as extreme drought and, to a lesser extent, extreme temperatures. These results are consistent with previous studies (Willems and Armitage, 1975) demonstrating that rodents in montane zones adapt poorer to climate extremes than their lower altitude counterparts.

(Poster Presentation, Session II (3:00-4:15pm), Poster #22)

Intake Manifold For BMW M3 S50 Motor

Ian Dunlap, David Boon, Ryan Regenold, Christopher Yoder – Mechanical Engineering Technology

Faculty Mentor: Mingli He

Ar Design, a Denver based customized design and manufacturing company for performance cars, requests that we design an intake manifold for BMW M3 S50 motor that is tailored for a high performance, forced induction application. The problem with the current design is minimal flow and premature failure due to cracking. The work scope includes: 1) Design and model a direct replacement intake manifold that mounts within the same spatial constraints of the engine bay using factory mounting pattern on the head, 2) Perform flow analysis and calculate optimal plenum volume to ensure sufficient air flow to all cylinders while keeping individual cylinder flow equivalent, 3) Determine material that will withstand environment within engine bay without failure, and 4) Analyze/revise design and determine techniques for fabrication to allow low cost, low volume manufacturing. The team will present the approach to the challenge, finding from the design process, and the result of the design.

(Oral Presentation, Session II, Room 1325, 10:45am)

Deceptive Labeling & Organics

Frank Erickson, Crystal Newman – Accounting

Faculty Mentor: Donald Chang

Organic foods and natural products are one of the fastest growing industries in the world, but not everything that carries those labels is what it claims. The USDA set organic labeling requirements, which allow products to be labeled as organic without being 100% organic. This is misleading consumers who are paying a premium for something that is not as advertised.
Using the terms organic and natural on products needs to be more tightly regulated.

Consumers don't have the time to research the ingredients in everything they buy. They trust the USDA and FDA to protect them from harmful ingredients. There needs to be a better system that includes consumer awareness campaigns and GMO labeling. This will allow the consumer to get what they paid for.

(Oral Presentation, Session IV, Room 1314, 3:45pm)

Bio-Diesel Dry Wash Tower

Eric Farmer, Vinny Castellano, David Horinka, Tony Sanelli - Mechanical Engineering Technology

Faculty Mentor: Devi Kalla

As the world's access to fuel sources depletes, alternative materials and methods of efficiency and reduction of waste are necessary. While the ability for large companies and industries to integrate changes to their manufacturing and economic process increases, the options of local and small businesses for effective opportunities to reduce power consumption, waste, and associated costs are few. One solution is the in house creation of biofuels refined from waste fats normally removed from meat packing facilities and farms at a significant cost to the owner or business. These fuels could then be used in the loaders, delivery trucks, and generators used in everyday production, or even to sell as an additional product. The challenge with existing apparatus to accomplish this objective is that they have a large initial capital investment relying on high volume output of fuel to compensate. The local farmer or small meat packer does not have the available resources for such an investment nor do they require such high volume outputs. Our goal is to create an invaluable piece to the system of biofuel manufacturing from waste animal fats, the Dry wash Tower. The dry wash tower refines the fuel by processing it through a dry media such as wood chips or composite which extracts impurities and soaps in the final product. The tower, along with the rest of the process, will produce an environment that is easy to use, create an efficient output, and be adjustable to a variety of customers' needs. We will work to design and produce a dry wash tower in which the output rate and media used is adjustable, the product footprint remains small, and the maintenance and cleaning can be accomplished quickly and efficiently with one person to reduce downtime of production all while keeping costs and footprint reasonable.

(Oral Presentation, Session I, Room 1325, 9:00am)

Conversion Therapies: Unethical And Ineffective Practices

Vanessa Farrera – Psychology

Faculty Mentor: Anna Ropp

As most know, the homosexual community has long been a victim of discrimination, oppression, and marginalization. Contrary to the helping and supportive appearance that the psychological community has historically tried to convey, the field of psychology has been no stranger to negatively targeting gays and lesbians. This presentation examines multiple aspects of the history and origin of homosexuality and conversion/reparative therapies. As time has gone on, society, along with the psychological community, has become more accepting of homosexuality. Despite growing acceptance, there are still highly unethical and even banned practices of conversion therapies occurring in the United States. The history of conversion therapies began in the late 1700's when homosexuals were given criminal charges that were punishable by death in order to put an end to, what was then considered, "crimes against nature". Today, conversion therapies are currently using religion and shame practices in attempt to *rid* homosexuals of their sexual ailments (Jenkins & Johnston, 2004). While psychology may have aided in the harmful treatment of homosexual individuals in the past, it is important to note that the American Psychological Association has since removed homosexuality as a diagnosis from the Diagnostic and Statistical Manual.

They are also beginning to assert that their professionals should manage their homosexual clients in a supportive and accepting manner (American Psychological Association, 2011). The current presentation will discuss past and current research, as well as where the field of psychology, with respect to therapeutic treatment of gays and lesbians, is headed today. It will also evaluate the effectiveness and efficacy of the conversion therapies.

(Oral Presentation, Session III, Room 1312, 1:30pm)

Purification Of A Metal Regulator, Efar, From *Enterococcus Faecalis*

Josiah Fernandez – Biology

Faculty Mentor: Sheryl Zajdowicz

Enterococcus faecalis is a Gram-positive bacterium that is commonly found in the GI tracts of mammals, including humans. *E. faecalis* can cause life-threatening infections, including meningitis, endocarditis, bacteremia, and urinary tract infections. It is especially associated wit nosocomial infections where its high resistance to antibiotics greatly contributes to the pathogenicity of the organism. Like many pathogenic bacteria, the pathogenicity of *E. faecalis* requires the successful uptake of metals, including iron and manganese. Because a high concentration of metals can be toxic to the bacterium, metal-dependent regulators typically regulate its uptake process. One regulator found in *E. faecalis*, EfaR belonging to the metalloregulator family DtxR/MntR, shows prevalent use of manganese in regulation. Little is known about EfaR and its involvement in iron uptake, but it is known that it helps to regulate virulence of *E. faecalis* and that inactivation of the *efaR* gene impairs the ability of the organism to handle oxidative stress, form biofilms, and survive inside of macrophages. Our research focuses on characterizing this regulator's involvement in iron uptake. Toward this end, we will clone the promoter-less *efaR* gene into the expression vector pET 22b, a vector commonly used for protein induction. The *efaR* will be cloned downstream from an IPTG inducible promoter to allow for controlled and increased expression of the EfaR protein. Using pET 22b as an expression vector allows us to simultaneously tag the protein with a histidine tag, which will greatly facilitate purification of the protein and allow for closer study of its expression.

(Poster Presentation, Session II (3:00-4:15pm), Poster #31)

Toxic Metals In Colorado Mountain Stream

Ryan Fitt, Nathan Cook – Chemistry

Faculty Mentor: Robert Hancock

Because Colorado is expected to see an increased demand for water resources in the coming years, there is a need to develop and refine a variety of methodologies that can be used to determine water quality. Concentrations of toxic metals in the tissue of aquatic organisms can be hundreds of times greater than those found in the surrounding water. Heavy metal pollution from historical mining activity is widespread in Colorado, and the analysis of aquatic invertebrates aids assessments of this type of contamination. Benthic macroinvertebrates are major food sources for vertebrate predators and can therefore contribute to bioaccumulation of some toxic metals in these animals and biomagnification up the food chain. Despite emerging evidence of the importance of larval blackflies (*Simuliidae*) in lotic food chains in mountainous regions of North America, their importance as key species in the trophic introduction of heavy metals into ecosystems has been understudied. This research examined the concentrations of mercury, lead, chromium, arsenic, and zinc in blackfly larvae collected in the early summer of 2012 from the East Fork of the Arkansas River near Leadville, Colorado. Larvae were collected from sites above and below tributaries draining areas of historic high-impact mining activity. Samples were tested using inductively-coupled plasma mass spectrometry, atomic absorption spectroscopy, and a colorimetric assay.

Concentrations far in excess of those reported in the water were found. The information gathered using these techniques can aid restoration plans for watersheds, evaluations of previous restoration projects, and water resource planning.

(Poster Presentation, Session I (10:15-11:30am), Poster #29)

Coronal Cavity Survey: Morphological Clues To Eruptive Magnetic Topologies

Blake Forland – Physics

Faculty Mentor: Jim Dove

We present a survey on coronal prominence cavities conducted using 19 months of data from the Atmospheric Imaging Assembly (AIA) instrument aboard the Solar Dynamics Observatory (SDO) satellite. Coronal cavities are elliptical regions of rarified density lying above and around prominences. They can be long-lived (weeks-to-months) but are often observed to eventually erupt as part of a coronal mass ejection. We determine morphological properties of the cavities both by qualitatively assessing their shape, and quantitatively fitting them with ellipses. We demonstrate consistency between these two approaches, and find that fitted ellipses are taller than they are wide for almost all cavities studied, in agreement with an earlier analysis of white-light cavities. We examine correlations between cavity shape, aspect ratio, and propensity for eruption. We find that cavities with a teardrop-shaped morphology are more likely to erupt and we discuss the implications this morphology has for magnetic topologies associated with CME models. We provide the full details of the survey for broad scientific use as supplemental material.

(Oral Presentation, Session I, Room 1323, 9:30am)

FORWARD Codes: Now With Widgets!

Blake Forland – Physics

Faculty Mentor: Jim Dove

The FORWARD suite of SolarSoft IDL codes converts an analytic model or simulation data cube into a form directly comparable to observations. Observables such as extreme ultra violet, soft X-ray, white light, and polarization images from the Coronal Multichannel Polarimeter (CoMP) can be reproduced. The observer's viewpoint is also incorporated in the forward analysis and the codes can output the results in a variety of forms in order to easily create movies, Carrington maps, or simply observable information at a particular point in the plane of the sky. We present a newly developed front end to the FORWARD codes which utilizes IDL widgets to facilitate ease of use by the solar physics community. Our ultimate goal is to provide as useful a tool as possible for a broad range of scientific applications.

(Poster Presentation, Session I (10:15-11:30am), Poster #23)

New Suspected Kimberlite: Northern Colorado

Stephanie Gallegos - Environmental Science

Faculty Member: Uwe Kackstaetter

Kimberlite pipes are small in diameter, carrot shaped, geologically elusive, ultra mafic igneous structures which are penetrating the crust all the way from the mantle. They often occur in swarms, such as in the Colorado – Wyoming district, are primary source rocks for diamonds, and are very difficult to detect. A small Kimberlite is believed to exist in a road cut on County Road 45E and Highway 287, just North of Virginia Dale, Colorado, in a minor fault line. While first surveys confirmed the presence of chlorite, a

common decompositional mineral of ultra-mafic lithologies, additional data such as PLM (Polarized Light Microscopy) investigation of thin sections, XRD (X-ray Diffraction), chemical testing through the ICP (inductively coupled plasma) and XRF (X-ray Fluorescence) analysis, as well as heavy mineral identification, strongly supports the initial hypothesis. Additionally, preliminary scans, with the most up to date research technology (TIMA mineral analyzer), has unambiguously shown the presence of pyrope garnets, a strong indicator mineral of kimberlitic rocks.

(Oral Presentation, Session IV, Room 1323, 3:45pm)

MSU Denver Liquid Crystal Materials Research

Alicia Gamble, Lee Foley – Chemistry

Faculty Mentor: Ethan Tsai

The world of materials chemistry lies at the forefront of advancing today's technology. Through dedicated research, new materials are created that help benefit our world in many ways and liquid crystal (LC) materials are at the pinnacle of current inquiry. LC research has led to the development of the Liquid Crystal Display (LCD), novel organic electronics, synthetic muscle fibers, energy conversion, and possible new organic photovoltaic (OPV) systems, as well as unveiling physical phenomena that would previously have been thought to violate natural laws. Amongst the most researched of these applications are the OPVs. Due to the energy intensive process of producing traditional solar cells, the development of OPVs are of significant interest, and LCs provide a promising platform for OPVs due to the physical characteristics of the material. The liquid crystal research conducted at MSU Denver is currently investigating novel phase characteristics of specific LC systems, to further understand the physical environment experienced by the material at an atomic level. MSU Denver LC research focuses primarily on the synthesis of the material, but co-operates with the Liquid Crystal Materials Research Center (LCMRC) located at the University of Colorado, Boulder and Brookhaven National Laboratories in New York to further characterize the materials.

(Poster Presentation, Session II (3:00-4:15pm), Poster #18)

Free Trade And Human Trafficking

Adrie García – Modern Languages

Faculty Mentor: James Smithwick

Free trade agreements such as NAFTA and CAFTA have played a major role in globalization, cutting through much of the red tape that had previously been an impediment to international business. While these agreements between governments do in fact ease the flow of goods and services between nations, there are also many negative ramifications of these treaties. One of these ramifications is the exacerbation of human trafficking. Not only do these treaties facilitate the methods used by traffickers, they also contribute to the already high levels of poverty in many places and, in doing so, increase vulnerabilities for potential victims of trafficking.

The goals of NAFTA and CAFTA are strictly economic in nature, and the intended result is to benefit all parties. Not only has this idealistic approach drastically fallen short of its' goal, it also has gaping holes in the area of human rights. The wording of the treaties themselves leaves grey areas in the interpretation of worker rights, creating an opportunity for labor exploitation. Small businesses and agricultural operations cannot compete with transnational corporations' plentiful, cheap goods flooding the markets. In this manner, many businesses are forced to close and many are put out of work. As a result, these vulnerable populations are now forced to take risks and desperate measures just to find the means for survival. This project investigates the implications of these treaties as they pertain to human trafficking.

(Oral Presentation, Session III, Room 1312, 1:45pm)

Self-Control And Judgments Of Mental Tasks

Dylan Ghaffari, Chelsea Hester, Christine Jaeger – Psychology

Faculty Mentor: Chad Mortensen

Depleting self-control has been shown to make individuals more passive and more prone to giving up earlier on subsequent tasks, which shows that self-control is indeed derived from a limited resource. For instance, participants asked to resist chocolate gave up quicker on an impossible puzzle than did those who were able to eat the chocolates because they had less self-control remaining (Baumeister, Bratslavsky, Muraven, & Tice, 1998).
The current research intended to examine the effect of depleted self-control (caused via carefully watching a video clip while following difficult instructions) on judgments of a card-sorting task yet to be completed. While the manipulation of self-control did not affect judged difficulty of the card-sorting task, $F(1, 133) = 0.01$, $p = .99$, $\eta_p^2 < .01$, other interesting relationships were found. Particularly interesting are the relationships between trait measures of self-control and judgments of the video task, which required self-control. Specifically, the judged difficulty of watching the movie correlated significantly with the Poor Self-Control Scale, $r(133) = .18$, $p = .04$, and marginally with the Good Self-Control Scale, $r(133) = -.16$, $p = .07$. Even more interesting is that perceptions of the time participants were engaged in watching the interview video correlated significantly with trait self-control as measured by the Self-Control Scale, $r(133) = .19$, $p = .03$, and Good Self-Control Scale, $r(133) = .17$, $p = .05$.

(Poster Presentation, Session I (10:15-11:30am), Poster #4)

Putting A Face To Social Interactions: Facial Recognition Training Affects Mood States

Dylan Ghaffari – Psychology

Faculty Mentor: Pamela Ansburg

Facial expressions of emotions are socially loaded, highly evolved forms of communication that serve as a representation of an internal state and are crucially important in promoting empathy during social interactions. If individual's ability to interpret facial expressions is disrupted, their ability to properly function in social situations will be disrupted as well. For example both individuals who are diagnosed with Bipolar Disorder and/or with Borderline Personality Disorder have abnormal thresholds for emotional recognition of facial expression and suffer in the social realm. Individuals with Bipolar Disorder require more fully expressed faces to recognize the emotions than do control populations, whereas individuals with Borderline Personality Disorder can discern the emotional expression of faces with less pronounced expression present than can normal populations. From a subjective perspective, the differences in ability to recognize facial expressions affect empathy, seen by a change in mood, which would in turn effect social interaction. The present study attempted to model these differential abilities to recognize emotions by training individuals who were not known to be diagnosed with either disorder. One group of participants were taught to consider extreme emotional expressions as normal, another to consider slight expressions as normal, and a third group, to consider normal expressions as normal. Although the training manipulation did not show statistically significant effect on mood, data from the manipulation check raised interesting questions. Ideas for future research and about clinical relevance will be discussed.

(Oral Presentation, Session I, Room 1202, 9:15am)

Gandhian Civil Disobedience: Theoretical Foundations

Peter Gibbins – Political Science

Faculty Mentors: Amy Eckert, Allen Gilbert

This presentation examines Gandhi's views on the state, the economy, individuals' relationship to the state and each other, and how civil disobedience and non-violence relate to achieving Gandhi's ideals. In many respects, traditionally accepted views or theories of civil disobedience including the one presented by John Rawls in his *Theory of Justice* don't fully explain what Gandhi was attempting.

(Oral Presentation, Session II, Room 1202, 10:15am)

Identifying Potential Mesoscale Processes In Long Lake-Axis-Parallel Lake Effect Storms Using Remotely Sensed And In-Situ Measurements

Alycia Gilliland – Meteorology

Faculty Mentor: Sam Ng

The eastern Great-Lakes region experiences some of the highest snowfall rates in the world as the result of Long Lake-Axis-Parallel (LLAP) Lake-effect snows. These storms often cripple entire cities and can hamper transportation for days. These areas of convection can result in tremendous snowfall accumulations in a small, localized area. These same areas have proven difficult to forecast, and the overall level of understanding of the inner dynamics and structure of LLAP snow bands is poor because they have not been extensively studied in the past. In-situ and remotely sense data was gathered on two LLAP events during the winter of 2010-2011. Many features, similar to those seen in warm-season convective storms were identified within the LLAP snow bands. This radar data, combined with surface measurements and observations were compared to find any correlation that may or may not exist, in an effort to understand and predict these snowstorms with greater confidence and accuracy. A basic analysis of this data suggested the presence of a baroclinic zone, which promotes a positive feedback process to occur, thus promoting the snowband to increase in intensity.

(Poster Presentation, Session I (10:15-11:30am), Poster #36)

Persistent EGF Signaling Serves To Promote Lactotrope Differentiation In GH4 Pituitary Somatolactotrope Tumor Cells

Crystal Gomez, Arthur Gutierrez-Hartmann, Tammy Trudeau – Biology

Faculty Mentor: Jennifer Haskell

Background: Pituitary somatotropes, and lactotropes, expressing GH and PRL, respectively, retain plasticity, allowing rapid cell expansions in response to increased physiological demands. For example, the somato-lactotrope cell expands into lactotropes during pregnancy and into somtatotropes with exercise. Unfortunately, very little is known about the signaling events that instruct somato-lactotrope cells to proliferate and then terminally differentiate or that contribute to the transformed phenotype. A number of *in vivo* transgenic mouse studies revealed that uncontrolled activation of growth factor Ras/MAPK signaling pathways in lactotropes results in lactotrope hyperplasia. Moreover, *in vitro* studies using GH4 and GH3 rat pituitary somato-lactotrope tumor cell lines have shown that activated pMAPK is necessary for both short-term proliferation and differentiation, with possibly the duration of pMAPK activation dictating differential responses. However, these proliferation studies all relied on short-term (6-24 hrs) assays. Thus, the specific role of MAPK in durable lactotrope proliferation and differentiation responses (ie, cell counts and phenotypic characterization over ~5 days), remain unknown. Furthermore, the role of mTOR signaling in either of these as durable responses is not well understood.

Methods: In order to directly interrogate the role of EGF and mTOR, we used persistent EGF addition or pharmacological inhibitors, to interrogate the role of these pathways in GH4 cell proliferation and clonogenicity.
Results: Using long-term proliferation and clonogenicity assays, we found that treating cycling GH4 cells with EGF reduced cell proliferation and clonogenicity.
Conclusion: Collectively, these data reveal that the EGF signaling pathway, via Ras/Raf/MAPK, serves to promote lactotrope differentiation, whereas activation of the PI3K/mTOR/S6K pathway regulates lactotrope proliferation and transformed phenotype.

(Poster Presentation, Session I (10:15-11:30am), Poster #22)

Piezo Platform

Alex Goudeseune, Saeed Darvish – Mechanical Engineering Technology

Faculty Mentor: Devi Kalla

The global demand for clean, renewable energy is at its apex as alternative energy sources are being utilized more than ever. However, solar panels and windmills require large, dedicated areas for installation and may not be aesthetically pleasing. The Piezo Platform is intended to be relatively invisible to those using it and forfeit no useful space. Of course similar products already exist, such as the Sustainable Dance Floor, but the goal is to create a complementary design and, ideally, an improvement. This project is intended to be used as an informative tool as well as motivation for others to utilize piezoelectricity. This naturally occurring phenomenon is caused by an accumulation of charge within the crystal lattice of ceramic materials such as PZT but has been found in some polymers. When these materials experience a mechanical deformation, they emit a voltage in a linear relationship. The final product will harness pedestrian walking energy that is normally wasted and convert it to electrical energy with a one square foot, loaded tile. The output can then be used to power other components such as LEDs or be stored in batteries. Ultimately, a functioning prototype will be constructed and tested for indoor use.

(Oral Presentation, Session II, Room 1325, 10:15am)

Tandem-seating Vehicle Interior Design

Elias Gutierrez, Jacob Stein, Jacob Fling, Lucas Van Alsten – Industrial Design

Faculty Mentor: John Wanberg

Passenger vehicle interior configurations have remained unchanged for over a hundred years. These traditional interior configurations complicate current needs for vehicles with lower mass and higher aerodynamic efficiency, especially when these vehicles are primarily utilized by a single occupant. Therefore, this research explores the ergonomic requirements of drivers and passengers and applies their needs to high efficiency tandem-seating arrangements in an alternative vehicle architecture. These findings are then applied to the development of a physical mock-up that presents a styling option for a two-occupant, tandem-seated configuration within a vehicle interior.

(Oral Presentation, Session I, Room 1325, 9:15am)

The Philippi Mummy Project Historical Analysis (Award Finalist)

David Haddad and Julia Woodward –
Anthropology

Faculty Mentor: Rebecca Forgash, David Hill, Ronald Beckett, and Gerald Conlogue,

In 1888, a court in Philippi, West Virginia awarded the amateur embalmer Graham H. Hamrick two unclaimed bodies, both female, from the Trans-Alleghany Lunatic Asylum for use as experimental embalming subjects to demonstrate the efficacy of his method. Hamrick's technique was established and a patent was awarded but his ownership of the mummies was brief. The women are purported to have toured Europe via the Barnum and Bailey circus, were sold to several private collectors, and served as a roadside attraction in West Virginia, before ending up in the Barbour Country Historical Society Museum. An exploration of Hamrick's career as an amateur scientist and the footnotes he left of himself in the scientific literature will be detailed to better characterize his life. This historical analysis for The Phillipi Mummy Project involves the collection and use of archival data, public records research, and interviews with local historians to reconstruct the life histories of two individuals who were embalmed, including the cultural and political contexts surrounding their institutionalization. Through tracking the posthumous treatment of their remains, this study will examine historical embalming practices in the United States as well as practices associated with psychiatric institutionalism to detail the legal circumstances that led to the awarding of the bodies to Hammrick. As such, the study aims to broaden understanding of civil liberties and treatment of women and the mentally ill in the 19th century.

(Oral Presentation, Session III, Room 1202, 2:00pm)

Health Policy Support In Child Care Settings

Alicia Henning, Kelly Enenbach – Nutrition

Faculty Mentor: Cynthia Dormer

The purpose of this project is to determine which health policies or recommended practices caregivers are most interested in working on and what resources are needed to do so. Early childhood is key time for developing healthy behaviors and early child care centers are an underutilized setting for promoting healthy behaviors and preferences. More information is needed about what health policies caregivers are most interested in and which are more practical. There is very little information on which policies or best practices are easiest for caregivers to implement on a small budget. This project utilized a community-based participatory approach to elicit which policies and resources would be most helpful. This approach presented the opportunity to collaborate and discuss ideas with the caregivers on the most realistic ways to make an impact on health and wellness policies. We gathered data on what types of changes they were interested in and what support they needed to make those changes. The results so far suggest the practices caregivers are most interested in implementing are nutritional parent outreach (PO-N) and environmental nutrition (E-N). We have found they are least interested in physical activity parent outreach (PO-PA) and physical activity policy change (PC-PA). Based on initial data it appears that when given the resources they need, early childcare centers and preschools show improved adherence to policy and improved nutritional intake. We are going to continue to provide support and collect data that informs future effort to engage caregivers in health policy and best practice implementation.

(Oral Presentation, Session IV, Room 1323, 3:15pm)

Geomyces Destructans And White-Nose Syndrome

Matthew Hernandez – Environmental Science

Faculty Mentor: Sangeeta Singh

White-nose Syndrome is a new and emerging disease associated with massive declines in North American bat populations and has not been present in North America prior to the winter of 2006. Researchers have identified the causative agent of White-nose Syndrome as a new fungal species dubbed Geomyces *destructans*. G. *destructans* was initially determined to be a normal, psychrophilic, soil saprophyte, but upon isolation and research G. *destructans* varied from its closely related cousin, G. *pannorum*, by morphological differences in conidiophores, which are curved in G. *destructans*. G. *destructans* causes opportunistic infections in hibernating bats by taking advantage of a hibernating bat's down regulated metabolism. The fungus is able to infect bats with no resistance from the bat's non-functioning immune system. This allows G. *destructans* to inflict greater harm and spread throughout bat populations while causing mortalities due to emaciation.

(Oral Presentation, Session III, Room 1325, 1:45pm)

Reduction Of Construction Costs Through Implementation Of Dynamic Technology

Miguel Hernandez – Civil Engineering Technology

Faculty Mentor: Zsuzsa Balogh

As project costs increase due to the rising prices of materials, labor and equipment, more efficient approaches are looked upon when performing cost estimates. However, when accounting for the unforeseeable costs of injuries as a result of construction activities there is no flawless plan. While some injuries can be avoided, others such as those caused by repetitive movements can have negative impacts on the worker and in the end affect the project timeline.
Although companies provide safety programs, often times those guidelines can go by the wayside when efficiency and project deadlines loom. The result of requiring workers to perform beyond their physical capabilities leads to an increase in the occurrence of injuries. By introducing technology that can reduce the physical effort of the worker, the employer can benefit from a healthy and productive work force. The type of technology available to assist the construction worker in performing rigorous tasks is a commercial exoskeleton. However, this technology has many drawbacks and the price can increase the cost of a construction project. Introducing dynamic technology to the construction field can have a large impact by maintaining the health of the workforce, reducing injuries and in turn resulting in higher efficiency. The advantage of using this type of technology includes: affordability, ease of use in rigorous environments, composed of lightweight materials and designed to be non-cumbersome. The long-term impact means completing projects on schedule, maintaining a healthy experienced workforce and reducing the costs from injuries that affect the projects bottom line.

(Oral Presentation, Session IV, Room 1325, 3:45pm)

Olfactory Stimuli And Memory Performance (Award Finalist)

Lucero Herrera - Psychology

Faculty Mentor: Courtney Rocheleau

The purpose of this study was to assess the effect of peppermint essential oil on memory recall. Research demonstrates that peppermint scent increases alertness, memory, and concentration and energizes the mind; therefore, it was hypothesized that participants who were exposed to a peppermint scent would have higher mean scores on a memory test. Fourteen participants were recruited from the MSU Denver

psychology subject pool for the study titled *Cognitive Tasks and Our Chemical Senses*. The participants were systematically assigned to either the control group (unscented condition) or the experimental group (peppermint scented condition). After assigning the participants to one of the two conditions, they were asked to hold an index card to their nose (scented or unscented), while completing the False Memory Test developed by Paller (2004). After a five-minute delay, participants were asked to recall as many of the stimuli from the False Memory Test as possible. The number of stimuli that were correctly recalled served as the dependent variable in the study. Analysis of performance on the memory test revealed that, consistent with the hypothesis, participants in the peppermint scented condition had higher scores on the memory test than participants in the unscented condition, $t(12) = 2.05$, $p = .06$. These findings indicate that perhaps peppermint essential oil can produce a positive effect on memory. Pairing peppermint scent with studying for an exam might help improve test scores. Also, becoming exposed to the scent right before the exam may allow the individual to better recall the information studied.

(Poster Presentation, Session II (3:00-4:15pm), Poster #7)

Female Choice And Pair Bond Success In The Monogamous, Biparental Convict Cichlid (*Amatitlania Nigrofasciata*)

Alyssa Herrin, Aaron Bakker, Megan Burke, Melissa Glenn, Jennifer Pluta – Biology

Faculty Mentor: Jennifer Gagliardi-Seeley

This research will determine whether female mate choice in convict cichlids (Amatitlania nigrofasciata) was based on mate quality or breeding site quality. We created 3 compartments in a tank and placed a male in each outer compartment, leaving the center compartment neutral. Our experimental design isolated the males with dividers that had holes large enough for the smaller female to swim to either compartment. In the experimental, only the small male received a breeding site. In the controls, the males were of equal size and one was randomly given a breeding site. During the initial experiment, most of the females stayed in the neutral compartment; thus, no choice was made. This led us to investigate whether male choice is equally important as female choice. Since convict cichlids are serially monogamous and bi-parental, it is possible that both male and female choice is vital. We are repeating the experiment with an additional female; thus, there are two isolated males and two free-swimming females. We hypothesize that pair-bond formation will occur more often than the earlier experiment since both males and females will be involved in the mate choice process. In addition, if breeding site quality is more important to the females, we predict that females will choose the male with the flowerpot; however, if mate-quality is more important to females, the larger male will be chosen. Preliminary data suggests that pair-bond formation increases when two females are present and there is a trend that females are choosing the high quality-breeding site.

(Oral Presentation, Session II, Room 1323, 10:45am)

Evaluation Of Feeding Competition And Food Preferences Between Eurasian Collared-Dove (Streptopelia Decaocto) And Mourning Doves (Zenaida Macroura) In Colorado

Suzy Hiskey, Patrick Kenney – Biology

Faculty Mentor: Christy Carello

The Eurasian Collared-dove (*Streptopelia decaocto*) is an invasive species and may be contributing to declines in native populations, such as Mourning Doves (*Zenaida macroura*), due to resource competition. Studies of captive collared- and mourning doves indicate a high degree of dietary overlap, but few studies have examined their food preferences in the wild. Our study's objective is to examine

food selection of Collared-doves and Mourning doves in the wild. We anticipate a high degree of dietary overlap between Mourning and Collared-doves in the wild, as was demonstrated in previous laboratory studies. We also expect the Collared-dove to forage selectively, and its food preferences to be constant across seasons. The Collared- and Mourning dove specimens used in this study are obtained from hunters participating in a parts-collection program during Mourning dove hunting season. Specimens are dissected to obtain crop contents, and when available, gizzard size, bill measurements, wing cord length, and gender identification. Specimens are aged based on the level of wing molt. Seeds from the crop are weighed, sorted, counted, and identified. Seed dimensions are also taken. Feeding preferences of Collared- and Mourning doves will be determined based on contents of crops collected throughout the hunting season. This study of Collared-dove seed choice in the wild is the first of its kind for this species and will shed light on dietary overlap in the wild. A greater understanding of habitat use and resource competition between native and invasive species is critical for developing strategies to protect native populations.

(Poster Presentation, Session II (3:00-4:15pm), Poster #16)

Environment In Jeopardy: Regional And Global Consequences Of Siberian Climate Change

Victoria Ives – Land Use

Faculty Mentor: Sangeeta Singh

The purpose of the following research is to analyze the effects of climate change and polar amplification in Russia, both regionally and globally. Within its borders, Russia is experiencing a vegetation shift in the Siberian taiga as well as melting permafrost in the tundra areas. The race for oil under the Arctic sea ice has also lead to environmental negligence in the region. A further goal of this study is to investigate the role of government policies as well as non-governmental organizations on environmental awareness, adaptation, and conservation. Russia is a realm in transition, moving from a communistic government to a democracy. This limits the political efforts and funding that can be put towards prevention and adaptation regarding the changing climate. Supplementing these findings with various scientific conclusions has revealed a discrepancy between Russian efforts and the efforts needed to address a problem of this magnitude.

(Oral Presentation, Session II, Room 1323, 11:15am)

Classifying The Astroid Curve

Fulton Jackson – Mathematics

Faculty Mentor: Diane Davis

A plane algebraic curve is the set of points on the Euclidean plane whose coordinates are zeros of some polynomial in two variables. Some algebraic curves have interesting symmetries. For instance, the Lemniscate of Bernoulli is shaped like the infinity symbol. It turns out that the symmetries of the Lemniscate are closely related to the rotational symmetries of an Octahedron. The talk begins with a summary of some results by Langer and Singer in “When is a Curve an Octahedron?” (The American Mathematical Monthly, December 2010). We extend the results of this paper through the investigation of the Astroid curve. This curve resembles a diamond with pizzazz! We explore the characteristics of the Astroid and conclude with a conjecture about the symmetry group of this curve.

(Oral Presentation, Session I, Room 1323, 9:00am)

Diophantine Monoids And Their Matrix Representations

Fulton Jackson – Mathematics

Faculty Mentor: Mona Mocanasu

The *Krull-Riemak-Schmidt-Azumaya Theorem* (*KRSA Theorem*) proves the uniqueness of direct-sum decomposition for *R*-modules under a certain set of conditions. Therefore, understanding the nature of indecomposable modules is necessary if one needs to work with general modules.
We start by defining the notion of indecomposable modules and their associated matrix and what are the properties of direct sums. The main known results are listed, including the *KRSA Theorem* and how this applies to our special type of monoids. A brief history of the notion of Diophantine monoids and their relation to the Diophantine equations is included, to justify our question. We include several computational examples to illustrate the connection between matrices and monoids, and explain how the sign of the entries relates to the monoid. This is a preliminary report for an undergoing research project, so we conclude with a conjecture and with several results that support it. We are confident that by the end of the research project we will have a complete proof of this conjecture.

(Poster Presentation, Session I (10:15-11:30am), Poster #26)

Does Multicultural Counseling Competency Training Lead To Multicultural Competent Counselors?

Christine Jaeger – Psychology

Faculty Mentor: Anna Ropp

The multicultural counseling competency (MCC) framework provides counselors with direction for effectively treating the culturally diverse. Much research indicates that multicultural educational instruction leads to greater self-reported MCC, however, the model has been criticized for its lack of empirical support. This literature review examines the impacts of MCC training on MCC skills. Education based on extant theory and experiential practices has been found to effectively develop MCCs in counselors and trainees. Research on the effectiveness of MCC training has predominantly used self-reported measures to evaluate MCC. Relatively little research has used observer-rated measures. Suggestions for effective MCC training, measurement, and future research are addressed.

(Oral Presentation, Session I, Room 1202, 9:30am)

Language Learning

Arijana Jaksic – Psychology

Faculty Mentor: Lesley Hathorn

A difference between learning a first language, compared to a foreign language, is that people learn their first language proficiently, while there is great variation to which they acquire foreign languages (Ebrahim, 1998). An emerging concept in memory and language is paired associate learning. Paired associates (PA) learning is when a person responds to any stimulus (foreign language) from a list with an associated response (native language). Cooper (1964), found that there is a relationship between people's rate of paired associate acquisition and their ability to learn a second language.
Two experiments have been done to find additional information on language learning. The purpose of Experiment 1 was to determine if (1) showing a short video clip of foreign language words just once influenced language learning and (2) labeling words easy, difficult or useful would facilitate learning Serbo-Croatian words presented as paired-associates. In the study, useful words were words that were

specifically spoken in a short video clip. The purpose of Experiment 2 was to determine which method of studying is best for acquisition of language.

In Experiment 2, condition 1 uses paired association by allowing participants to study Serbo-Croatian words along with their English translation. Condition 2 requires participants to use more working memory. They are shown the English translation of a word only after they have submitted their answer of what they think a word means. Data collection is still in progress for Experiment 2 and results will be discussed at the Undergraduate Conference.

(Oral Presentation, Session II, Room 1314, 10:45am)

Field Studies Of Visual Cues That Elicit Territorial Response Behaviors In The Damselfish *Pomacentrus Albicaudatus* [Pomocentridae, Pisces]

Jennifer Jennings, Megan Burke – Biology

Faculty Mentor: Robert Hancock

Antagonistic behaviors displayed to defend territory by *P. albicaudatus* were studied using a model challenge method in a shallow lagoon littered with coral rubble off of the South Eastern tip of Kadmat Island, Lakshadweep, India in the Arabian Sea. Specifically we studied effects of pigmentation and anatomical detail on response of fishes to hydrodynamic models that were dropped in observed territories of adult *P. albicaudatus*. Field models were prepared using polyurethane resin containing a foam center and were tethered to a sinker with monofilament to ensure they would float correctly. They were shaped from plaster molds formed from clay models. Fish scale and color pattern were added to the models. Selected *P. albicaudatus* were video recorded using GoPro II cameras. Two minutes of baseline was recorded before a randomly chosen model was dropped near the center of the defended territory. Response was recorded for 3 minutes. These video recordings were analyzed using the computer program Jwatcher, which quantified key behaviors defined by our ethogram. The recordings reveal several frequent behaviors of *P. albicaudatus* and established a pattern of antagonistic behavior towards intruders (the field models) in their territories. This coincides with the highly territorial manner observed in most species within the Damselfish family Pomocentridae.

(Poster Presentation, Session I (10:15-11:30am), Poster #30)

The Phototactic Response Of Planktonic Marine Crab Larvae To The Wavelength And Intensity Of Light (Award Finalist)

Jennifer Jennings – Biology

Faculty Mentor: Robert Hancock

Every night one of the largest migrations on Earth occurs within the world's oceans. Millions of organisms join in a dynamic journey from the sea floor to the surface layers. This mass migration, known as the diel vertical migration, is preformed by everything from microscopic organisms to macroscopic organisms.

One important group of microscopic organism to join in this phenomenon is the brachyuran zoea. These minute swimming animals are one of the larval stages of true crabs (Order Decopoda, Infra Order Brachyura). These larvae are driven by an instinctual response to light known as phototaxis. This response is used to coordinate the diel vertical migration.

Past research has focused on the movement of zoeae in response to both wavelength, color and intensity of light. Most of this work has been performed in the confines of the laboratory on East and Gulf Coast species and little research has been done in the field setting. In June of 2012 I took this research has taken this into the field, using color filtered chemical light sticks to test the response of brachyuran zoea to the wavelength and intensity of light off the coast of Southern California. Samples were collected and then

brought back to MSU Denver for sorting, identification and analysis. Statistical G-tests of Independence have shown that the species of brachyuran zoea collected were most attracted to light between 400 nm and 420 nm wavelength and furthermore, that there was no preference to the two light intensities that were tested.

(Oral Presentation, Session III, Room 1202, 2:30pm)

Here's To Ears!: Prevention Of Noise-Induced Hearing Loss In Children

Kamilah Jones –Speech, Language & Hearing Science

Faculty Mentor: Jessica Rossi-Katz

Permanent hearing loss as a result of exposure to noise affects approximately 5.2 million children ages 6-19 in the United States (Niskar et al., 2001). In an effort to educate school-aged children about the importance of hearing-loss prevention, MSU Denver's Speech, Language and Hearing Sciences department teamed up with the Theater department to design a theatrical production and workshop entitled, Here's to Ears! Here's to Ears originally began touring area elementary schools in 2011. In spring 2013, pilot data was collected to determine the efficacy of this production. This was demonstrated by comparing the participants' pre-performance drawings with their immediate post-performance and two week post-performance illustrations following the prompt, "draw how we hear." In this present study, one of three sites where data was collected included a classroom of 20 fourth graders. Their drawings were analyzed by three reviewers using a rubric to measure the changes observed between the drawings. Some preliminary trends included the presence of outer ear structures such as the pinna in the pre-performance drawings. The drawings grew in complexity immediately after the performance and many included structures that are not outwardly visible, such as the brain. In the two-week post performance, it was noted that some of the drawings began to devolve, becoming less complex as compared to the illustrations created immediately after the performance. This data provides implications for the use of educational theater in the context of hearing loss prevention in schools.

(Poster Presentation, Session I (10:15-11:30am), Poster #11)

The Effect Of Immediate And Continued Skin-To-Skin Contact On Breastfeeding Duration And Exclusivity (Award Finalist)

Jennifer Kane, Leslie Wall, Kaitlin Hornbostel –Nutrition

Faculty Mentors: Jennifer Weddig, Michelle Tollefson

The American Academy of Pediatrics recommends exclusive breastfeeding for the first 6 months of life and continued breastfeeding with complementary foods to one year and beyond. This research hypothesizes that continued skin to skin contact (SSC) during the first 72 hours of life (HOL) will increase exclusivity and duration of breastfeeding in the infant's first year of life.

The study population is women from a free-standing birth center whose infants were delivered by certified nurse midwives at more than 37 weeks gestation and without respiratory distress. Treatment condition is discharge education encouraging continued SSC throughout the first 72 HOL and control is no discharge education.

Data from patient charts, including time from birth to first breastfeeding and total SSC from birth to discharge, was aggregated into the treatment and control groups. From this data, we learned that at 6 weeks post-partum, 94% of the treatment group and 92% of the control group were exclusively breastfeeding, a statistically insignificant difference. This finding is not surprising given the education this population receives on the importance of exclusive breastfeeding.

A validated survey was developed that will be distributed to 1080 participants to assess differences between the two groups at longer time intervals. Statistical analysis will be conducted to test our

hypothesis. Positive outcomes from the survey may assist hospitals and care providers in amending their postpartum practices to include greater SSC for mothers and babies as well as education for parents about the benefits of SSC.

(Poster Presentation, Session II (3:00-4:15pm), Poster #27)

Modern Marks: Assessing The Meaning Behind Tattoos

Alley Kasney – Psychology

Faculty Mentor: Lesley Hathorn

While much of previous research has been centered around negative aspects of tattoos, such as associating it with deviant behavior, this study is aimed at bringing to light new aspects of tattoos in the 21st century by assessing the meaning individuals hold for their tattoos. We hypothesize that by simply writing about one's tattoo, self-compassion will increase. Additionally, this study will evaluate whether the location or type of tattoo is significant. Participants were sampled from the general public (for a $5 Starbucks gift card) and from MSU Denver Introductory Psychology courses (for course credit). Participants were asked to complete a questionnaire comprised of the Big Five Inventory and the Zuckerman-Kuhlman Personality Questionnaire. Next, one group completed the self-compassion questionnaire followed by questions of their tattoos, while the second group received the same procedure but the self-compassion questionnaire was completed after writing about their tattoos. Participants wrote about the quantity, frequency acquired, influence, motivation, location, and were encouraged to elaborate on the meaning of their tattoos including a description of design/appearance, ranking tattoos by meaningfulness, the purpose of acquiring the tattoo, and current feelings of them. Lastly, participants were given the option to allow photographs to be taken of visible tattoos for the purpose of creating a classification system of tattoo styles. These photographs will be reviewed to assess which styles are being adorned in today's population. Data collection is currently in process. Results will be discussed in the context of the literature review.

(Oral Presentation, Session I, Room 1312, 8:45am)

WITHDRAWN: Reading With Objectives

Alley Kasney, Ryan Balke, Jillian Sterns – Psychology

Faculty Mentor: Lesley Hathorn

Previous research shows conflicting evidence on the benefits of rereading text for comprehension. The present study addresses two research questions: (a) whether the type of text determine an advantage to reading text twice; and (b) whether giving implicit learning objectives before reading text will increase comprehension. Participants were Introductory Psychology students, self-identified as having no diagnosed reading disabilities, who participated for course credit. Six different texts were read by participants on a computer. Each passage included learning objectives and was immediately followed by a self-reported confidence judgment question asking the participant to rate how well they felt they could answer questions about the text. Finally, comprehension questions of the passages were asked. In the second part of the study, participants completed a reading span test in which participants had to verbally recall the last word of a sentence after it had been removed, as well as report answers to comprehension questions to a researcher. Difficulty of the reading span test increased with correct answers. Data collection is currently in process. Results will be discussed.

(Poster Presentation, Session II (3:00-4:15pm), Poster #10: WITHDRAW)

Exogenous Attentional Capture And Personality Effects On Memory

Eric Klein – Psychology

Faculty Mentor: Linda Lockwood

To explore what moderates teachers' ability to assist students in learning, this study takes into account attention, focusing on multimodal tasks. Multimodal memory tasks have been shown to cause decreased recall (Fernandez and Moscovitch, 2000). Exogenous attentional capture (EAC) moderates the focus of attention by various bottom-up cuing events (McKee, Christie & Klein, 2007). Here EAC is placed in the context of a classroom lecture using various stimuli to moderate attention. Personality factors could also play a role in how attention moderates learning: Need for Cognition, Opnness, Conscientiouness and Neuroticism, all have been shown to affect memory through dual-tasks, or directly (Fleischhauer, Enge, Brocke Ullrich, Strobel & Strobel, 2009; Pearman & Storandt 2005; Pearman, 2009). These principles have led to the formulation of two hypotheses: First if EAC stimuli were presented in the context of a class lecture, such stimuli could draw students' attention away from the material and decrease memory of it. Secondly, that various personality factors could play a role in the amount of remembered material during this condition. To test these hypotheses, participants are presented with various versions of lecture videos. They are then quizzed on them. Each lecture is recorded both with and without various EAC stimuli. Participants are asked to fill out both an NFC and BFI scale. The resulting data is currently being collected. The findings of this study could prove to be relevant to both professors' in-class lecturing habits as well as their understanding of their students' needs based on their varying personalities.

(Poster Presentation, Session II (3:00-4:15pm), Poster #14)

Assessment Of A Minimum-Impact Macrophotographic Technique To Record Odonate Biodiversity In Kerala, India

Torry Knodell, Samantha Taylor – Biology

Faculty Mentor: Robert Hancock

Traditionally in the western world, the assessment and monitoring of biological resources has been done in such a way that sometimes, the surveys and experiments being conducted can have a negative impact on the environment and the resident flora and fauna. Because of these complications, development and implementation of new, low impact methods is becoming more and more important. A macrophotographic technique was employed in the field to survey adult dragonflies and damselflies (O. Odonata) over the course of 24 days in the tropical southwestern Indian state of Kerala. Odonates exhibit aquatic immature stages and Kerala, with vast lowland flood plains and numerous river systems and wetlands is a major center of endemicity for the order. Photographs were taken of perching adult dragonflies and damselflies at 12 locations, and for each location GPS coordinates and physical characteristics of the surroundings were recorded. The species in the photos were identified using various scientific keys, as well as Keralan nature guides. Maps were later built to reflect the diversity of species found at each location, and how habitat variables relate to the presence of different species. Over 90% of all species photographed (31 species in 5 genera) were confidently identified using high quality photographs alone. The implications of these outcomes show that, for selected organisms, biodiversity can be readily assessed using a low impact macrophotographic technique.

(Poster Presentation, Session I (10:15-11:30am), Poster #31)

Connecting Sets

Ethan Kowalenko – Mathematics

Faculty Mentors: Diane Davis, Mona Mocanasu, Patty McKenna

In the pure mathematics field of abstract algebra, there are sets of whole numbers (called integers) that have specific requirement for admittance. Examples of these include the set of all of the numbers divisible by 3 with a remainder of 1, the set of all of the odd numbers, or the set of multiples of 5. I analyze sets like these and describe a specific way to partition such sets. I also use an analogy to clocks in order to explain my proof so that my poster may be understood by a broad audience. Finally, I discuss further topics I would like to explore in relation to integer sets.

(Poster Presentation, Session II (3:00-4:15pm), Poster #28)

Bringing Two Hundred Years Of Scientific Research To Digital Life

John Larimore – Mathematics

Faculty Mentor: Ben Dyhr

Much of the scientific data which has been collected over that last two hundred years is literally being stored in museums, which confers little benefit to anybody who does not physically go to the location to look at the records. A large push is now underway to digitize these records to make them available to all. For instance, researchers looking into the geographic spread of species over time would have an invaluable asset by being able to access the large records which have been collected over the last two centuries. It would be prohibitively expensive to manually type in all of these records. To digitize the records, pictures are taken of the specimen sheet which gives us an image of each record. We then use optical character recognition software to extract the words from the record, after which we use natural language processing to try understand the meaning of the words. This allows us to report all of the relevant information such as scientific name, location, date collected, and the like, in a spreadsheet format perfect for doing analysis on. The final product connects the image with the core fields, so when researchers find a record that interests them, they can access the image of that record. For some idea of the scale, a small collection has a few thousand records, a medium collection has a few tens of thousands of records, while a large collection has over one hundred thousand records.

(Oral Presentation, Session II, Room 1323, 10:30am)

Measured Changes In Guitar String's Vibrational Characteristics When Used In Combination With Differing Types Of Fret Materials

Lauren Lautenschlager, Brad Busley, Randall Tagg - Physics

Faculty Mentor: Richard Krantz

The materials used in guitars have remained largely the same for many years. In replacing traditional nickel silver frets with quartz crystal, a few interesting things take place. First, the mid-range and higher harmonics of the struck string are substantially reduced, resulting in a cleaner and more pure sound. The quartz crystal has a hardness of 7 on the Mohs scale, as compared to nickel silver whose combined elements have hardness ranging from 2.5-4. This initially caused us to hypothesize that the sustain of the string would be longer, due to lowered damping on the sting's vibration.
However, the sustain of the struck note is measurably reduced – possibly because of the altered process of installing the crystal frets. Unlike the typical fret, which is T-shaped with burs to hold it in place through pressure, the crystal frets we worked with had rectangular bases and were glued to an additional layer of holographic paper before being glued into the slots on the neck, for cosmetic purposes.

We hypothesize that the much lower hardness of these additional layers contributes largely to the lowered sustain. The applications of this study are largely musical, offering a new and different sound to be achieved with one of the most popular musical instruments.

(Poster Presentation, Session II (3:00-4:15pm), Poster #29)

Antimicrobial Properties Of Plant-Based Gelatinous Matrices

Dasha Lavrinenko – Biology

Faculty Mentor: Sheryl Zajdowicz

The common water clover, *Marsilea quadrifolia*, is invasive to wetlands in the southeast region of the United States. As part of its reproduction, hydrated *Marsilea* sporocarps produce a gelatin-like matrix, which serves as a protective substrate in which its gametes are contained. *Salvia hispanica*, also known as chia, produces a gelatinous material when it is placed in an aquatic environment as well. We predict that the gelatinous material contains antibacterial properties. This current study analyzed these gelatinous matrices for antibacterial properties against both Gram-positive and Gram-negative environmental and pathogenic bacteria; obligate anaerobes were excluded from the study. Twenty-one different bacterial species were plated on Mueller-Hinton agar and the gelatinous material was plated directly onto the inoculum. We showed that this matrix completely inhibits 14 of the 21 bacterial species tested including: *Citrobacter freundii*, *Micrococcus roseus*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Enterobacter cloacae*, *Enterobacter aerogenes*, *Staphylococcus epidermidis*, *Staphylococcus aureus, Bacillus cereus*, *Streptococcus pyogenes*, *Corynebacterium xerosis*, and *Streptococcus pneumoniae*. Subsequent analysis will focus on specific biochemical attributes of the matrix and the degree to which dilutions are sufficient to inhibit bacterial growth.

(Poster Presentation, Session II (3:00-4:15pm), Poster #32)

Do Happy People Sleep Around More?

Amber Lea – Psychology Major

Faculty Mentor: Chrislyn Randell

This study focuses on both gender and happiness level as a factor influencing an individual's number of sexual partners. Other studies have shown measures on happiness and how it relates to self-esteem, religion, risky sexual behavior and drug or alcohol use. It is believed that happiness could potentially be a factor in the number of sexual partners an individual has. It is predicted that participants who have lower levels of happiness, in comparison to those who have higher levels of happiness, would be more likely to have multiple sexual partners. It is also anticipated that a difference between genders will be found with males indicating more sexual partners in general than females. Data collection is still in progress with an expected number of participants totaling around 60. Participants will be assigned to either a high happiness or low happiness score with the division score being 57. The question on number of sexual partners was collected for an individual's lifetime number of partners. Results are expected to show that those who scored lower the Oxford Happiness Questionnaire would also report having an increased number of sexual partners. Furthermore, it is expected that males will be more likely to report multiple sexual partners than women will. Analysis of all data will be presented in final form during the conference presentation.

(Oral Presentation, Session I, Room 1312, 9:15am)

Alphabetic Literacy In The Digital Age: The Rise Of The Ebook And Its Affect On American College Students

Brittany Leddy – English

Faculty Mentor: Elizabeth Kleinfeld

This study examines the development of eBook technology within the publishing industry, and its applications for college students. The goal of the research is to discover if there is any difference in the reading practices of students when they use an eBook compared to a printed book. In the primary research I have conducted, I am comparing how students critically read the same reading sample in a digital format and in print format, and then qualitatively analyzing the data collected through two different formats: a critical reading quiz and an interview.

(Oral Presentation, Session III, Room 1314, 1:45pm)

Using The Research-Based High School: "Discover The Microbes Within: The Wolbachia Project!" In The College Classroom

Geoffrey May – Biology

Faculty Mentor: Joanne Odden

Student involvement and "hands on" learning in the classroom has long been hailed as an invaluable tool. The lab exercises in "Discover the Microbes Within! The *Wolbachia* Project"[1] were designed to incorporate this type of learning experience in science classrooms throughout the US, with the goal of student involvement in data collection and increasing student understanding of a wide range of biology related topics.

Our research involved implementing these modules, originally designed for high school, in undergraduate college classes. The goal was to record changes in self-assessed interest in scientific research, as well as laboratory skills, science knowledge, and attitudes towards scientific research. Students in two elective biology courses were given surveys before and after the lab exercise, which was conducted in several parts. The surveys, designed for the "*Wolbachia* Project", assigned scores to student responses to a range of questions relating to both the exercises in the lab activity and to self-assessed interest and success in science. We hypothesized that students would show an increase in interest for scientific research as well as lab skills and science knowledge after having completed the modules.

(Poster Presentation, Session II (3:00-4:15pm), Poster #24)

WITHDRAWN: A Cost Effective Training For Criminal Investigations Involving Whole Bone Remains

Alanna Mayberry – Anthropology

Faculty Mentor: Gary Scott

The two factors that most often influence an agencies capacity to solve a crime are time and money. Being cross trained in peripheral skills, like the ability to do a basic analysis of whole bone skeletal remains, will allow any branch of law enforcement to more effectively use these limited resources. To address time-sensitive cases centered on whole bone remains I have established a training session that can be provided at low cost to any level of law enforcement. This training session will help agencies to optimize their time by providing the skills to make a tentative identification of the recovered remains based on multiple skeletal characteristics including age, sex, and population affiliation. To evaluate its effectiveness, I have conducted this training in several college level police academy and criminalistics

classes. Data was collected from the lesson activities and through an anonymous survey provided to each participant. Preliminary results have helped to streamline the session and have shown that students who repeated the training continue to demonstrate a substantial retention of the material and methods being taught, supporting the training's efficacy. The next step in my research is to offer the training session to current law enforcement agents. It is my belief that this training will be a cost effective method for criminal investigations that involve whole bone remains. The generation of a tentative identification can immediately be used to investigate the circumstances surrounding the remains and reduce previously unavoidable idle time that can contribute to a case going cold.

(Oral Presentation, Session II, Room 1312, 10:45am)

Reading Compensation: Reading Rate As A Predictor Of Student Success (Award Finalist)

Caitlin McConnell – Psychology

Faculty Mentor: Lesley Hathorn

In order to explore the factors that contribute to MSU Denver's low full-time first year retention rate, reading studies have been conducted using reading comprehension measures such as the Nelson-Denny Reading Test (NDRT), which measures vocabulary, reading comprehension, and reading rate. Grade-equivalent reading levels are calculated from grades 4.1 to 18.9.

Students answered 80 vocabulary questions and then read passages from the NDRT and answered comprehension questions. Their approximate reading rates were also measured. Data from a random sample of 100 students without diagnosed reading disabilities were selected and analyzed.

On the vocabulary and comprehension sections, the majority of participants scored higher (M = 115.2, SD = 24.4) than the NDRT means. Participants (M = 200.9, SD = 64.6) scored significantly below the NDRT reading rate (M = 234.2, SD = 87.2) for incoming first years $t(92) = 4.977$, $p < .001$.

Students in introductory psychology have a vocabulary score that ranges from a grade equivalent level of grades four to 18.9 and a comprehension score that ranges from grades six to 18.9. The total (vocabulary and comprehension) score ranges from sixth grade to 18.9 grade as well.

The especially low comprehension and vocabulary scores for approximately 25% of students indicate a poor prognosis and may even signal an undiagnosed reading disability. Most students clearly can understand what they read, but the reading rate suggests that it takes them much longer than average to comprehend.

(Poster Presentation, Session II (3:00-4:15pm), Poster #11)

A Penchant For Verbosity: Does Reading Ability Translate Into Writing Skill? (Award Finalist)

Caitlin McConnell – Psychology

Faculty Mentor: Lesley Hathorn

Reading and comprehending are important predictors of graduation rate (Czubatyj, 2010). Prior research has indicated that reading comprehension, as measured on the Nelson-Denny Reading Test (NDRT), significantly predicts students' abilities to take quality notes from lectures and answer test and essay questions correctly (Peverly & Sumowski, 2012).

This study's goal was to assess the reading level of students at MSU Denver and compare these to the grade level of their writing. Participants wrote a description of a concept for five minutes. Participants then completed the NDRT. The writings were analyzed using the Flesch-Kincaid writing grade level and reading ease. Those scores were compared with vocabulary and reading comprehension scores on the NDRT.Correlations were conducted between the variables.

Writing grade level (*M* = 7.90, *SD* = 3.13) did not significantly correlate with reading rate (*M* = 219.80, *SD* = 77.37), the number of vocabulary questions answered correctly (*M* = 60.39, *SD* = 11.41), or the number of comprehension questions answered correctly (*M* = 27.03, *SD* = 4.62).
The participants exhibited a wide range of skill levels. The vocabulary grade level range was 10.1 to 18.9. The comprehension grade level range was 9.2 to 18.6. Seventy one percent of participants wrote below a high school level, while all participants had a comprehension grade level of at least 9.2, potentially indicating that, while students may understand the material, they are unable to express their comprehension at an equivalent grade level. Essentially, these data indicate that reading and writing may be separate skills.

(Oral Presentation, Session III, Room 1202, 1:30pm)

WITHDRAWN: Cognitive Depletion

Caitlin McConnell – Psychology

Faculty Mentor: Lesley Hathorn

When opportunities to cheat are minimized, online quizzes tend not to offer any benefits to students beyond those provided by in-class quizzes (Daniel & Broida, 2004) and that there are no statistically significant differences between scores achieved on in-class and online quizzes (Metz, 2008). As long as cheating is made more difficult (e.g. by randomizing questions and answer orders and applying time limits) online quiz scores correlate positively with exam and course grades (Anthis & Adams, 2012; Johnson & Kiviniemi, 2009; and Metz, 2008). Students tend to employ a "quiz-to-learn" strategy, which misleads them into thinking that they have learned the material (Anthis & Adams, 2012). Students rationalize cheating for a number of reasons such as time management (Silverman, 2002). It is hypothesized that students completing all the tasks in the face-to-face environment will be more likely to experience cognitive depletion than those completing the tasks online who are in a more relaxed environment
The participants will be approximately 80 students, about half of whom will take the tests online. They will be given a pre-test, a section of an intro to psychology book, a post-test with matched questions, and finally a survey consisting of questions about their personality and attitudes towards honesty. The amount of things they will have to do will create an additive burden, leading to cognitive depletion and a greater willingness to admit their true feelings about academic dishonesty.
Data are still being collected for this study and will be presented at the conference.

(WITHDRAWN: Oral Presentation, Session I, Room 1314, 9:30am)

Attitude To Different Beliefs

Caitlin McConnell – Psychology

Faculty Mentor: Lesley Hathorn

People's assessments of cults and their indoctrination tactics are highly negative (Pfeifer, 1992; Olson, 2006). Perceptions of cults are most often based on media accounts, which are typically sensationalistic and stereotypical (Olson, 2006) and on a single vivid incident (Pheifer, 1992).
It was hypothesized that participants would associate some terms with cults when they could be equally applied to religious organizations.
Participants (N = 100) completed an anonymous survey on their perceptions of behaviors often associated with cults. Participants indicated which behaviors associated with cults also applied to cults, new religious movements (NRM), new Christian churches (NCC), or atheist organizations. Participants completed a questionnaire on their own religiosity. On a scale from threatening to safe, they differentiated between synonyms for brainwashing.

A repeated measures ANOVA was conducted on the mean responses to the set of behaviors associated with cults. There was a significant difference between the groups. Wilks' $\wedge = .250$, $F(3, 97) = 97.11$, $p<.001$. Follow up *t*-tests showed that there was a significant difference in that cult behavior was associated most with cults, least with atheists, but also with NCC and NRM.
On the semantic differentiation scale from threatening to safe, participants indicated brainwashing ($M = 1.52$) was the most threatening and education ($M = 6.48$) was the safest.
Overall, participants tended to assign more of the characteristics to cults than to the other three categories and assigned the fewest characteristics to atheism. They also differentiated between phrases that are denotatively synonyms, meaning that they are connotatively distinct.

(Poster Presentation, Session II (3:00-4:15pm), Poster #12)

To Take A Task-Related Break Or Not: That Is The Question

Jocelyn Medina – Psychology

Faculty Mentor: Pamela Ansburg

The current study focused on examining whether task-related break activity improved visual search performance in comparison to task-unrelated break activity. The sample size consisted of 72 participants within the range of 18 to 47 years of age ($M = 21.54$), 50% of which were female and 50% of which were male. Participants searched for a total of 20 objects hidden within a picture puzzle to measure the impact of task-related or task-unrelated break activity on visual search task performance. The current study also used an adapted version of the Big Five Inventory to determine whether a relationship existed between caution, perseverance, perfectionism, and procrastination refrainment in regards to visual search performance. Findings of the current study suggest that there is not a significant difference concerning performance on visual search and the type of break activity in which participants were engaged; it also failed to find a significant correlation between visual search performance and all personality variables measured. However, interpretation of the data suggests that there may be a small effect size which was not detected during analysis; as such, it is recommended that the current study not be disregarded until further data has been gathered. The reasoning behind the aforementioned interpretation, and future directions addressing the need to increase sensitivity of statistical analyses, are discussed.

(Poster Presentation, Session II (3:00-4:15pm), Poster #15)

Microphone Shrink: Looking At Hip Hop Therapy And Its Implications On Minority Youth

Mirabelle Mouskos, Shelby Clutterbuck, Jessica Thompson, Lashey Randon, Paulo Arroyo – Psychology

Faculty Mentor: Travis Heath

African-American and Hispanic-American adolescents are a demographic of people that are not afforded a developmental strategy they can use and relate to. Neighborhoods plagued with poverty are predominantly comprised of African-Americans and Latinos. Issues associated with poverty can negatively impact healthy development and possibly lead to clinical conditions such as PTSD, depression, anxiety, conduct disorder, and aggression. This is a demographic that needs vital consideration and alternative forms of therapy in regards to how we approach, work and support minority youth. Cognitive Behavioral Therapy (CBT) has shown to be effective, however, due to previously mentioned circumstances of the population, has its limitations and low success rate. The same can be said with the psychodynamic approach, due to the high resistance factor, it may not be the most helpful approach when working with these adolescents.

An alternative approach is music therapy, which has shown to be more successful with youth in general. Music therapy allows clients more freedom and control in therapy. Clients are allowed to pick their own type of music, giving them a sense of empowerment in the healing process, and creating less resistance. Considering music therapy, rap lyrics and its application has been documented to show a welcoming and exciting experience. Hip-Hop Therapy (HHT) has shown promising effects by combining elements of behavioral, music, narrative, and person-in-environment therapies, which is achieved through the influence hip-hop culture has.
This literature review will compare the success rates between HHT and CBT, and psychodynamic therapy. Implications are discussed for future research.

(Oral Presentation, Session IV, Room 1312, 3:45pm)

Oxygen Therapy Heat Transfer In Extreme Cold At Moderately High Altitude To Hypothermia

Mark Nelson – Biology

Faculty Mentor: Mark Mazurek

A deadly situation where a person loses heat to the environment, called hypothermia, commonly presents as the primary life threat in numerous wilderness accidents and medical emergencies. In an observed case of wilderness rescue during severe winter conditions, the use of medical grade oxygen gas, called oxygen therapy, successfully intervened against this crisis. That life-saving account inspires our study to examine oxygen therapy's role in heat transfer to the environment, and to approach an argument about treating a disabled patient in the wilderness.
Without patient contact, we conducted therapy heat transfer experiments at moderately high mountain altitudes simulating rescue conditions. The experiments used medical oxygen tanks typically backpacked into wilderness. We reviewed circumstances where the majority of U.S. ground-based mountain rescues have occurred. We proposed that the environment would not play a major role in heat transfer, and that therapy temperature could be predicted by controlling velocity. We also proposed that newly designed tanks made of carbon composite material would be less conductive than aluminum.
Collected data on temperatures showed heat transfer from oxygen therapy which rapidly equalized to the environment, and those findings might offer insight toward better ways to stabilize a patient. We showed that either tank type had gas that adjusted to the environment well within the rescue timeline. We found that the flow velocity affected temperature behavior in oxygen therapy, that gas laws remained intact with respect to time in therapy, but that the environment showed to be the overriding factor in heat transfer.

(Oral Presentation, Session II, Room 1323, 11:00am)

Investigation Of Extracellular Microenvironments And Small Molecule Chemistry For The Maintenance And Differentiation Of Pluripotent Embryonic Stem Cells To Foster Neural Specification (Award Finalist)

Nickolas Nelson – Biology / Chemistry

Faculty Mentors: Andrew Bonham, Doug Petcoff

While embryonic stem cells (ESCs) offer the potential for cellular therapy through the in vivo repair and replacement of diseased or damaged organs or tissue, the lack of available donor cell sources because of poorly controlled differentiation in vitro limits their value. More efficient and selective methods must be developed to facilitate the maintenance and passage of pluripotent stem cells, as well as the generation of homogenous populations of specific cell types. Targeting specific signaling pathways and/or proteins with small molecules has proven effective for manipulating cell fate, state, and function. This study employed a porcine gelatin basement membrane and a feeder-free and serum free culture environment to maintain

and passage pluripotent murine stem cells (mESCs) through 20 generations. Baseline pluripotent (undifferentiated) mESC characterization was carried out utilizing standard techniques for Immunofluorescent Staining, RT-PCR and qPCR, and the chemical analysis by GC-MS and NMR on intracellular and extracellular analytes. Retinoic acid was employed to activate the transcription of genes involved in neuronal differentiation. Post differentiation studies were carried out utilizing the same standard characterization techniques performed on the baseline undifferentiated cells. A chemically defined serum and feeder-free environment for the maintenance and differentiation of mESCs is a feasible approach. Subsequent experimentation on pluripotent mESCs will include the simultaneous application of the differentiation factors required to foster neural precursor cells, and from the precursor cells, all the cell lines (neurons, astrocytes, oligodendrocytes) required to stimulate the effective repair or replacement of diseased or damaged Central Nervous System tissue.

(Oral Presentation, Session III, Room 1202, 1:45pm)

Genetic Patterns Of Mitochondrial DNA In The Cutthroat Trout

Nickolas Nelson, Seth Gordon – Biology / Chemistry

Faculty Mentor: Doug Petcoff

Current methods for molecular genetic analysis serve as a powerful tool for taxonomy. For centuries, classification of organisms depended primarily on morphology with geography as a secondary consideration. The Cutthroat trout, Oncorhynchus clarki, is a complex that contains four infra-species and 14 sub-species overall. Overall, populations of Cutthroat trout have been greatly reduced throughout the West and two sub-species are considered extinct. Decades of habitat alteration, over-harvesting and competition from introduced salmonid fish are the main causes. The mitochondrial genes, ND2 and CO1 are frequently used for the evaluation of trout. A growing consensus is that the ND2 gene changes rapidly. CO1 data suggest two fairly divergent lineages. Using only this data for taxonomy and the subsequent management policies would be imprudent. Most of the single nucleotide polymorphisms (SNP) do not result in amino acid substitutions. Mitochondrial DNA was extracted from fresh samples obtained from a number of diverse locations in the Colorado mountains, consistent with the locations of historical samples previously collected and reported on in the current literature. Primers specific for the CO1 and ND2 genes were employed to provide samples for PCR and sequencing and comparison with previously described sequences. In this study, we are focusing subsequent efforts on the isolation and sequencing of the ND5 mitochondrial region. Newly designed ND5 primers are already yielding useful results. The ultimate goal is to sequence and publish the entire mitochondrial region for native cutthroat trout. The effective restoration of native populations depends entirely on the reliable identification of remaining indigenous populations of cutthroat trout.

(Poster Presentation, Session I (10:15-11:30am), Poster #21)

Investigating The Proteins Involved In The Childhood Cancer Retinoblastoma

Kathryn Norquest – Chemistry

Faculty Mentor: Andrew Bonham

Retinoblastoma is a devastating childhood cancer that develops in the retina of the eye, and if unchecked causes blindness. Often the eye must be removed if the tumor grows too large. Retinoblastoma is caused by a mutation of the RB1 gene on chromosome 13 which codes for a tumor suppressor protein, known as Rb1. The retinoblastoma protein plays key roles in the regulation of the cell cycle through interactions with the E2F family of transcription factors. Transcription factors are essential proteins that bind DNA and control gene expression, ultimately dictating the progression of the cell cycle. The resulting Rb

dysfunction results in the malfunction of the E2F transcription factors which causes the growth of tumors. We are working to recombinantly express and purify constructs of Rb1 and E2F1 in a bacterial host system to investigate the impact of Rb1 on E2F1 DNA-binding activity. Thus far we have successfully expressed Rb1 in E. Coli BL21 cells and purified the protein using column chromatography. To observe DNA-binding activity between Rb1 and E2F1 we have developed sensitive DNA-based biosensors that allow rapid detection of these interactions with a simple fluorescent readout. In the future, these biosensors will act as an early detection mechanism to diagnose Retinoblastoma before tumors appear.

(Poster Presentation, Session I (10:15-11:30am), Poster #16)

Sibling Teachers: The Child's Greatest Influence

Jessica Olivas – Biology

Faculty Mentor: Ting Jiang

The purpose of this research was to investigate when a child develops their personality. By understanding all the variables that are present during this age, we as a society can learn how to create and maintain encouraging environments to promote positive behavior. The central question was: where and how do children develop their personalities and assume roles in society? I hypothesize that a great influence a child has is their sibling; through sibling interaction, children acquire important skills of socialization. The research methods include non-participant observations and conducting literature reviews, one of the articles include Sibling Relationship Quality: Its Causes and Consequences. This investigation will also consist of personal observations of children, and interviews with siblings. However, the authorization from the Institutional Review Board (IRB) has been obtained in order to conduct these investigations. I will observe a kindergartener in their class and at their home to compare the acquired socialization skills. An implication that occurred was to obtain authorization from the (IRB) to conduct direct interviews and observations with underage individuals. Information purely based on the peer reviewed articles have confirmed that children assume roles based on their personalities that they built off of their interactions with their siblings. With the obtainable information from the interviews and observations, I will be able to confirm or disprove the theoretical conclusions.

(Oral Presentation, Session III, Room 1325, 2:15pm)

Improving The Quality Of Life In Alzheimer's Patients

Paul Oliver – Psychology

Faculty Mentors: Katherine Hill, Cheryl Sanders

Alzheimer's disease is the result of the loss of neuronal activity in an area of the brain important for storing and encoding long-term information called the hippocampus (Matsuda, et. al., 2010). While there is no known cure for Alzheimer's, over the past decade more information than ever before has become available to help us understand which treatments work and which do not. This literature review covers the following topics in detail: a) the demographics of those most likely to be affected by Alzheimer's disease, b) a basic overview on the deterioration of the brain, and c) comparing and contrasting drug therapies, cognitive therapies, as well as physical therapies. Research examined the differences within the drug therapies, cognitive therapies, and physical therapies groups. If gauging on effectiveness alone, physical exercise seems to not only slow the development of Alzheimer's disease, but can also have a protective effect (Yu, et. al., 2006). Given there is no single cure for this disease, a variety of methods must be implemented to delay the rates of cognitive decline in Alzheimer's patients. While the results of the cognitive therapies and physical therapies seem promising, they will only slow the disease, not cure it. The real potential for a cure for Alzheimer's disease in the future lies in drug research.

(Oral Presentation, Session II, Room 1202, 11:00am)

Spaceport Colorado Feasibility Simulation

Magens Orman, ChukwuEmeka Mecca, Matt Longo, Weston McCary, Sean Thomas, Zyola Mix – Aviation Technology

Faculty Mentor: Jose Lopez

This STK simulation to evaluate the effect of space flight operations based at Spaceport Colorado upon commercial air traffic inside and outside of Class B airspace through the use of various simulated space-plane models. The study takes into account near misses with surrounding aircraft within 1000 feet and what path a landing space plane may have to take in order to safely avoid other air traffic.

(Oral Presentation, Session II, Room 1325, 11:00am)

Importance Of Physical Attractiveness And Character In A Romantic Partner

Kelly Parker – Psychology

Faculty Mentor: Alexis Karris Bachik

What do people look for in a partner? We know physical attractiveness is a major component, but what exactly does that consist of? Previous research suggests traits such as facial symmetry (Grammer & Thornhill, 1994) and smell (Herz & Inzlicht, 2002) arouse some level of desire. With character and relationships however, very little has been identified. In the U.S. forgiveness is most desirable whereas in Russia gratitude is important (Pearce, Chuikova, Ramsey & Galyautdinova, 2010). Most data simply observes character in a general sense. We wanted to know more specifically the traits, physical and in character, that are most attractive to others. This study investigated what physical and character traits college students crave in a romantic partner. There were three primary aims of this study: 1) to determine what specific physical attributes are most desirable, 2) to determine what character traits are most longed for, and lastly, 3) to determine whether college students deem physical attractiveness or character traits most important. Results (N=157*)* showed physical traits rated highest by all participants were clean appearance (M= 4.63) and pleasant smell (M= 4.56). Fake eyelashes (M = 1.06) and hair extensions (M = 1.10) came in last. Regarding character, honesty (M = 4.59) and humor (M = 4.56) were most appealing, while the lowest rated character traits were prudence (M = 3.80) and spirituality (M = 3.42). Results suggested the sample rated character as more important than physical attributes when choosing a romantic partner, but most people reported searching for both in their ideal partner.

(Oral Presentation, Session I, Room 1202, 9:00am)

Reducing The Flash-Lag Effect Using Spatial Reference Cues **(Award Finalist)**

Jacob Paschall – Biology / Music

Faculty Mentor: Mark Mazurek

The flash-lag effect is a visual illusion where a moving stimulus is perceived as being located ahead in space when it is compared to a non-moving stimulus flashed at the same location. How our brains create this illusion is hotly debated, with deep implications for our understanding of conscious awareness. To investigate this question, we performed an experiment with human subjects. Research participants used a video game controller to adjust the position of a moving bar until it was perceptually vertically aligned with a flashed bar. Our experiment asked whether or not the presence of a continuously visible non-moving stimulus (a "fixed bar") will partially undo the flash-lag effect by acting as a fixed spatial reference. If it is partially undone, this will suggest that the flash-lag effect likely results from cognitive circuitry (e.g. circuits in the parietal lobes) rather than pre-cognitive circuitry (e.g. adjacent retinal cell interactions). Data collected from five subjects suggest the fixed bar does indeed reduce the size of the

flash-lag effect. In a second experiment, we address the question of whether or not the reduction in the effect may be due to low-level visual interactions by varying the size of the fixed bar. We predict that the observed reduction will be unaltered by this manipulation, giving further support for the cognitive basis of the flash-lag effect. Preliminary results indicate that our prediction is valid.

(Poster Presentation, Session I (10:15-11:30am), Poster #25)

Time Series Regression Models For Analyzing The Cost And Profit Structure Of A Trucking Company

John Patterson, Travis Myers – Mathematics

Faculty Mentor: Shahar Boneh

The Redden Group, LTD is a 3rd party logistics company with annual revenues in excess of $80MM. Their business model includes truck transportation and on-site logistics management solutions for companies such as MillerCoors (formerly Coors Brewing Co. & Miller Brewing Co.), Occidental Chemical, Suzuki, and Wal-Mart. 3 years of financial data, which was approximately $200MM in revenue and 200,000 individual shipments, was analyzed to determine what impact diesel fuel prices have on their profit margins by week and average shipment costs by week.
Fuel prices are reported as a national average by the U.S. Department of Energy, which were used as the dependent variable in two regression models. Average shipment costs by week were analyzed as the independent variable the 1st model, and profit margins by week were analyzed as the independent variable in the 2nd model. This allowed for analysis of correlation, as well as building predictive models of future profits and costs. There was significant positive autocorrelation to account for in both models, due to fuel prices being heavily dependent upon time. After attempting to remove the autocorrelation, it was determined that fuel prices were a significant impact to and a valid predictor of average shipment costs, however the same was not true for profit margin.

(Oral Presentation, Session III, Room 1325, 2:00pm)

Analysis And Synthesis Of Biodiesel From Non-Food-Sourced Renewable Resources

Arthur Phillipson, Cathrine Birch, Josh Holloway – Chemistry

Faculty Mentors: Michael Jacobs, Thomas Vogt, Eric Ball

With the average price of fossil fuels at an all time high, the demand for alternative fuel sources is increasing. Biofuel is a greatly renewable and inexpensive source that can be conveniently processed and used in place of petro fuels. Our research focuses on the analysis and synthesis of biofuels from feedstocks using a variety of methods and techniques, which can be applied to large production. To comply with this, a clean burning biodiesel was created and tested for purity. Analysis included standardized assays for physical characteristics such as free fatty acids, specific heats, and soap impurities. Chemical compositions of the samples were tested using GCMS utilizing a prototype ion column from Thermal Fisher designed specifically for biofuels. All analysis was in compliance with the American Oil and Chemical Society standards to ensure reproducible and effective techniques for study. This analytic critique will be used in future research testing a variety of oils and biofuels generated from differing synthesis technique both chemical and biological. Future works in this area will include synthesis in large scale production using expended cooking oils, and making the biofuel field more accessible.

(Poster Presentation, Session II (3:00-4:15pm), Poster #35)

Sexuality, Happiness, Gender Differences, And Relationship Satisfaction

Addie Pisel – Psychology

Faculty Mentor: Chrislyn Randell

Previous studies have provided conflicting information as to the happiness and relationship satisfaction of homosexuals in comparison to heterosexuals, as well as the differences between men and women. This study investigated differences in relationship satisfaction and happiness between heterosexual and homosexual individuals as a function of gender. Participants were asked to fill out two questionnaires, the first being the Oxford Happiness Questionnaire, and the second being the Happiness and Satisfaction With Relationship Measure. A 12 question 7 point Likert scale so scores can be between 12 to 84, survey meant to measure closeness and happiness within the relationship with such questions as: "In general, how satisfied are you with your relationship" and reverse score questions such as: "How many problems are there in your relationship". Participants were instructed to answer questions on the Happiness and Satisfaction with Relationship Measure, based on a current relationship, or the most recent committed relationship if single. Approximately 30 participants were recruited from the Psychology Department participant pool, consisting of introductory psychology students Data is still being collected at this time. The 2 (Sexual Orientation) X 2 (Gender) ANOVA is expected to show homosexual women and heterosexual men are happier and more satisfied with their relationships than heterosexual women and homosexual men.

(Poster Presentation, Session II (3:00-4:15pm), Poster #5)

Presentation Title: Exploratory Study Of Effects Of Training System Acceptance On User Training Program Outcomes

Jonathon Pries – IDP Systems Analysis in a Diverse ERP Environment

Faculty Mentor: Biswadip Ghosh

End-user training is an important element of Information Systems (IS) projects inside organizations. End-user training can constitute roughly 5% to 50% of project budgets. To lower costs and make training more convenient for the end-users, organizations are largely utilizing online systems for the electronic delivery of such training programs, referred to as Technology Mediated Learning. In this scenario, before the end-users are able to immerse themselves in the actual training program, they are first required to adopt and use an online training system. Currently published IS research has two mature streams of publications that are relevant to this scenario: (1) Focused on models of technology acceptance and usage that has led to the UTAUT2 (Unified Theory of Acceptance and Use of Technology) framework and (2) Focused on TML models of training structures and outcomes. This research project aims to build and validate an empirical model to study of effects of selected constructs from the UTAUT2 framework on training outcome constructs from the TML framework. By conducting a survey of MSU-Denver CIS2010 students, this research will measure how the student's level of adoption of a training system (MyITLab) effect the outcomes of learning MS-Office software. The results of this study have implications for both the UTAUT2 and TML research models and also the design/use of technology mediated training for end-users.

(Poster Presentation, Session II (3:00-4:15pm), Poster #38)

Human Interaction Along The Meenachil River In Kerala, India And The Effects On Water Quality And Invertebrate Diversity

Alison Puckett, Katrina Andrus – Biology

Faculty Mentors: Robert Hancock, Tom Davinroy

Humans are a major part of an ecosystem, having a significant influence on their environment. Acting as a regulating function, water is vital to the way any ecosystem is sustained and is imperative to its health and ability to thrive. In Kerala, India, the situation is even more precarious due to the unique relationship that locals share with the hydrologic ecosystem, depending upon it for drinking, cooking, bathing, irrigation, and religious practices. A study was conducted in January of 2012 with the aid of students from the Tropical Institute of Ecological Sciences (TIES) in Kottayam, Kerala in order to link water quality to biodiversity in relation to human impact and land use.

In order to measure the health of the aquatic systems, and the resulting impact on invertebrate diversity, an interdisciplinary team of students employed several methods to test for a predetermined set of criteria. Primarily, water was tested at six sites along the Meenachil River, a major source for the region, using a YSI Professional Plus handheld device. Parameters tested using the YSI included temperature, pH, dissolved oxygen, total dissolved solids, ammonium, ammonia, and chlorine. Coliscan Easygel kits (Micrology Laboratories, LLC.) were used to obtain semi-quantitative levels of general coliform bacteria and Eshrichia coli. Invertebrates were sampled in the field using kick nets and macro-photography and were later identified using scientific keys and nature guides. Land use was categorized into five groups as follows: forest, plantation, paddy, urban, and mixed tree crop. The types of human activities/influences were observed and documented, and varied in ways that were dependent upon the land use category.

In a sequence of samplings sites that started above intensive human activity and followed downstream through settlements and agriculture areas, water quality, as measured by inorganic pollutants and biological contamination, progressively decreased. The data collected revealed a correlation between water quality and biodiversity; as the general health of the water tested declined, the invertebrate diversity was also reduced. The first test site, which was upstream and much less impacted by human activities than lower sites, had initial indicators of a healthy aquatic ecosystem and yielded a total of eight invertebrate orders, while the fourth site gave initial readings of an unhealthy stream and produced only four orders. This data supports the hypothesis that, in Kottayam, Kerala, land use on the Meenachil River has affected its water quality, subsequently decreasing the amount of invertebrates that are able to survive its aquatic ecosystem.

(Poster Presentation, Session I (10:15-11:30am), Poster #34)

The Effectiveness Of Reading Technology Kindergarten Classrooms

Kayla Pullano – Psychology

Faculty Mentor: Bethany Fleck

This study evaluated the use of technology in a kindergarten classroom, and if it could serve as an effective teaching method. The study compared comprehension scores collected from an interview after children were read a story that was delivered via hard-copy (researcher read) and one that delivered via technology (computer read). Thirty-five kindergarten participants, from two different urban schools, participated in the experiment.). Results indicated that the students scored higher on the comprehension tests when the material was presented using the computer condition. Information processing theory is used to explain the results with implications for classroom teachers. Based on these finding, both of the mediums can be counted as an effective medium to be used in the classroom.

(Poster Presentation, Session II (3:00-4:15pm), Poster #3)

Investigation Of The Fur-Like Protein Of *Streptococcus Agalactiae*

Kalen Quintanar – Biology

Faculty Mentor: Sheryl Zajdowicz

Streptococcus agalactiae, also known as Group B Streptococcus (GBS), is a human pathogen that causes numerous diseases, including septicemia, meningitis, and pneumonia. Bacterial pathogenesis is enhanced by the ability of GBS to acquire ferrous iron (Fe2+) from its host. While essential for the bacterium, excess Fe2+ can have toxic effects; therefore, its uptake must be tightly regulated. Numerous iron-dependent regulators have been identified in bacteria, including the well-characterized ferric uptake repressor (Fur) and diphtheria toxin repressor (DtxR). Regulation of iron uptake in S. agalactiae has yet to be characterized. Toward this end, we evaluated the genome of S. agalactiae strain A909 for homologues to known iron regulators and identified a gene encoding a Fur-like protein. We predict that this protein coordinates transcription in an iron-dependent manner. In this study, we initiated the characterization by PCR amplifying the gene and cloning it into the His-tagged protein expression vector pet-22b. The resulting vector will be transformed into *Escherichia coli* and expression will be induced. Following induction, protein fractions will be collected and observed for the predicted 43.9 kDa His-tagged Fur-like protein. The His-tagged protein will be purified using metal affinity column chromatography and the elution fractions will be observed by SDS-PAGE. We will then examine its ability to bind to the promoter genes that encode previously indentified iron uptake proteins. By understanding the function of this protein, therapeutics that target it may be developed.

(Poster Presentation, Session II (3:00-4:15pm), Poster #33)

Adolescent Truancy And Juvenile Delinquency: Testing Differential Oppression Theory

Jennifer Raby – Sociology

Faculty Mentor: Jeffrey London

Truancy is a deviant behavior that can lead to serious consequences, such as drug and alcohol use, criminal behavior and teenage pregnancy. The percentage of adolescent truants that drop out of school altogether is unknown, as most states do not collect that data, but it has been established that habitual truants have a propensity for academic problems (Morris 1991). The purpose of this study is to test Robert Regoli and John Hewitt's Differential Oppression Theory to better understand habitual adolescent truancy as a response to the systemic oppression of children. Data was collected by conducting two focus groups of former adolescent truants who are now successful university students, currently enrolled in the Honors Program at Metropolitan State University of Denver.

(Oral Presentation, Session II, Room 1312, 11:00am)

Authentication: The Analyzation Of Graham H. Hamrick's Solution To Preserve Corpses Patented In 1892

Denise Regan, Julia Woodward, Roxanne Finn, David Haddad – Anthropology

Faculty Mentor: April Hill, Ronald Beckett (Quinnipiac University), Gerald Conlogue (Quinnipiac University)

In this subproject of the Philippi Mummy Project we focus upon the analysis of two samples believed to be remnants of a 1888 embalming solution used in the mummification of two Jane Doe subjects. One sample was collected from a jar of liquid asserted to be the original solution, and the other from a dry jar in which sediment had been rehydrated. The two specimens are being analyzed using gas

chromatography mass spectrometry, inductively coupled plasma mass spectrometry, and high-performance liquid chromatography instrumentation. Identification of the chemical components of the solution, evaluation of over 100 years of exposure to variations in temperature, humidity, and possible other contaminants, the effects of those variations and the overall degradation of the solution will be considered. The initial findings will then be evaluated and compared to Hamrick's 1892 patented process. The primary purpose of the research is to support the historical record that the samples from which the recently discovered research specimens were taken are confirmed as equivalent to the patented solution. Secondarily, there exists a historical aspect; local Philippi West Virginia lore states Hamrick withheld some elements of the solution when filing the patent, in an effort to guard against authentic duplication. The findings will be reviewed to confirm or dispute that claim. Additional research is pending to produce the patented solution in ample quantities to begin efficacy testing of the preservation qualities by using incidentally deceased porcine subjects.

(Oral Presentation, Session II, Room 1312, 10:30am)

DNA Based Folding Bio-Sensors That Are Capable Of Detecting Transcription Factors Involved In Cancer Progression By Expressing TATA Binding Protein

Yerelsy Reyna – Biology

Faculty Mentor: Andrew Bonham

Transcription factors bind to specific genomic sequences in order to control the flow of genetic information from DNA to mRNA. The pre-initiation complex of these proteins includes TATA binding protein (TBP), which specifically recognizes the TATA box, a highly conserved region at the beginning of many genes. Transcription factors promote or block the recruitment of the RNA polymerase II complex to specific genes under different conditions, such as growth or response to disease. Intriguingly, many varieties of cancer result from the aberrant regulation of transcription factors and other proteins that control and direct gene expression. As many cancers result from the aberrant regulation of transcription factors, there is great interest in other transcription factors and TBP on how they bind DNA and regulate these aberrant processes both academically and diagnostically. In a better understanding these binding events and TBP are a core factor that can help guide the design of novel probes of transcription. Here, we report on the design and use of DNA-based folding biosensors that are capable of quantitatively and sensitively detecting TBP using custom optical and electrochemical bio-sensors probes that are activated by TBP's intrinsic DNA-binding activity. These sensors will ultimately allow us to investigate the role that protein-protein interactions and inhibitory drugs have on gene expression.

(Poster Presentation, Session I (10:15-11:30am), Poster #17)

Develop A Next Generation Carrier Receiving And Handling Device For Existing And New Stations

Spencer Roszelle, Brandon Haas, Daniel Joiner, Michael Kopetzky, Chester Whinery – Mechanical Engineering Technology

Faculty Mentor: Mingli He

Swisslog's standard station only has ability to gather received carriers in the receive area bin. This project would focus on addressing needs of customers with high capacity and throughput requirements for workflow at a given station. For example, a lab station might receive a number of transactions back to back, requiring a lab technician to retrieve each as they arrive. We will explore new concept or approach that could present received carriers onto a work bench or

rollout tray so they can be accessed easily. Taking the idea further, some sort of automated carrier opening could be incorporated to eliminate steps from the user's workflow. A concept like this allows a technician to focus on the value added tasks of handling the specimens rather than retrieving and opening carriers. These concepts do not need to stay within the station envelope and will likely have to extend out in some way. Our goals include:
Fall Semester 2012 – Project proposal with project plan, budget and timeline. Also,
1) demonstrations of concept generation including sketches, renderings, CAD models and physical as appropriate. This should be approached as if the team is selling their idea and proposal to prospective clients. Spring Semester 2013 – Presentation of physical proof of concept. This only needs to
2) include the functional part of the station receive area but should demonstrate how the station could organize the carriers for the most efficient access by users.

(Oral Presentation, Session IV, Room 1325, 3:00pm)

Digital Preservation Of Herbarium Specimens

Letitia Salazar Monk – Biology

Faculty Mentors: Christy Carello, Mark Simmons (CSU)

Conventionally, herbarium specimens are prepared by mounting pressed dried plant material to acid-free paper. Collections often contain plant samples centuries old and are important to the ecological record, plant identification and research. Despite our best curation efforts, collections deteriorate over time. Furthermore, herbaria may be inaccessible to the public due to geographic limitations or exclusive use. Increasingly, herbaria are digitizing their collections. Digitizing herbarium collections preserves the quality and detail of plant specimens. Digital images and ecological data may then be accessed via the internet by the public. Currently, the Colorado State University Herbarium is digitizing its nearly 100,000 specimen collection with grant support from The National Science Foundation for collection improvement. The grant allows undergraduate students to participate in the digitization effort. I was employed through this grant during July-December of 2012 at Colorado State University Herbarium. I participated in all aspects of the digitization process. This poster gives an overview of the process currently in use at the CSU Herbarium. Similar to other herbaria, CSU Herbarium begins by creating a database record for each specimen, which is then linked to a digital image of the same. These procedures can be easily replicated in other herbaria interested in digitizing their collections.

(Poster Presentation, Session II (3:00-4:15pm), Poster #17)

Susceptibility To Eating Disorders: Are Bullies And Victims At High-Risk?

Kristina Sanders, Katherine Miller, Pejmon Pourriahi – Psychology

Faculty Mentor: Cheryl Sanders

Research has indicated that being bullied by one's peers increases the risk of both physical and mental health problems, specifically eating disturbances. This study examined the relationship between bullying, victimization and the development of eating disorders. Due to a small amount of research on the subject of bullies and eating dysfunction, this study wanted to investigate if bullies—in addition to victims—were at high-risk for eating disorders. Undergraduate students completed the Bully/Victim Questionnaire and the Eating Attitudes Test (EAT-26) as a means of assessing their participation in bullying, victimization, and tendencies towards eating disorders. Results and implications of clinical interest will be discussed, as well as future research goals.

(Oral Presentation, Session II, Room 1202, 10:45am)

Gender Differences In Maternal Reminiscing Style

Jordace Sanderson, Sara Yacovetta – Behavioral Science

Faculty Mentor: Bethany Fleck

This study investigated if gender differences exist in maternal reminiscing style. The characteristics of parent and child conversations about the past have been the focus of much research. From those investigations researchers have concluded that mothers talk with their children about past events in consistent ways known as maternal reminiscing style. Two such styles have been established, high and low elaborative style. These styles vary in the amount of information mothers contribute to the conversation, the types of questions they ask of their children, and amount they embellish on ideas (Haden, Ornstein, Rudek & Cameron, 2009). The current study utilized previously collected data in which mother-child conversations about past learning events were recorded. The data was re-coded and analyzed. The participants of the study included 30 preschool children and their mothers. 20 children were male and 10 were female. On average children were 46.65 months old or 3.89 years. The main findings to be presented in this poster include a series of independent samples t-test run to analyze gender differences in maternal reminiscing style. Tests were run on variables indicating high elaboration style in mothers and children such as "wh" questions, yes or no questions, tag questions, statement elaborations and a total high elaboration style. No tests indicated significant differences between male and female children in mothers speech or children's speech ($p<.05$ significance level). Further analysis needs to be conducted for a more nuanced report of the differences that might exist in the conversations.

(Poster Presentation, Session II (3:00-4:15pm), Poster #4)

Structure Switching DNA Biosensors For Investigation Of Oncogenic Transcription Factor Dynamics

Stephen Schaffner – Biology / Chemistry

Faculty Mentor: Andrew Bonham

A patient's chances of surviving cancer increase significantly with early detection, and aggressive treatment in the early stages of disease. The long term goal of this project is the creation of a rapid blood test to help improve the odds of early detection. To that end, a clear understanding of the complex dynamics of the myriad molecular factors involved in both normal and cancerous cell growth is necessary. The proper regulation of cellular growth cycles is critical in maintaining the biochemical steady state present in every human cell. The deregulation of transcription factors controlling cell growth and development is a hallmark of malignant tumorigenesis, and this necessity opens the door to the possibility of rapid and early detection of cancers through analysis of transcription factor concentration. Upregulated, mutated, or highly stabilized transcription factor c-Myc is associated with numerous cancers including approximately 25% of breast cancer incidences. This transcription factor preferentially binds with the straightforward DNA sequence "CACGTG", making it a good candidate for initial research into methods for *in vitro* concentration analysis. The c-Myc protein also interacts with a number of other associated transcription factors including Max, Miz1 and Sp1, forming heterodimers which have a known impact on the binding affinity and specificity of c-Myc. A better understanding of c-Myc's binding activity and concentration in different pre- and post-tumorigenic conditions would enable a straightforward screen for early onset of certain cancers.

(Oral Presentation, Session III, Room 1323, 1:30pm)

The Quality Of Attention To Negative Thoughts: Examining How Intention Affects Mood And State Anxiety

Thomas Scobell – Psychology

Faculty Mentor: Courtney Rocheleau

The impact of the quality of attention given to one's negative thoughts on experienced levels of anxiety and negative mood was examined, testing the differential effectiveness of a brief mindfulness intervention to a rational emotive behavioral therapy (REBT) intervention. Participants completing a breathing space guided meditation demonstrated a significant decrease in measured state anxiety (M = 36, SD = 10.61) as compared with the control group (M = 44, SD = 13.09). Participants in the breathing space condition also demonstrated a significant decrease in negative affect levels (M = 14, SD = 3.87) as compared with the control group (M = 19, SD = 8.49). Mean differences in positive affect were not significant across conditions. Participants completing the REBT exercise demonstrated no significant decreases in state anxiety and negative affect as compared with the control group. The findings question whether it is always best to combat maladaptive thoughts with more thinking, suggesting mindfulness-based approaches may help alleviate stress and complement more established cognitive approaches in the treatment of mood and anxiety disorders.

(Oral Presentation, Session I, Room 1312, 9:30am)

Isolating Fungal DNA In Alpine Soil

Sherice Shiner

Faculty Mentors: Joanne Odden and Jason Janke

Our project goals are to find fungal DNA from Rocky Mountain National Park alpine soil samples. Fungi are an integral part in soil microbiomes because of their symbiotic relations with most plants, their nutrient cycling capabilities, and their ability to extract mineral nutriment directly from rock. We are seeking to determine if and in what seasons fungi are present in this alpine soil community. Our experimental plan is to use PCR to determine whether fungal DNA is present in soil samples. If we do find evidence of fungal DNA we will then use quantitative PCR (q-PCR) to determine if there is fungal diversity in the soil samples. Currently we are preparing control DNA from *Saccharomyces cerevisiae.* Investigating whether fungi are present or not will help us determine the community makeup of the unique alpine soil environment.

(Poster Presentation, Session II (3:00-4:15pm), Poster #25)

A Comparison Of Corynephages From *Corynebacterium Diphtheriae*

TJ Sides – Biology

Faculty Mentor: Sheryl Zajdowicz

Corynebacterium diphtheriae is a human pathogen that causes diphtheria. The pathogenesis of this bacterium is dependent on its ability to produce diphtheria toxin, an A-B toxin that disrupts protein synthesis in target cells by ADP-ribosylating EF-2. Diphtheria toxin is encoded by the tox gene found on lysogenic corynephages, including β and β-like corynephages that are capable of integrating into the C. diphtheriae chromosome at two specific sites, attB1 and attB2. This study investigates the infection frequency of β and β-like corynephages in the permissive C. diphtheriae strain C7(-) and compares the genetic profile of β-like corynephages to the well-characterized β corynephage. Toward this end, we characterized the ability of various corynebacteriophages to infect the C7(-) strain of C. diphtheriae. We induced phage conversion in infected C. diphtheriae strains through UV exposure. Released phages were

filtered from their lysed bacterial hosts and the isolated phage was quantified. We then isolated the DNA from each strain of corynephage and digested this DNA using various restriction enzymes to generate restriction profiles. We predict that differences in the genetic profile of the phage are directly responsible for the variability in induction rate observed.

(Poster Presentation, Session II (3:00-4:15pm), Poster #34)

A Comparison Of Aqueous Metals Sampling And Preparation Techniques

Morgan Spedale – Chemistry

Faculty Mentor: Garry Farmer

The bioavailability of aqueous metals in bodies of water poses a potential health risk to humans. Metals that are dissolved into a body of water are in a bioavailable form and can enter the food chain. This leads to serious health problems. The metals dissolved in a body of water would be present in the fish that inhabit the stream, the animals that drink from the stream, and the metals would be passed on to a human if they consumed one of these. The metals can also become bioavailable to humans if the stream feeds into a water supply that is not properly treated for the metal contamination. This research aims to discern what metals are truly bioavailable in Peru Creek, a tributary of the Snake River that feeds into Dillon Reservoir from which drinking water is sourced. This will be accomplished by utilizing a slotted PVC pipe that contains a dialysis bag full of deionized water, which be left in the creek over two weeks to equilibrate. The water contained in the dialysis bags will be analyzed using Atomic Adsorption Spectroscopy to determine the quantity and type of dissolved metals contained in it. The metals contained in the dialysis bag represent metals that are truly in an aqueous form in the creek and are therefore bioavailable. This collection method will be compared with conventional sampling techniques. The comparison will serve to establish which metals are truly dissolved in the stream, and therefore bioavailable.

(Poster Presentation, Session II (3:00-4:15pm), Poster #19)

Empowering The Underdeveloped World With Design Thinking

Rachael Stamps - Art

Faculty Mentor: Lisa Abendroth

This project explores how design thinking can provide a road map to a desired result as well as acting as a tool for empowering people in the developing world.
Ah-gah-pay Mercy Children's Center (AMCC) is a children's home in Thika, Kenya that strives to provide orphaned and at-risk children access to a formal education. The staff at AMCC believes that education is the key to overcoming poverty and dreams of one day opening their own school. However, AMCC faces many challenges, including limited funding for basic monthly operating costs, providing the children nutritional food and clothing, and annual school fees.
AMCC desires to become a finically self-sustaining organization, but has had limited success in their previous attempts. I traveled to AMCC in 2010 to learn more. Upon arrival, I began applying design research methods that showed me that AMCC is in need of a holistic system that improves nutrition, creates opportunities for enhancing the children's education, and provides a source of income that is effective on a small scale with strategies to allow it to grow. My team and I believe that long-term success can only come from development projects that are locally conceived and community supported. We have taken a step back to consider how we can empower the staff and children of AMCC to solve their own problems. By teaching them how design thinking can be used to create effective systems, we can give them the tools to solve their own problems in a sustainable, holistic way.

(Oral Presentation, Session III, Room 1314, 1:30pm)

Fealden: A Software Suite To Automate The Design Of Transcription Factor Beacons

Presenter: Jody Stephens – Mathematics

Faculty Mentor: Andrew Bonham

Human transcription factors are proteins that regulate gene expression, thus playing countless roles in normal development and in disease. Recently, we have developed fluorescent bio-sensors based on a conformation-switching mechanism. These sensors enable the rapid, quantitative detection of the DNA-binding activity of transcription factors. However, the design of these "Transcription Factor Beacons" requires satisfying a challenging set of synthetic design goals: the synthetic DNA of the sensor must present a recognizable binding element, while preserving to isoenergetic, inter-converting geometries of DNA. Manual sensor design, then, is a hit or miss process. In this project, we sought to simplify and automate the design of these sensor elements to help enable their widespread adoption. Our algorithm and webserver software suite, dubbed Fealden, can efficiently search the entire problem space for candidate solutions while minimizing false negatives. This software was developed in the programming language Python and presents a fully extensible solution to finding ideal solutions for the design of these DNA bio-sensors. Ongoing efforts continue to refine its ability to design even more complex and varied sensors with longer recognition elements or alternate geometries. Ultimately, Fealden should enable the rapid, efficient, and accurate design of bio-sensors that will aid in bio-medical diagnostics and research efforts for a multitude of users.

(Oral Presentation, Session IV, Room 1323, 3:00pm)

A Wholistic Review Of College Students

Jillian Sterns – Psychology / Human Development

Faculty Mentor: Lesley Hathorn

Research indicates that social networks, such as Facebook, provide valid insight for personal information of others (Hong, 2012). This information is used to develop impressions of social desirability; however the strongest indicator of reliability of the information is the congruency with other information that is reviewed. Hong (2012) found that because individuals may try to portray oneself in the most positive light possible, the information that others post (such as Facebook comments) provides the most reliable information. The current research study investigated how individuals evaluated other students when provided congruent and incongruent written information. The materials included a positive or negative Facebook post with comments, academic personal statements, and academic curriculum vitas. The participants evaluated the individuals based on six adjectives related to intelligence, social desirability, and academic self-concept. The results indicated that individuals who presented a negative Facebook with a positive academic profile were rated lower overall than the individuals with congruent positive Facebook and academic profile. The implication of these results is that information taken from social media has a major impact on impression development when evaluating college age students.

(Oral Presentation, Session III, Room 1312, 2:00pm)

A Study Of The Environmental Impact Of Building A Spaceport At Front Range

Daniel Strawn, Jeff Kyle, Lane Phillips, Ryan Lewis, Mike Towle - Mechanical Engineering Technology / Aerospace Systems Engineering Technology

Faculty Mentor: Tanya Gatlin

In this study, the environmental impact of the development of Spaceport Colorado at Front Range Airport in Watkins county Colorado will be investigated. The environmental impact of man's activity on earth must be taken in to account if we want to pass the world on to future generations in as good of, if not better condition than when it was given to us. New projects should be considered with sustainability in mind, so future generations can live in a society as vibrant and promising as it is today.
We will investigate the new spaceport; the vehicles being utilized at the spaceport, as well as any infrastructure changes need to accommodate these vehicles. We will look at what type of fuels these crafts are using, what hazards they pose, and how will they be stored. We will also be looking at what kind of footprint will be left by any needed changes to the airport. The last item of concern is what will take place in the event of a catastrophic failure, and what type of emergency/containment procedures will take place if such a catastrophe were to occur.

(Oral Presentation, Session IV, Room 1325, 3:30pm)

Traditionalism

Kyle Sutherland – Philosophy

Faculty Mentors: Paul Sidelko, Adam Graves

Traditionalism is generally viewed with confusion, paranoia and even contempt among the modern world. My research and presentation aims to highlight the necessity of teaching Tradition, which could be summed up as the necessity for teaching religious studies as an anthropological requisite for true global understanding of humanity. Considering the vast differences that both divide and unite us, it is the goal of this presentation to begin a syncretic attempt at intellectual harmony by imparting knowledge on a seemingly forgotten subject.
The presentation will provide attendees with some tools for self-research on this topic. It will highlight the phenomenological school of religious thought, as well as the perennial school of comparative religious thought (Sophia Perennis) , including highlights from great world religionists such as Huston Smith, Stephen Prothero, as well as mythologists such as Joseph Campbell. It will also cover the necessity for engaging in sacred texts, experiencing traditionalism in action, and finally that of engaging religious and traditional people's in an appropriate and knowledgeable way. Ranging from the Plains Indians to the Islamic world to the current state of Christendom, this presentation hopes to impart a general appreciate and revivified sense of innocent awe at traditional cultures and understandings.

(Oral Presentation, Session II, Room 1323, 10:15am)

Running The Stats On Pay-Per-Click Ads

Morgan Swaney, Emily Rabenneck – Marketing

Faculty Mentor: Joseph Hasley

Morgan Swaney and Emily Rabenneck are both marketing majors entering into our senior year. We worked with Dr. Joseph Hasley for this poster presentation. Our case study stemmed from our curiosity about Google AdWords and how it can influence a businesses' growth. We decided to use our knowledge, from the classroom, in statistical analyses to investigate this interest.

Google AdWords is a pay-per-click advertisement function that runs on Google's Search Engine. When a person searches a keyword, for example 'Distilleries in Colorado,' certain advertisements pop-up according to a specific Google algorithm. In order to run AdWords, it's a simple process of opening an account, choosing keywords, and creating advertisements. The purpose of this case study was to examine the correlation between keywords, ads, and click-through-rates for Black Canyon Distillery (BCD). Black Canyon is a local whiskey distillery based out of Longmont, Colorado. They funded our case study in order to increase traffic to their website, in turn, driving up their sales.
The keywords are the first step in producing good advertisements. For our case study, we chose keywords that highlighted their business as well as their products offered. Furthermore, we used their local competition as keywords to evaluate and potentially expand BCD's customer base.
To gain a better understanding of the raw data, we ran statistical analyses in order to present a business recommendation to BCD. Based off the information gathered, one proposal was to increase promotion in favor of their whiskey cocktail.

(Poster Presentation, Session II (3:00-4:15pm), Poster #1)

High Capacity Receive Station (HCRS)

Milan Tancar, Matt Heinlein, Joshua Mattocks, Maurico Fierro, Jorge Ramos, Matt Neil – Mechanical Engineering Technology

Faculty Mentor: Mingli He

The standard Swisslog Translogic station has a capacity of 3-4 carriers. When the capacity is reached, the station is not able to receive additional carriers. This creates a potential for lost productivity, delays in getting results for critical laboratory test, and delays in getting lifesaving medications to patients. The problem can be solved easily by creating a larger "bin" area in the station, but a more elegant solution to the problem has been requested by Swisslog. The solution is not confined to the design of the current station; therefore the scope of the project is not limited to the current station. However, we feel that creating a design that optimizes carrier reception efficiency while operating within the current station design constraints will provide Swisslog with the most cost effective way to implement a high capacity receiver. To be an effective and economical solution for both Swisslog and the end user, changing the base receiver station is not a viable option. Our design aims to solve the problem as an external addition to the current station. Currently, the stations' reception interface is very simple and user friendly; any addition to the device must maintain the ergonomic, easy to use, and fail safe user interface currently in operation. We would like to share our design and the proof of concept product with our fellow students.

(Oral Presentation, Session IV, Room 1325, 4:00pm)

Artifacts "They Manufacture Themselves, And Which They Prize As Jewels": Dutch-Native American Material Exchange In New Netherland

Kerry Tanner – History

Faculty Mentor: Shelby Balik

In commercial centers across Europe in the seventeenth century, traders were taking advantage of a commodities boom that was rapidly expanding in breadth and scope during the first half of the seventeenth century. One of the most important commodities fueling that boom were pelts, specifically the beaver pelts used to make the fashionable headwear sought by men and women of distinction across Western Europe. The cultural and commercial exchange between native trappers in New Netherland Colony – where many of these pelts were sourced – and the Dutch and other European traders there transformed material culture on both sides of the Atlantic. The Dutch position in North America was largely derailed by a long series of expensive wars and by Willem Kieft's punitive campaign against New

Amsterdam's Algonquian neighbors. But the Dutch and the native peoples both struggled to retain their respective cultural identities after the English took the colony over in 1664. The material goods used by both the native peoples and the Dutch colonists reflect the attempts by each side of their cultural exchange to hold on to dearly held cultural values in a rapidly changing environment. These attempts were met with mixed success.

(Oral Presentation, Session IV, Room 1312, 3:30pm)

The Effects Of Cognitive Enhancing Beverages On Cognitive Flexibility Through The Stroop Effect

Bethany Taylor – Anthropology

Faculty Mentor: Cynthia Erickson

With the onslaught of drinks available on the market claiming to improve cognitive abilities, more research should be available to consumers on the validity of these claims. The goal of this study was to determine if consuming one such beverage, NeuroSonic, yielded any improvement in cognitive functioning beyond a placebo effect. To determine this, a double-blind study was designed and participants were divided into two groups where one group was given a single serving of NeuroSonic, while the control group was given an equal amount of a drink that tasted similar but had none of the proprietary ingredients of NeuroSonic. After consuming the beverage, participants took a visual memory test, lasting approximately 20 minutes to allow the drinks to take effect.
This study utilized the Stroop test in order to gauge reaction time and cognitive flexibility, since the test measured a participant's reaction time to changing stimuli. In the 3 trials, the first two involved random letters (neutral) or color words printed in that color (facilitating), and last one involved color words printed in a different color, with the objective of identifying what color the word was printed in (interfering), as quickly as possible. If the NeuroSonic aided in improving cognitive acuity, then participants who consumed it should have a smaller reaction time difference between the neutral, facilitating, and the subsequent interfering trials than the control group.
The reaction time for participants will be analyzed in trials for which they had the correct response. Results have not yet been established.

(Poster Presentation, Session I (10:15-11:30am), Poster #7)

Dragonflies, Cameras And Conservation: A Photographic Survey Of The Insect Order Odonata In Kerala, India

Samantha Taylor, Torry Knodell – Biology

Faculty Mentor: Robert Hancock

Since the International Convention on Biological Diversity of 1992, 193 countries including India have enacted policies committed to missions, including but not limited to, assessing impact and increasing education and public awareness. Currently, India is a global hot spot for development codependent upon conservationist theory. On the other hand, the rapid rate of development and population growth has placed tremendous pressure on ecosystems and the biodiversity they support: monitoring the impacts of these changes is of paramount importance. Organisms in India are considered a national resource and are therefore protected bureaucratically from persons of non-Indian nationality. Thus, the traditional zoological survey technique of physical collection, preservation and holding of specimens in museums is illegal. During January of 2013 we utilized a low-impact macrophotographic technique to survey adult dragonflies and damselflies (O. Odonata) in mainland and island locations of the southwestern tropical state of Kerala, India. Specifically, we used macrophotography and GPS over a 12-day preiod at 14 survey sites. Thirtyone species of adult Odonata comprising five families and 19 genera were confirmed.

Species distribution was quite variable and two species, Brachythemis contaminata and Trithemis aurora, dragonflies known to breed in polluted and brackish waters, were found in many sites thus indicating poor water quality. Our work clearly demonstrates that a zoological survey of Odonata and perhaps other arthropods can be successfully carried to fruition with an imaging technique. Additionally, quality images of local fauna can be effectively utilized in public awareness campaigns spanning from conservation to public health.

(Poster Presentation, Session I (10:15-11:30am), Poster #32)

Donder's Reaction Time Task

Zach Taylor – Biology / IDP Neuroscience

Faculty Mentor: Cynthia Erickson

NeuroSonic® is a drink that claims to improve nervous system function. The purpose of this study was to design and implement a set of tasks that would measure whether NeuroSonic® enhanced cognitive function, and if so, what aspects of cognition were enhanced. I selected the Donder's reaction time test for my component of this study. Reaction time can be measured by simple reaction time or choice reaction time (Gottsdanker, 1985). Both types of reaction time were tested in this study. The simple reaction time task required the subjects to press a key on a keyboard whenever an X appeared on the screen. The choice reaction time tasks required subjects to discriminate between two different stimuli and respond accordingly by pressing different keys depending on where on the screen the X appeared. Studies show that caffeine enhances reaction time and cognitive function (Scholey 2004; Warburton 1995). NeuroSonic® contains caffeine, so I hypothesized that NeuroSonic® would enhance reaction time. Ten subjects completed the tasks correctly. Their results were analyzed and the students who drank NeuroSonic® had faster reaction times than the control students in all three reaction time tasks presented to them. Although this study did demonstrate improved reaction times it does not by itself demonstrate that NeuroSonic® is a cognitive enhancer. As these results are integrated with the rest of the research done this semester, a more conclusive idea of how beneficial NeuroSonic® is to overall cognition should be revealed.

(Poster Presentation, Session I (10:15-11:30am), Poster #18)

Heteronormative Vs. LGB-Inclusive Material In The Classroom: How Do Students React?

Anna Terranova, Shannon Hampton – Psychology

Faculty Mentor: Dr. Anna Ropp

Research from the past three decades has endeavored to understand the complexities of classroom dynamics from the perspective of LGB students in comparison to that of heterosexual students (Biaggio, Orchard, Petrino, & Mihara, 2003; Hodges & Pearson, 2008; Longerbeam, Inkelas, Johnson, & Lee, 2007; Yost & Gilmore, 2011). This topic is fundamental for a better understanding of how to further explore the effects of campus climate and the quality of education on students' experiences. Studies have demonstrated that the overall experience of LGB students in the classroom is significantly poorer than heterosexual students, based on the severity and frequency of mental health issues, especially when assessing academic performance (Oswalt & Wyatt, 2011). In particular, the experiences of LGB students differ from non-LGB students as a result of the reported homophobic and heteronormative material in the classroom (Hodges & Pearson, 2008). The present study examines differences between the responses of LGB and heterosexual students to heteronormative and inclusive material. Participants were prompted to watch an instructional video about relationships further exemplified by heteronormative or inclusive examples. They were then asked to rate the instruction of the instructor in the video and to complete the

Professor-Student Rapport Scale, the Student Course Engagement Questionnaire, the Collective Self-Esteem Scale, and the Attitudes Towards Lesbians and Gay Men Scale. These scores will be used to assess whether LGB and heterosexual students are affected differently by the aforementioned conditions. Implications of the results will be discussed.

(Poster Presentation, Session I (10:15-11:30am), Poster #1)

Variable Seasonal Migration Decisions Among Female Elk (*Cervus Canadensis*) In A Colorado Herd

Kurtis Tesch, Ben Kraft – Biology

Faculty Mentor: Robert Hancock

North American Elk or "Wapiti" (*Cervus canadensis*) typically display seasonal migration as they travel, some times over long distances to new forage and/or breeding sites. To test the hypothesis of whether or not they do in fact display common seasonal migration patterns we conducted a lengthy and intensive radio tracking survey of the biweekly positions of 26 female elk for 6 months beginning in the spring of 2012. In recent years this study herd, which winters in Loveland, CO (U.S.A) has been increasing in numbers for unknown reasons. Tracking elk fitted with radio-collars consisted of using antennas affixed to the top of the truck to first get a general location, then switching to a hand held antenna of closer range to get a good directional "bead" on them. Once location was obtained they were entered into GPS Visualizer, which enabled tracking of the movements of the animals based on the triangulated locations. Over 600 GPS locations were used to compile over 200 triangulation locations on these 26 elk in order to be able to properly assess their migration patterns. Three of the 26 Elk did not migrate and therefore stayed within 5 miles from the first triangulation location, others traveled close to 70 miles from their first triangulation location to a new locations. Transition analysis indicated that migration from winter forage is variable with herd members making independent decisions.

(Poster Presentation, Session I (10:15-11:30am), Poster #33)

They Still Had Class

Christina Tillitz Egtvedt – History

Faculty Mentor: Ellen Slatkin

Waves of fortune seekers washed onto the central plains of present-day Colorado with the discovery of gold in the upper Clear creek in 1859. Denver City, a mere mining supply camp, catered to the burgeoning population of young, single, male miners flooding into the area. These young men arrived in search of fast, and vast, riches. But they weren't the only sex lured by the temptation of instant fortune. Where lonely, hard-worked men accumulated, women were sure to follow. A vast majority of scholars romanticize the life of a frontier prostitute. Well-paid madams and extravagant parlor houses fill the pages of most scholarly works, with only a hint of the underside of the profession tucked between tempting tales of silk stockings and forbidden love. The glamorization of the "Old West" prostitute leaves a gaping hole in previous research on the subject. What seems to be overlooked is the women who entered prostitution as a way to escape the class structure thrust upon them by "respectable" society found the same class scale existed within the profession itself. Madams hired the prettiest girls who, in turn, attracted the highest class customers with the biggest wallets. Crib girls were those not satisfactory for a parlor house. A hierarchy existed among prostitutes and those at the top controlled "the Line," just as the hierarchy of big business and big money controlled the streets that surrounded it.

(Oral Presentation, Session I, Room 1314, 9:00am)

Transactional Aid Modeling: US And Pakistani Relations

Michael Toney – Political Science

Faculty Mentor: Robert Hazan

This paper studies the allocation of aid to Pakistan by the United States of America for the years 2002-2012. I find there to be a quid-pro-quo method of aid distribution creating a transactional model. In turn, this transactional model when coupled with non-rational actors such as tribal alliances and kin groups, creates a problem for proper aid distribution. Further, that because of this misallocation, Pakistan has an increasingly negative perception of the United States. Simultaneously, Pakistan has an incredibly positive perception of supportive Islamic countries.
My research concentrates specifically on the failure of US aid allocation and its negative effect of United States perception, and Pakistan's increasing support of Islamic countries.

(Oral Presentation, Session III, Room 1314, 2:15pm)

A Time Of Transformation: How The Applied Learning Center Can Help MSU Denver Achieve It's Strategic Goals

Tanya Turitto – Computer Information Systems

Faculty Mentor: János Füstös

MSU Denver has undergone many changes including the restructuring of the Applied Learning Center. The University is being transformed right before our eyes, so it seems appropriate that the new strategic plan is titled *A Time of Transformation*.
At the Applied Learning Center students are given the opportunity to enhance their educational experience by becoming active in the community. The four programs housed in the Applied Learning center offers a variety of ways students and faculty can get involved in the community.

- The Internship program connects students looking for internships with businesses in the community.
- The Center for Urban Connections facilitates enriching volunteer experiences.
- The Service Learning Program assists in the coordination of classes participating in the community for real world experience.
- The Undergraduate Research Program organizes an event that showcase undergraduate students' work.

During the formation of the ALC the organizational infrastructure was inherited from the Internship Center.
The Internship Center has a long history of strong data collection verifying the value of the program. One tool the Internship program uses is referred to as T.I.P.
My internship is to discover the commonalities between the programs and make recommendations on the capabilities of T.I.P. to accommodate the needs of the other 3 program areas as well as the Internship Program.
This presentation will discuss these changes, how the Applied Learning Center can be instrumental in reaching the goals outlined in *A Time of Transformation*, the progress made in my internship, and why agile methods should be considered in the transformation of MSU Denver.

(Oral Presentation, Session IV, Room 1314, 3:30pm)

The Disillusionment Of Spain's Marginalized Population During Post-Franco Spain

José Vega Jr. – Modern Languages

Faculty Mentor: María Rey-Lopez

Following the death of Spanish dictator Franco, the people of Spain experienced an intense change allowing for freedom of expression and a sense of hope that all of Spain's population would be able to enjoy a better quality of living. Author Rosa Montero displays the difficulties of the marginalized population adjusting to post-Franco Spain in her novel *Te trataré como una Reina*. The repressive environment that was imposed during Franco's era did affect the ability to comprehend reality and brought about self-imposed doubt and insecurity that pushed Montero's characters to unfortunate consequences. Using examples from Montero's novel and a paper by Francisca Lopez comparing the illusion of the Cuban bolero love song experienced by Montero's main characters, I will investigate the ideologies of the Franco regime that contributed to the frustration of this generation in Spain.

(Poster Presentation, Session I (10:15-11:30am), Poster #12)

Gender, Sexual Orientation, And Sex Roles: The Effect Of Stereotypes On The Assumption Of Sexuality

Abigail VonFeldt – Psychology

Faculty Mentor: Lesley Hathorn

According to prior research, masculine and feminine personality traits are deeply embedded in this culture. Gender seems to influence daily life based on human traits that have been assigned a gender. These traits may include introversion, extroversion, independence, dependence, etc. Human traits such as kindness or promiscuity have been show to have different expectations for males and females. The prior research indicates that there are strong stereotypical implications within the culture surrounding gender. Three surveys were used in the current research, which were derived from prior researchers. The first survey used in the current research was derived from The Person Perception Paradigm Survey created by Sirin, McCreary, & Mahalk, 2004 on the topic of personality traits and behaviors and how the participants assumed gender based those traits and behaviors. A second survey used in the current research was derived from Eagly & Steffen, 1988 on the topic of percentages of human traits associated with males and females. The third and final survey used in the current research was derived from Vincent, W., Peterson, J., & Parrott, D. (2009) on the topic of attitudes surround homosexuality. The current research study is intended to discover the ways in which sexual orientation is perceived via stereotypes by looking at personality traits. The expected results of this study would show that there are significant similarities and differences between males and females as well as heterosexuality and homosexuality.

(Oral Presentation, Session II, Room 1314, 11:00am)

Memory Glasses

James Wadell, Elizabeth Sogunle (Aurora Public Schools), Isaac Andrade (Aurora Public Schools), Amos Gwa (Aurora Public Schools), Emma McCourt (Aurora Public Schools) – Physics

Faculty Mentors: Randall Tagg (UCD), Richard Krantz

Students in the Aurora Lights Innovation Academy work together to develop new solutions to real-world problems. In October of 2012, one such group was challenged to help patients with cognitive disabilities to lead more full lives.
After researching cognitive disabilities, the team decided to focus on early-onset Alzheimer's Syndrome patients. By integrating a small video camera into a pair of glasses, and providing a suite of tools for sorting, searching and playing back the video from the patient's day, the team believes they can help Alzheimer's patients to remain independent and active longer. Later, the Memory Glasses can help caregivers better respond to the patient's needs.

(Poster Presentation, Session II (3:00-4:15pm), Poster #30)

The Effects Of Cognitive Enhancing Drinks On Visuospatial Memory

Charles Walters – Psychology

Faculty Mentor: Cynthia Erickson

A number of companies claim cognitive enhancing effects of nutritional supplements. Many of the ingredients in these supplements have been analyzed separately and have shown some signs of improving cognitive abilities. One company, Neuro®, sells a drink called NeuroSonic® that was developed using these ingredients, but there is no evidence to date that this drink improves cognition. In order to test NeuroSonic® I chose The Rey-Osterrieth Complex figure test, because it is a validated test that has been used to measure visual memory (Hamby 1993). This task involves having participants copy a complex 2-dimentional geometric figure. Participants are never told they will have to recall the image. After a delay of 20 to 30 minutes, participants are asked to draw the figure from memory. One advantage of this task is the objective scoring system of 18 specific design features. In this double-blind study, participants drank either a NeuroSonic® or a control drink, while performing the Rey-Osterrieth Complex figure test pretest drawings. During the delay that the Rey-Osterrieth test requires, additional cognitive tests were performed. The final task of the Rey-Osterrieth Complex figure test was then administered. I am in the process of collecting data. If NeuroSonic® does not increase visuospatial memory then people may choose to avoid purchasing this product. If NeuroSonic® does improve visuospacial memory it could be a valuable product for any person that would like to increase performance. The knowledge gained from this experiment can help researchers understand how nutrition can influence brain function.

(Poster Presentation, Session I (10:15-11:30am), Poster #8)

Psilocybin: An In-Depth Look At A Curious Chemical

Colin Watton – Psychology

Faculty Mentor: Linda Lockwood

Psilocybin is a controversial, hallucinogenic compound garnering much interest in recent years. A serotonergic 5HT2A agonist, psilocybin has been found in animal studies to have an extremely high threshold of toxic dosage (Winter et al. 2007), and no habitual usage (Fantegrossi et al. 2004). Downregulation of 5HT2 receptors was shown to occur in consistent long-term usage (Buckholtz et al. 1990). The subjective, hallucinatory effects of the compound appear to rely on its metabolites, namely

psilocin and 4-methylpsilocin (Passie et al. 2002). In a recent study, these effects were shown to include mystical-type experiences similar to those experienced under conditions such as fasting, meditation, or prayer (Griffiths et al. 2011). Other effects include: altered time perception, tiredness, a dazed state, introversion, increased positive mood and increased anxiety (Wittmann et al. 2006). This and a previous long-term study have both shown positive life changes in mood and behavior persisting undiminished at least as long as 14 months after administration (Griffiths et al. 2006). The primary areas of activation in the brain are serotonin receptors in the dorsal raphe nucleus (Passie et al. 2002), and at higher dosages, the nearby locus coeruleus (Rasmussen & Aghajanian, 1986). Psilocybin has demonstrated the potential to treat Obsessive Compulsive Disorder (OCD) (Moreno et al. 2006), cluster headaches (Sewell et al. 2006), and there are currently initial trials in treating anxiety associated with terminal illness (Brown & Reitman, 2010). Psilocybin has great potential, and it should be examined to the fullest extent possible.

(Oral Presentation, Session III, Room 1312, 2:15pm)

Unifying Quantum Computer Theory

Dylan Watts – Computer Information Systems

Faculty Mentor: Biswadip Ghosh

Quantum computing relates to the idea of a high speed data processing, transfer, and storage. Why a high speed system is required is due to the fact that data creation is expanding at a greater than exponential rate, from businesses and research but more so from amateur videographers, musicians, bloggers, and photographers, and of which rate is beginning to exceed Moore's law. In fact, there is a figurative brick wall to Moore's law if technology remains binary in nature, as there are physical limits to size reduction and compaction of circuitry. The theory following will clearly define the requirements a quantum computer needs to operate faster and more efficiently than a binary system, and more so how the two are related. Companies have indeed created quantum computers already, but, based on research of recent developments in the study, none of them understand why the computers are quantum and those of which are mainly only understanding that, by the current process, they are creating the needs of a quantum computer. The theory can easily be applied to existing technology as well on a basis more greatly expanded from what is understood now, which will allow for a rapid development/reclassification of/to quantum computers.

(Oral Presentation, Session IV, Room 1314, 3:15pm)

How Water Quality Affects Spawning Walleye Success Rates Between Two Bodies Of Water

Scott Weaver, Ben McFadyen – Biology

Faculty Mentor: Jennifer Seeley

Historically there has been a significant difference between the hatch success rates of Walleye spawn collected from Chatfield and Cherry Creek Reservoirs; Chatfield Reservoir has consistently had higher success rates than Cherry Creek. It is possible that water quality is a significant factor in walleye egg development and survival. Addressing this issue has importance in terms of broadening the understanding of how environmental conditions affect egg quality, as well as facilitating greater efficiency in spawning efforts performed by Colorado Parks and Wildlife. Here we examine the influence of water quality on egg success in the post zygotic stages of the spawn.
Sixteen spawning female walleye were collected at both Cherry Creek and Chatfield Reservoirs. At each location one spawn tank contained Cherry Creek water, while another tank contained water from Chatfield Reservoir. Each of the sixteen females had half of her eggs stripped into one control tank (native water), and half of her eggs stripped into the other experimental tank (foreign water) at both

locations. Finally, sperm from two male walleye was added in equal portions to the spawn tanks at both reservoirs. The eggs were then allowed to water harden prior to transport for incubation. After a 10-14 day incubation period, overall success rates were determined for each of the four test groups. Preliminary data demonstrates that water quality is affecting hatch percentages pre-spawn rather than post-spawn, suggesting that pollutant transfer from the females to their eggs is affecting hatch rates.

(Oral Presentation, Session III, Room 1323, 1:45pm)

Stressed And Depressed: The Role Of Self-Compassion In College Students' Well Being (Award Finalist)

Sharon Wharton – Human Development

Faculty Mentor: Lisa Badanes

Major depression is a prevalent and costly psychiatric disorder, and is closely linked to stressful life events. For first-year college students, the unique stressors of academic life often lead to depressive symptoms. Although the link between stress and depression is well established, the pathway between them is not clear-cut, and merits further examination. Self-compassion is a way of relating to oneself mindfully with acceptance and caring during difficult times. Studies show that self-compassion leads to greater well-being, and to less depression and anxiety.

We examined self-compassion in a sample of undergraduate students to test its potential moderating effect between stress and depression. Of the 192 subjects, 45% scored above the clinical cutoff point for depression. As expected, number of stressors and severity of stressors were both positively correlated with total depressive symptoms, meaning that the more our participants reported feeling stressed, the more depressed they were.

Self-compassion was significantly negatively correlated with both the number of and severity of stressors, and with depressive symptoms. In addition, participants' level of self-compassion was shown to moderate the effect of stress on the level of depression in our sample. Those under high stress who reported low self-compassion showed elevated levels of depression well above the clinical cutoff. However, even in the face of many life stressors, if the participant was high in self-compassion, they still scored below the clinical cutoff for depression. Therefore, interventions aimed at increasing self-compassion may mitigate the effects of stress on college students, and decrease their risk for depression.

(Oral Presentation, Session III, Room 1202, 2:15pm)

Pilot Study: Physiological Effects Of Image Size And Perception Of Pain

Seneca Widvey – Psychology

Faculty Mentor: Lesley Hathorn

This research is a pilot study that examined the relationship between image size and pain, in conjunction with physiological responses to those images. Past research has examined the interplay between preference and objects size, as well as physical pain and body size.

Mancini et al. (2011) compared participant's heat-pain tolerance to visual distortions of body size with a mirror box. Their research results showed that enhancing the body's size enhanced pain tolerance, and reducing the body size decreases pain tolerance. Viewing one's own body versus a neutral object also can reduce the pain on a subjective scale (Longo, Bettii, Aglioti, & Haggard, 2009). While viewing ourselves can increase pain tolerance viewing pain in others increases our empathy. When individuals are shown clips of others having difficult situations empathy is evoked when the main subject is having the difficulty (Eklund 2006).

It is hypothesized that participants will rate the subject of larger images of sports injuries as experiencing more pain. Participant's respirations, pulse and galvanized skin response were all measured. It is anticipated that the physiological response will habituate. Data is currently being analyzed and will be available for the conference.

(Poster Presentation, Session II (3:00-4:15pm), Poster #13)

Learning And Memory

Seneca Widvey, Eric Klein, Chris Dean, Rhianna Schell, Ashley Stamps, Sarah Lieberenz, Alley Kasney, Amanda Bourgeois, Anah Miller, Rudy Brown, Kristin Broussard, Lydia Tomlinson, Justin Hall, Christine Furman, Sasha Bacca, Joseph Maes, Kari Ann Meding - Psychology

Faculty Mentors: Chad Mortensen, Lisa Badanes

This research examines the relationship between memory and internet temptations. The study examined if internet sites such as Facebook, Youtube and Twitter could serve as will-depleting temptation in memory tasks. We recruited MSU Denver undergraduate students enrolled in the Introductory Psychology course and over the age of 18. We created two conditions, 1) Computer non-temptation condition (CNTC), and 2) Computer-temptation condition (CTC). Both conditions require participants to look up information on a search engine we created, and both have full access to the internet. The CTC has visible tabs to serve as a temptation while the CNTC will have no temptations available; we are currently still collecting and analyzing the data. Although previous research investigated temptation-resisting tasks as well as the effects of technology and its abundant availability no research has combined both. We hypothesized that it should be much more arduous for students to dedicate energy to homework and academic studies when there are no temptations visible on a search screen. Our research would fill in this gap by examining the impact of memory by both internet temptation-resistant tasks and pathways of memory.

(Poster Presentation, Session I (10:15-11:30am), Poster #5)

Memory & Tempo: The Effects Of Musical Rhythm On Short Term Memory

Judy Williamson-Jones – IDP Neuroscience

Faculty Mentor: Linda Lockwood

The connection of memory and music has been widely studied and discussed. Findings have shown that music, all by itself, has been tied to improvement in overall health, emotional well being, and better cognitive performance. The present research examines whether the specific tempo of a musical piece effects short term memory. Groups of up to 15 participants from the Introductory Psychology research pool were asked to perform a short term memory task while listening to fast tempo music, slow tempo music, or no music at all. The test consisted of 6 trials in which participants were shown a string of random letters for three seconds. Each trial increased the amount of letters to recall by two. The mean score for each condition was tallied and a one way ANOVA with independent samples was performed. Results are discussed with respect to tempo and short term memory in terms of their implications for future learning research.

(Poster Presentation, Session II (3:00-4:15pm), Poster #26)

Effects Of Energy Drinks

Judy Williamson-Jones – IDP Neuroscience

Faculty Mentor: Cynthia Erickson

Neuroscience as a field has grown exponentially the past few years. So much so that those in business are creating products meant to capitalize on even the smallest of findings. The company that makes the NeuroSonic family of beverages claims that their product "supports mental focus and performance." The success of the drink seems to hinge on its ratio of caffeine to L-Theanine, an amino acid commonly found in tea leaves that has shown to increase levels of GABA and dopamine (DA) receptors in the brain. Both of these neurotransmitters have been tied to memory in past studies. Recent findings show that high concentration of GABA at a synapse allows memories to be stored more readily. Unlike GABA, DA levels are more specific, meaning that there is a "sweet spot" with regard to short term memory, too much being an inhibiting factor on memory task performance. In the present study we address the drinks cognitive claims by administering a short term memory test to volunteers. Participants from the Introductory Psychology pool were given the recommended serving of NeuroSonic or a control beverage made from carbonated pineapple juice mixed with vitamin C. The control beverage did not contain either caffeine or L-Theanine. A short term memory task was given to participants after finishing their beverage. For each trial of the task participants were shown a string of randomized letters for three seconds each, then asked to write what they remembered. Results are discussed with regard to NeuroSonic and short term memory.

(Poster Presentation, Session I (10:15-11:30am), Poster #19)

A Study On Mechanical Properties Of Green Composites

Nate Wilson – Mechanical Engineering Technology

Faculty Mentor: Lukas Vaznonis

Composite materials offer engineers many advantages that are especially appealing for structural applications. Light weight design, high specific strength, high specific stiffness and durability in harsh environments are just a few examples of why the use of composite materials is ideal. We commonly seek synthetic materials to suit our needs first, and completely overlook the possibility of their "Green" counter parts. Green composites offer the possible solution to waste disposal problems associated with traditional petroleum derived plastics. One very promising option for green composites is the use of hemp which comes from the Cannabis plant. Water has been shown to cause swelling and plasticization of the matrix, and de-bonding of the interface between matrix and reinforcement greatly weakening the material. This study will compare the flexural, tensile, and compressive properties of fiber glass versus hemp fibers before and after exposure to water. In order to have a point of comparison, fiber glass and hemp specimens were made with equivalent weight fabric and identical resin as closely as possible to ASTM standards. Specimens were submerged in room temperature water for 24hrs, and then dried outdoors in the sun for 24hrs. The results show fiberglass has a higher tensile specific strength and bending stress than hemp by a factor of 3.5 and 2.5, respectively. The hemp composite has a higher compressive strength than fiberglass by a factor of 1.7, and it is surprisingly further increased once the hemp is exposed to water.

(Oral Presentation, Session IV, Room 1325, 3:15pm)

Bridging Knowledge Gaps In Chemical Concepts

Cristina Winchester, Jeremy O'Brien – Pre-Nursing

Faculty Mentor: Connie Gabel

General chemistry knowledge is important for chemistry and biology students. By improving chemistry knowledge, biology students should have a more conceptual understanding of these concepts. Students are expected to have prior knowledge of algebraic concepts when they enter general chemistry. In assessing their ability to apply these skills to chemical concepts, they strengthen their understanding of these concepts. Supplemental Instruction (SI) provides an opportunity for students, outside of traditional lecture, to apply chemical knowledge to problems and discussion. The SI Peer Leader serves as the expert in constructing chemical knowledge. Students are often unable to identify gaps in their knowledge. By asking appropriate questions, the expert is able to identify knowledge gaps and help students make connections between chemical concepts. In this way, students are able to achieve greater depth of knowledge. The purpose of this research was to assess if there is a benefit to students participating in SI.

(Poster Presentation, Session II (3:00-4:15pm), Poster #6)

Neurodrinks And Cognition Using The Mindflex

Mitchell Wolf – Human Development

Faculty Mentor: Cynthia Erickson

Do "neurodrinks" make a difference in cognitive abilities? Over the last decade, the market has been flooded with "neurodrinks" making that exact claim. Is there a difference in cognition between participants who drink neurodrinks and those who do not? This study used Mattel's "MindFlex", which is a Brain-Computer Interaction (BCI) game easily purchased at Toy'R'us. "Mindflex uses theta waves in the brain to measure focus and concentration. (Melissa Perenson, PCWorld, Jan 2009) For this study, my hypothesis was twofold; First, that the participants would experience higher than normal neurological success due to placebo with the control drink. Second, no difference will be observed between the MindFlex times of participants who drank the neurodrink and those who drank the control. Participants were recruited from the introductory Psychology courses at MSU Denver and given class credit for participating in the study. They were first asked to consume either a "neurodrink" or a placebo but were not told which drink they were given. Each participant was given a practice trial and four actual trials on the Mindflex "Race the Lights" task. "Race the Lights" is a game which challenges the participants to move a small blue ball down the course of the provided race track and then announces their time after each trial is finished. Analysis will be done using times between the the placebo group's and the neurodrinks group's times. Each group's times will be averaged and compared to yield data to accomplish this goal.

(Poster Presentation, Session I (10:15-11:30am), Poster #9)

The Philippi Mummy Project: Progress Briefing And New Directions

Julia Woodward,– Anthropology

Faculty Mentors: David Hill Rebecca Forgash, Julie Reyes, David Hill, Ronald Beckett (Quinnipiac University), Gerald Conlogue (Quinnipiac University)

In the last five years the Philippi Mummy Project has grown tenfold and now encompasses topics of research spanning numerous fields. Yet the future of the mummified specimens has become increasingly questionable. While the physical state of the mummies continues to be at risk, the legal battle for their internment has not been resolved, and the survival of the local museum which houses them is in question.

In order to secure a safe future for the mummies a more comprehensive approach has been adopted. We are now working with the Barbour County Historical Society Museum to redesign the mummy display and also to find additional support through museum studies programs at local universities in order to recover from an incident which left the museum devastated. Another immediate concern is the efforts of a coalition attempting to have the mummies buried so that they may no longer be displayed or examined. This is due to the perceived vulnerable status of the mummified individuals as females (a group with unequal rights within their historical context) and as patients at the Trans-Allegheny Insane Asylum. The academic research also advances with continued work on the initial investigation, new investigations planned upon collection of samples, and two subprojects granted to student investigators. This report briefly addresses each of the subprojects in order to demonstrate a broad approach to mummy research and efforts to continue academic research while aiding a rural museum and launching a public interest campaign.

(Oral Presentation, Session II, Room 1312, 10:15am)

Redefining GLBT: How The Confusion Of Sexual Orientation And Gender Identity Affects Gender Minorities

Andrea Wucherpfennig – IDP Queer Studies

Faculty Mentor: Robert Schatz

The acronym GLBT reflects a flaw in society's view of these communities. The acronym provides no distinction between sexual orientation and gender identity. Put simply, sexual orientation is who you want to be with, while gender identity is who you are. The two concepts are not the same, nor are they exclusive categories. The acronym also fails to include all gender and sexual minorities. The terminology should change from "GLBT" to "gender and sexual minorities." This would clearly distinguish gender identity from sexual orientation and include all gender and sexual minorities.

In this literature review, I emphasize how the confusion of gender identity and sexual orientation affects gender minorities. The current focus on sexual minorities is reinforced by this confusion. The two communities are fighting for very different social issues, though, and many of the key issues for gender minorities are irrelevant to sexual minorities.

The confusion of gender identity and sexual orientation also affects the research. In the literature, the meaning of GLBT is inconsistent. Often research ignores gender minorities completely, using GLBT to refer only to sexual minorities. Other times, researchers collect data from all GLBT populations but draw conclusions that are only relevant to sexual minorities. GLBT is also used when researchers collected data from sexual minorities but overgeneralize the findings to include gender minorities as well.

(Oral Presentation, Session IV, Room 1323, 3:30pm)

The Effects Of Cognitive Enhancing Drinks On Reasoning Ability

Anastasia Zavilla – Psychology

Faculty Mentor: Cynthia Erickson

Continued popularity of cognitive enhancing drinks on the market today has provoked some interest among researchers in the actual effects of such beverages on cognitive performance. This study attempts to assess the effects of a particular cognitive enhancing drink on various cognitive functions. Participants were randomly assigned to an experimental group or control group. The experimental group received the NeuroSonic® drink and the control group received a placebo drink. Participants consumed the beverages and participated in 3 separate psychological measures, one of which was the Raven's Progressive Matrix task. The task used in this study was similar to the original Raven's Progressive Matrix task in which participants are tested individually. In order to test multiple participants simultaneously problem of the

task was presented on a separate PowerPoint slide in fixed time format. Participants had to choose the missing component of a matrix from four or five options. This study expects to find no statistically significant difference between the experimental and control groups reasoning abilities as measured by the Ravens Progressive task. Data collection and analysis for this study had not been fully completed at the time of this abstract submission. Upon completion of data collection statistical analysis will be conducted to compare percent of correct responses between the two groups. Results will speak to the validity of claims made by NeuroSonic® drink as to cognitive enhancing qualities.

(Poster Presentation, Session I (10:15-11:30am), Poster #10)

Humanitarian Engineering Project

Guy Zerfoss, Dennis Phakonekham, James Anderson – Mechanical Engineering Technology

Faculty Mentor: Aaron Brown

Humanitarian engineering is research and design to directly improve the wellbeing of marginalized or under-served communities. The goal was to design and implement a sustainable solar water heater in conjunction with the Pacific College of Costa Rica to be used in their facilities. For the project to be successful, the solar water heater must be readily operated, maintained, and repaired by members of the community. In order to accomplish this goal, a site survey must be completed in order to establish an appropriate design. Next, material and cost analysis could be carried out based on available resources to ensure ease of operation and repair. In achieving the above goals the solar water heater was constructed and tested for functionality. Upon completion, this simple project was able to improve quality of life on the Pacific College of Costa Rica's research campus through providing hot water with no electricity use required. This project delivered high value to the Pacific of College of Costa Rica while providing an exceptional educational experience to students.

(Oral Presentation, Session I, Room 1325, 8:45am)

Indexes

by Presenters

by Mentors

by Majors