University of Nebraska Omaha

2nd annual Celebration of Student Research and Creative Activity

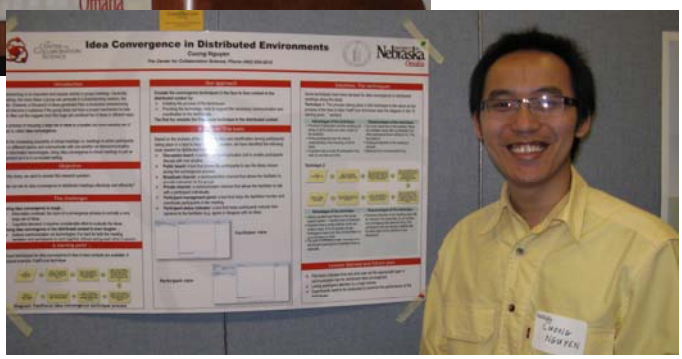
University of Nebraska at Omaha
Milo Bail Student Center

April 6, 2010
Graduate oral presentations and performances | 5:30—9:00 p.m. | Chancellor's Room—2nd floor
Undergraduate oral presentations and performances | 5:30—8:00 p.m. | U-Mo-Ho Room—3rd floor
Poster presentations and exhibits | 7:35—9:15 p.m. | Nebraska Room—2nd floor

April 7, 2010
Graduate oral presentations and performances | 5:30—9:00 p.m. | Chancellor's Room—2nd floor
Poster presentations and exhibits | 7:35—9:15 p.m. | Nebraska Room—2nd floor

April 8, 2010
Awards program | 4 p.m. | Strauss Performing Arts Center

The event was made possible with support from the Office of Sponsored Programs and Research and the Office of Graduate Studies.



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Dear Colleagues, Students and Friends:

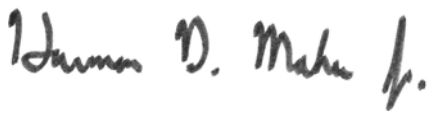
As a student-focused university, the University of Nebraska at Omaha provides a rich variety of high quality research and creative activity opportunities for students. This year's Celebration of Student Research and Creative Activity held in conjunction with the annual Honor's Program Senior Symposium is the second celebration of our students' scholarly accomplishments. Over 150 undergraduate and graduate students showcased their research and creative activity as a medley of 132 oral presentations, performances, poster presentations and exhibits. This collection of abstracts captures a tiny fraction of their presentations and work, and I encourage all to attend next year's celebration so that you can appreciate the vibrant and cutting edge array of research and creative activity our students are engaged in.

Thank you to the planning committee members for their time and expertise: Christine Beard, Prithviraj Dasgupta, Kristen Hendershot, Wendi Jensen, Harmon Maher, Jerri Maxwell, Christine McIvor, Philip Nordness, Roni Reiter-Palmon, Rosalie Saltzman, Lisa Scherer, Joanne Sowell, and Robert Woody. Special thanks to Wendi Jensen, Kristen Hendershot and Jerri Maxwell for contributions too numerous to detail here, but including organization, responding to questions, and compiling student entries and this document. Without their efforts, this would not have happened.

I especially appreciate the willingness and time of those who served as judges for this event, our UNO friends: John Buckley, Omaha Public Power District; Audrey DeFrank, UNO, Criss Library; Andrew Jameton, University of Nebraska Medical Center; Linda Mannering, UNO, Institutional Research; Tim McIvor, Omaha Public Power District; Julie Reilly, Ford Museum; Robert Runyon, emeritus faculty, UNO; Jacquie Scoones, KANEKO; Susie Sisson, Marian High School; Mike Watkins, Buena Vista University; Del Weber, emeritus chancellor, UNO; Tanya Wright, Boys Town; and Lyn Wallin Ziegenbein, Peter Kiewit Foundation. We thank them for their extreme conscientiousness, insights and the significant time they spent in a challenging task.

I would finally like to thank the students and their advisors for their participation and abundant energy and enthusiasm. As last year, I found this event strongly encouraging in so many ways, and I look forward greatly to next year's celebration of student accomplishment.

Sincerely,



Dr. Harmon D. Maher, Jr.

Interim Associate Vice Chancellor for Research and Creative Activity

AWARD WINNERS

Awards were given in seven categories: Oral presentation—undergraduate, Oral presentation—graduate, Poster presentation—undergraduate, Poster presentation—graduate, Performance—undergraduate, Performance—graduate, and Honors Presentation. In each category first prize was $200, second prize was $100, and third prize was $50.

ORAL PRESENTATION—undergraduate

First place: NEIL HUBEN, Biotechnology
"Gait Impairment in PAD Patients Is Independent of Level of Disease"
Advisor: Nick Stergiou

Second place: NICHOLAS CONOAN, Biotechnology/Chemistry
"Differential expression of StAR mRNA in the Fathead Minnow (Pimephales Promelas)"
Advisor: Alan Kolok

Third place: CALEB SCHMID, Bioinformatics
"A New Approach for Finding Protein Sorting Motifs"
Advisor: Hesham Ali

ORAL PRESENTATION—graduate

First place: JANYL JUMADINOVA, Information Technology
"FORETELL: A Multi-agent Prediction Market for Forecasting Event Outcomes"
Advisor: Prithviraj Dasgupta

Second place: SACHIN PAWASKAR, Information Technology
"A Dynamic Energy-Aware Model for Scheduling Computationally Intensive Bioinformatics Applications"
Advisor: Hesham Ali

Third place: ANDREW BIRNIE, Psychobiology
"A Dynamic Energy-Aware Model for Scheduling Computationally Intensive Bioinformatics Applications"
Advisor: Hesham Ali

POSTER PRESENTATION—undergraduate

First place: JENNA ALLISON, Chemistry/Biology
"Mannose 6 Phosphate/Insulin-like Growth Factor II Receptor Dimerization"
Advisor: Jodi Kreiling

Second place: RYAN PLACZEK, Psychology
"Relationships Among Reported Stress, Salivary Cortisol Levels, and Illness Incidence and Severity in College Students"
Advisor: Jeffrey French

Third place: WINDY ROTTENBUCHER, Social Work
"Tranquility and Questions"
Advisor: Peter Szto

POSTER PRESENTATION—graduate

First place: JESSIE HUISINGA, Biomechanics
"Linear and Nonlinear Assessment of Postural Control in Multiple Sclerosis Patients"
Advisor: Nick Stergiou

Second place: ANASTASIA KYVELIDOU, Medical Sciences interdepartmental area in Pediatrics
"Infant sitting posture under distorted visual and proprioceptive information"
Advisor: Nick Stergiou

Third place: COBRA RAHMANI, Information Technology/Software Reliability
"Open Source Software Reliability: An Experimental Analysis"
Advisor: Azad Azadmanesh

PERFORMANCE PRESENTATIONS—undergraduate

First place: JOSH GRAY AND JOSH BUDA, Broadcasting New Media
"Mav'N Around"
Advisor: Mark Dail and Gary Repair

PERFORMANCE PRESENTATIONS—graduate

First place: TIMOTHY VALLIER, Music Composition
"Mobile Phone Orchestra"
Advisor: Kenton Bales

Second place: SARA SCHUHARDT, Music Performance
"The Unaccompanied Flute Solo: A Discussion and Performance"
Advisor: Christine Beard

HONORS PRESENTATIONS

First place: ELIZABETH SALZMAN, Criminology and Criminal Justice
"Nebraska's Anti-Meth Law: Too little, too late?"
Advisor: James Bogner

Second place: NICHOLAS SPINTIG AND RONALD TYSON, JR., Computer Engineering
"UNO Bike Lock System"
Advisor: Herbert Detloff

Third place: AUSTIN ZACH, Computer Science
"Flood Stage Monitoring with the Google Maps API"
Advisor: Robert Fulkerson

STUDENT RESEARCH AND CREATIVY ACTIVITY

Oral Presentations

"Endocrine Disruption in the Bow Creek Watershed"

KELTY ABBOTT
Faculty advisor: Alan Kolok
Major: Biology, undergraduate

The objective of the experiment was to determine if fathead minnows caged in the Bow Creek watershed experienced alteration in endocrine function. Endocrine disruption can occur when an exogenous compound mimics endogenous hormones, and in this watershed there are multiple agrichemical compounds that can elicit such a response.

To evaluate endocrine disruption in the caged fish in this watershed, we focused on changes in relative gene expression of steroid-induced genes, such as vitellogenin and estrogen receptor . In 2008, exposed fathead minnows displayed a significantly decreased liver ER-α expression in two out of four sample sites within the watershed. . Integrative chemical samplers, deployed in 2008 indicate the presence of atrazine at all four sample sites; however the levels of atrazine did not correlate with the effects on the fish. In 2009, fathead minnows once again had lower hepatic ER-α expression at the lower reaches within the watershed, a very consistent result relative to the previous year. It is likely that an exogenous compound, or mixture of compounds, is present in Bow Creek and is eliciting adverse impacts on local fish. Agrichemicals increase agricultural yield; however, they also have the potential to affect non-target organisms in unintended ways such as endocrine disruption.

"Conductive Concrete Sidewalk Panel Heating Research"

JICHONG AN
Faculty advisor: Christopher Tuan
Major: Civil Engineering, graduate

It is expected that this project will demonstrate that conductive concrete technology has national and international importance. Statistics indicate that 10% to 15% of all roadway accidents are directly related to weather conditions. This percentage alone represents thousands of human injuries and deaths and millions of dollars in property damage annually. Ice accumulation on paved surfaces is not merely a concern for motorists; ice on pedestrian walkways accounts for numerous slip and fall injuries. The payoff potential for this project is tremendous: it could eliminate icy roadways and save lives. This revolutionary deicing technology is applicable to accident-prone areas such as sidewalks, bridge overpasses, exit ramps, airport runways, street intersections and driveways. Conductive concrete contains a certain amount of electrically conductive components in the regular concrete matrix to attain stable and relatively high electrical conductivity. The mix design used in this project contained steel fibers and carbon products for conductive materials. Due to its electrical resistance and impedance, a thin conductive concrete overlay can generate enough heat to prevent ice formation on sidewalks when connected to a power source.

"Lululemon's Commitment to the Environment: A tangle of seaweed, suppliers, and social responsibility"

ANDREA ERIN BASS
Faculty advisor: Lynn Harland
Major: Business Administration, graduate

Globalization is an inevitable facet of today's business world. Many companies outsource in order to manage operations and generate profits. Companies that expand rapidly can experience growing pains to a greater degree than those experienced by companies with moderate expansion strategies. This case introduces Lululemon, an athletic and yoga wear retailer. The company was founded on its Corporate Social Responsibility (CSR) initiative, and took pride in its approach to the environment. The company trusted

its suppliers, and believed the products it was buying were as the suppliers described.

Lululemon, faced with pressure to expand and maximize profits while maintaining its CSR pledge to the environment and innovation, found itself in a difficult position when an environmentally-friendly fiber it used for a clothing product was determined to be marketed falsely. This case involved both primary and secondary research focused on the innovative strategy of the retailer, and the series of events that led up to its fabric controversy. Data collected about the company included SEC filings, executive speeches, industry surveys, site visits, and third-party articles. Finally, analysis of the internal and external environment in which Lululemon competes was conducted. The case aids in analyzing sustainability as a foundation for both strategic and CSR plans, as well as detailing how a company can be held responsible for its suppliers' actions. The output of using the Case Study methodology for this form of research was to produce questions to be answered by those using the case (academics, students, and professionals) for analysis and application to real-world situations.

"Prenatal Androstenedione Levels are Associated with Later Juvenile Play Behavior in the White-Faced Marmoset (Callithrix geoffroyi)"

ANDREW BIRNIE
Faculty advisor: Jeffrey French
Major: Psychobiology, graduate

Prenatal androgens can influence a number of developmental and behavioral trajectories. In some species, higher levels of gestational androstenedione (A4; an androgen precursor) are associated with higher rates of rough-and-tumble play during early-life development for offspring. This study evaluated the relationship of prenatal exposure to A4 with juvenile play behavior in a small neotropical primate, the white-faced marmoset. Eighteen pregnancies yielded a total of 29 subjects (13 females; 16 males). One to three first-void morning urine samples were collected from gestating females each week. We developed an adapted radioimmunoassay (RIA) procedure to analyze A4 concentrations in marmoset urine, correcting for urinary solute concentrations by creatinine, a muscle metabolite excreted at constant rates. Social play behaviors were recorded during behavioral observations two to five times per week for all juveniles age 5-10 months. Play effort (attempted play plus initiate play) rates did not differ significantly across the juvenile period, therefore a composite average of overall juvenile play was computed for each animal. Mean gestational A4 varied significantly across trimesters, and second trimester A4 was higher than both first and third trimester A4. Hormone levels for each trimester were correlated with play effort rates with various play partners (parents, siblings, co-twin). Higher levels of first, second and third trimester A4 levels were all associated with higher rates of play effort directed toward fathers for juvenile females, but not males. Results suggest that the development of behavioral trajectories of female marmosets may be more sensitive to variations in prenatal androgen levels than males.

"'The Feminine' and the Military: Initial Work on Leadership in the Military"

CATHERINE HUMPHRIES BROWN
Faculty advisor: Christine Reed
Major: Public Administration, graduate

Women today, with some notable and controversial exceptions, have equality of opportunity in the military and hold a number of leadership positions. Why, then, do they seem to be invisible in the military leadership literature? To borrow a terminology from feminist philosopher and phenomenologist Iris Marion Young, where are the female bodies in literature about military leadership? Moreover, what does it matter if they are absent? This paper presents work conducted to date as part of an iterative process. The work conducted to date includes: (1) a review of the literature on leadership, and addresses issues such as traditional versus contemporary approaches to the study of leadership and the assumptions that underlie these two approaches; (2) a review of the literature on military—specifically Army—leadership; and (3) structured interviews with leaders from the non-profit, private, and public sectors on the topic of military leadership. Interviewees also shared their thoughts on the extent to which military leadership (both in doctrine and practice) takes into account differences such as age, class, sex, and gender—with a particular emphasis on sex and gender.

"Structural Dynamics of Coxsackie Virus B3 RNA upon Binding of Poly (rC) Binding Protein II"

ERIC BURR
Faculty advisor: William Tapprich
Major: Information Technology, graduate

Coxsackievirus B3 (CVB3) is a pathogenic *Enterovirus* of the *Picornaviridae* family. CVB3 is responsible for severe clinical diseases such as myocarditis, pancreatitis and possibly type 1 diabetes. As in all picornaviruses, CVB3 has a 30 nm, icosahedral capsid enclosing a highly structured and well organized 7400 nucleotide RNA genome. The genome is characterized by four distinct sections: a 5'Non Translating Region (5'NTR), an open reading frame that serves as mRNA, a 3'NTR and a poly-A tail. Of these sections, the 5'NTR is absolutely critical because it contains highly folded and functionally active RNA regions known as the cloverleaf and the internal ribosome entry site (IRES). The functions of both regions are stimulated by their association with host protein factors. Of these factors, poly (rC) binding protein 2 (PCBP2) is significant because it is known to stabilize mRNA. However, it is unclear how PCBP2 functions in CVB3 infection. The data obtained from our electrophoresis mobility shift assays (EMSA) proves that the cloverleaf and the IRES bind PCBP2. In addition, our dimethylsulfate (DMS) modification assays, support the EMSA binding results and also indicate that dynamic changes in the structure of the RNA occur upon binding. I will present results generated in our lab to show the affect of protein-RNA interaction. Our overall goal is to delineate the structural dynamics and functional role of CVB3 5'NTR RNA. These findings may serve as a model to better understand how proteins and RNA interact with in biological systems to influence disease and treatment.

"Trends Analysis of Topics Based on Temporal Segmentation"

WEI CHEN
Faculty advisor: Parvathi Chundi
Major: Information Technology, graduate

Extracting interesting information from large unstructured document sets is a time consuming task. In this project, we designed an approach to analyze the temporal trends of a given topic in a time-stamped document set based on time series segmentation. We consider topics containing multiple keywords and use a fuzzy set based method to compute a numeric value to measure the relevance of a document set to the given topic. The measure of relevance is then used to assign a discrepancy score to a segmentation of the time period associated with the document set. The discrepancy score of a segmentation represents the likelihood of the topic across all segments in a segmentation. Given a user specified value k, we then define a min different k segmentation to capture the k-segmentation with the maximum possible discrepancy score and describe a dynamic-programming based algorithm to compute it. The proposed approach is illustrated by several experiments using a subset of the TDT-Pilot Corpus data set. Our experiments show that the min difference k segmentation successfully highlights the temporal trends of a topic using k segments.

"Implementation of a Telepsychiatry Clinic for Developmentally Disabled Adults"

JESSICA CLEM
Faculty advisor: James Sorrell
Major: Urban Studies, graduate

Access to mental health services in rural communities is a persistent barrier to care for these individuals. Telepsychiatry holds promise for improving access, but there is little information available regarding telepsychiatry for this unique population. We describe the initiation of a telepsychiatric clinic between an Intermediate Care Facility for developmentally disabled adults that was recently decertified by Centers for Medicare and Medicaid (CMS) after an investigation by the Department of Justice that uncovered significant deficits in psychiatric services, specifically in terms of inadequate assess to psychiatric care and polypharmacy. This clinic is the result of an ongoing collaboration between the Department of Health and Human Services and an academic psychiatry department to improve services.

This collaborative effort involves diagnostic assessments by academic psychiatrists, multidisciplinary team meetings, medication management and emergency assessments. The goals of the project are to increase access to care, reduce polypharmacy, and enhance

facility communication between medical specialists and treatment center staff. Ongoing assessment of acceptability of telemedicine by staff and clients has been initiated. Of particular interest is clarifying what constitutes adequate presence and rapport for these cognitively impaired adults participating in this medium.

This program is proving instrumental in improving psychiatric access and services for a vulnerable patient population and is assisting the state's efforts to re-establish certification from CMS. Furthermore, it is a model for utilizing telemedicine to follow these same clients back into their rural communities thereby ensuring a successful transition to community based care.

"The Origins of Migration from Carlentini, Sicily to Omaha, Nebraska, 1897-1905"

PATRICIA COATE
Faculty advisor: Bruce Garver
Major: History, graduate

This presentation, which condenses part of a larger master's thesis on the topic, examines the phenomenon of chain migration from the town of Carlentini, Sicily to Omaha, Nebraska at the turn of the 20th century continuing until the passage of the Immigration Act of 1924. Eventually, Carlentinesi came to comprise over two-thirds of all Italians in Omaha's Little Italy.

Thus, a study of Little Italy's main source community explains many of the more peculiar aspects of Italian settlement in Omaha. Here, I introduce the town itself and highlight some of the main geographic, agricultural, social and political characteristics of Carlentini and the surrounding region of Sicily's citrus country. A survey of appropriate secondary sources helps to distinguish Carlentini from the other parts of Italy and Sicily that sent the majority of immigrants to the "Little Italies" all over North America. I also include analysis of the original *nulla osta* and passport lists, housed in the Archivio Storico di Carlentini, in order to produce an overview of the makeup of the first generation of Carlentinese emigrants. Generally, I did not find them to be the poorest of the poor but rather, skilled laborers of the artisanal class who were well-suited to industrial work for the Union Pacific Railroad, the American Smelting and Refining Company (ASARCO), and in Omaha's meat-packing plants. There were also a surprising number of single women and families who expatriated as well.

"Graffiti Tags as a Method of Defining Space"

CARRIE CONLEY
Faculty advisor: John Crank
Major: Criminology/Criminal Justice, graduate

Researchers and the public have long debated that graffiti is related to social disorganization and acts of gang violence. The current study uses social ecological theory to examine sources of variation in the practice and use of graffiti. Using data from a computer-based graffiti tracking system, this analysis has three foci: 1) proportion of graffiti that is gang related and the proportion that is tagger or crew related; 2) how different ethnic groups use graffiti to define their space; and 3) how graffiti is practiced in cities with differing levels of gang presence.

"Differential expression of StAR mRNA in the Fathead Minnow (Pimephales Promelas)"

NICHOLAS CONOAN
Faculty advisor: Alan Kolok
Major: Biotechnology/Chemistry, undergraduate

The objective of this study was to ascertain the degree of StAR expression in the gonad, kidney, brain, and liver of the Fathead Minnow (*Pimephales Promelas)* with the ultimate goal of developing StAR as a biomarker for studying endocrine disrupting compounds in the environment. StAR, or Steroidogenic Acute Regulatory Protein, functions to transport cholesterol across the mitochondrial membrane. This process is the rate limiting step in steroidogenesis. A biomarker based upon star would therefore be useful to determine the mode of action (MOA) of endocrine disrupting compounds. In fact, liver StAR expression has been shown to be significantly elevated in females deployed in the Elkhorn River. It was our a priori expectation that StAR would be maximally expressed in the primary steroid hormone producing tissues, namely the gonad and head kidney. Indeed it was found that the highest levels of StAR expression were in the testis and ovaries. Somewhat unexpectedly, high levels of StAR expression

were found in the male brain tissue as well. Livers and kidneys had significantly lower expression of StAR as compared to the gonads and brains. The result for the liver was expected as the liver is not generally considered a steroidogenic tissue. However, the result for the head kidney was unexpected due to the head kidney's role in producing corticosteroid hormones. Based on these results, StAR's use as a biomarker may be best utilized when studying compounds that target the gonads of the Fathead Minnow.

"Identifying Differentially Expressed Gene Modules for Aging with Correlation Networks"

KATE DEMPSEY
Faculty advisor: Hesham Ali
Major: Pathology and Microbiology/Bioinformatics, graduate

Correlation networks are emerging as a novel modeling tool to characterize biological relationships. The correlation network is a graphical model that examines the degree of correlation over some biological entity, such as genes in microarray data. Identification of network properties such as hubs, cliques, and pathways can be used to filter noise and uncover sub-networks of biologically relevant gene modules or regulatory complexes. The progression of disease, effects of pharmaceuticals on body systems, and the aging process are all examples of correlation network applications for modeling biological relationships over time or states. With the integration of gene expression data, database mining, and the power of supercomputing, we are able to discern knowledge on the whole-genome scale regarding changes in regulation. To highlight the usability of the correlation network, we identified differentially expressed gene modules in the aging mouse.

This required the construction of filtered correlation networks from hypothalamus gene expression data from five types of mice. For up to three age states, we observed consistent patterns of change in correlation networks density, suggesting major shifts in regulatory mechanisms with the passage of time. We preliminarily confirm the presence of high degree nodes, or hubs, and the hypothesis of essentiality stating that these hub genes are more likely to result in lethal phenotype after mutation than a non-hub gene. We also use current methods for subnetwork comparison to propose an approach for finding causative modules using Gene Ontology notation, which will filter coincidental correlations from modules with potential for biological impact.

"Dual Tasking Indicates Elderly Inability to Delegate Locomotion to Lower Levels of Control"

ERIN FOSNAUGH
Faculty advisor: Nick Stergiou, Leslie Decker, Sara Myers
Major: Exercise Science/Chemistry & Biotechnology, undergraduate

Dual tasking is a useful paradigm to investigate processing resources in the brain. The present study used a dual-task paradigm to determine whether the composition of locomotion control (involving higher cerebral and lower spinal levels of control) is altered by increasing lower levels during a cognitive task. Motion analysis data of ten young adults and 10 elderly adults was collected during normal walking at self-selected pace (control condition) and while performing a secondary cognitive-linguistic task (phonemic fluency). The gait performance was evaluated for 3 minutes in each condition using the right and left minimum toe clearance (MTC). The Coefficient of Variation (CoV) of each MTC time series was then calculated to get information on gait control. For both conditions, the CoV values on the right and left sides were significantly smaller in the young than in the elderly. For the young, both left and right CoV values were significantly smaller under the dual-task condition as compared to the control condition. No differences were observed in the elderly for both sides.

The decreased CoV values in the young while performing the secondary task indicate a more automatic control of gait. An explanation is that to maintain a safe gait, despite an increased cognitive load, more control is delegated to lower levels and generates a stronger closed loop cycle. This ability may have diminished in the elderly. Lastly, the similar results observed for both sides during a left hemisphere dominant linguistic task, is consistent with the bilateral motor control of gait.

"Organizational Change: The Influence of Trust on Employee Resistance"

ABBY FREEMAN
Faculty advisor: Chin Chung (Joy) Chao
Major: Communication, graduate

Current research demonstrates that organizations fail to successfully implement change initiatives, also known as transformational programs, 66-75 percent of the time (McGuire & Rhodes, 2009). Change threatens the status quo by increasing fear and anxiety and causing individuals to resist the implementation of new policies or procedures. As demonstrated through the current health care initiatives, change is a ubiquitous phenomenon affecting every individual. Oreg et al. identifies resistance at many levels across the country (2008). Current literature identifies the aspect of trust as an essential factor in the management of government and social systems; linking trust to lower levels of resistance to change (Dunn & Schweitzer, 2005). The purpose of this study is to explore the relationship between individual's trust in governmental leadership and the level of resistance to policy change, targeting individual's perceptions toward the current health care initiatives. The literature review explores the concepts of trust, resistance, and change within the areas of Communication, Psychology, Sociology, and Political Science. This study utilizes a survey methodology to identify the levels of trust in President Obama's leadership and the levels of resistance to health care initiatives. A pilot study has been conducted to help identify limitations and establish parameters for a full scale research project. This project hopes to advance the study of leadership, trust, and change within the current body of literature.

"Probing the Three Dimensional Structure of Coxsackievirus B3 Genomic RNA"

MEGAN GOESER
Faculty advisor: William Tapprich
Major: Biotechnology, undergraduate

Coxsackievirus B3 (CVB3) is able to efficiently take over a host cell through a unique genomic region called the internal ribosome entry sites or IRES. This region is located within the 5' nontranslated region (5'NTR) of its RNA genome. The structure of the CVB3 5' NTR has been studied extensively. Previous experiments made use of chemical probes that specifically modified the RNA bases. These chemical probes modified positions which were not involved in Watson-Crick base pairing but did not modify bases which were involved in pairing. Surprisingly, nucleotides 90-110 in the 5'NTR, which is a proposed unpaired region that connects domain I and domain II, remained unmodified. In this experiment, we will treat the CVB3 5' NTR with an Fe-EDTA reagent that targets the sugar phosphate backbone rather than the bases. With this probe, we are able to map which regions of the genome are buried deep within the secondary structure of the virus's RNA genome. The Fe-EDTA reagent will make cuts in the sugar-phosphate backbone in all accessible sites. Then, using a primer extension assay, we will visualize where the RNA molecule has been cleaved. By analyzing the banding pattern it can be determined if nucleotides 90-110 are in fact buried deep within the RNA molecule or if they are involved in Watson-Crick base pairing or non-Watson-Crick base pairing that has not been identified yet. This will define the structural characteristics of a region in the 5'NTR that is well known for its functional importance.

"Problem Analysis"

MARIEL HOKE
Faculty advisor: Michael Matthews
Major: Secondary Education/Mathematics, undergraduate

Problems: everybody has them. High school students taking math seem to have an abundance of them. Predicaments often include drilling and practicing boring math procedures, not knowing how to begin to solve a question, or passively going through the course without considering why's or what-if's. It is this passiveness that has led to a one-dimensional and shallow understanding of the mathematical world. To both understand and appreciate the beauty in math, the way that those who love it do, students must learn to make problems their own. This can be done through problem analysis. Like dissecting a frog help students understand biology, problem analysis helps students anatomize a problem and in turn helps them understand math better. This method includes students taking a problem and expanding and restricting the givens, determining whether their initial solution is unique or not, and finally finding analogous problems which can be approached in similar ways. The creative activity that I have to present is an example of a problem analysis that I plan on utilizing in my future career. Working through this method students begin to find that math is

not an endless list of procedures and memorization but rather a rich and dynamic subject that they can get excited about.

"Gait Impairment in PAD Patients Is Independent of Level of Disease"

NEIL BARRINGTON HUBEN
Faculty advisor: Nick Stergiou
Major: Biotechnology, undergraduate

Peripheral arterial disease (PAD) is a manifestation of atherosclerosis in the lower extremities which causes reduced blood flow to the legs and leads to muscle ischemia and claudication. PAD can manifest as one of three levels of disease based on the location of atherosclerosis in the leg arteries. Atherosclerosis occurs in the iliac arteries in aortoiliac occlusive disease (AIOD), in the femoral and popliteal arteries in femoropopliteal occlusive diseases (FPD), and in one or more of the iliac, femoral and popliteal, and posterior tibial and peroneal arteries in patients with multiple-levels of disease (MLD). In previous studies in our laboratory, we have determined that PAD patients have altered joint kinetics and kinematics as compared to controls. However, it is unknown if these differences are consistent for patients with varying levels of occlusion. Comparisons between the three PAD groups identified only 3 out of 42 comparisons as significant. However, the three significant comparisons occurred in variables that were consistently identified as affected in PAD patients especially with respect to push-off in late stance. When each level of disease group was compared to controls, 30 of the 42 comparisons were significantly different. These results show that joint kinetics are consistently altered as compared to healthy controls, regardless of the level of disease occlusion. The overall absence of significant differences between the three PAD groups emphasize that these biomechanical alterations are due to documented metabolic myopathy and altered neural function, which affects proximal muscles in addition to distal muscles, regardless of occlusion location.

"I'm angry, but can we, umm...still have sex? A quantitative study in verbal and non-verbal expression of anger and sexual intimacy levels within newlywed married couples"

ANDREA IACCHERI
Faculty advisor: Chin Chung (Joy) Chao
Major: Communication, graduate

Since the 1950's scholars from different fields have been interested in the study of marital relationships (Clifford, 1955; Bowerman, 1957; Gottman, et al., 1998). Prior research has focused on anger (Crohan, 1992; Guerrero, La Valley, & Farinelli, 2008; Sanford, 2005) and sexual relations (Cupach & Comstock, 1990; Hurlbert & Apt, 1994) within marriages. Over the past decade, a small body of literature has emerged across several disciplines on conflict as well as anger and the probable correlation to sexual intimacy (Apt et al., 1996; Belanger, et al., 2001; Lawrence, et al., 2008). Current literature in the fields of Communication, Sociology, and Psychology is examined to propose a quantitative research study that utilizes two types of survey questionnaire instruments. The current study focuses on if a relationship exists between the level of both verbal and non-verbal expressions of anger and decreased sexual intimacy in newlywed couples. Newlywed couples up to their fourth year in marriage qualify to participate. The methodology for this research study will use the "Newlywed Anger and Sexual Intimacy Survey". This pilot study will test the validity and reliability of the survey used for data collection. This completion of this research study aims to provide evidence of the negative influences that anger can have on sexual intimacy in newlywed relationships thus contributing to the literature on Interpersonal Communication as well as Family Studies.

"The Airport Problem: Demonstrating Problem Anaylsis"

VICTOR ICENOGLE
Faculty advisor: Michael Matthews
Major: Mathematics, graduate

The Airport Problem demonstrates the capacity of problem analysis to help students see a standard topic in a sharper focus and enable them to acquire a deeper understanding of it as well. The analysis presents the existence of a solution, extreme cases, specialization and generalization, analogous problems, and various interpretations and representations of the same problem.

"To Tweet or not to Tweet? The Impact of Twitter Use in Non Profit Organizations and on Levels of Political Efficacy"

SHELLI INNESS AND CHERIL LEWIS
Faculty advisor: Chin Chung (Joy) Chao
Major: Communication, graduate

The research includes an analysis of potential applications of the social media site, Twitter for non -profit organizations and the impact to political efficacy. Discussion of Uses and Gratification Theory demonstrates that media audiences are goal directed in their use of Twitter. The study includes a content analysis of Tweets made by non-profit organizations over a limited period of time. Ultimately the study will provide a better understanding of how Twitter impacts levels of political efficacy.

"Origami and Conic Tetrahedra"

ALEXANDER JAMES
Faculty advisor: Griff Elder
Major: Mathematics/Computer Engineering, undergraduate

During the summer REU in Athens Georgia, an activity that we approached was trying to find an origami box which produced a maximal volume while using a regular 1x1 piece of origami paper. One of the presented objects was a triangular box of sorts and the question arose as to the volume of this solid. An approach to try to find the volume was to use a linear transformation on a solid which the volume would be more easily computed, such as a tetrahedron. This was the basis for the project that I ended the REU with. Unfortunately, the tetrahedron is not able to be linearly deformed into the triangular solid which was presented. Instead I continued the word on the conic tetrahedron to answer some questions such as, is it mathematically valid, and if it isn't, how can we change its construction to make it so. Finally, after being able to approach and solve these questions I continued to generalize the case to produce the main points on any regular conic tetrahedron.

"Cross-Class Unity in the Early Progressive Era: Kelly's Army in Omaha and Council Bluffs"

JILL JOZWIAK
Faculty advisor: William Pratt
Major: History, graduate

On the fifteenth of April 1894, 1,200 rather dirty, unemployed men arrived at the Union Pacific terminus in Council Bluffs, Iowa. The Depression of 1893 had thrown many Americans out of work, and these men were part of a national movement to do something about it. Forty so-called industrial armies set out for Washington, D.C., to demand public works jobs for at least some of the estimated three million unemployed Americans. Jacob S. Coxey and his "army" out of Massillon, Ohio, were the best known. The group that passed through Omaha-Council Bluffs was the largest of the industrial armies and traveled the farthest, having started from San Francisco. They were led by a soft-spoken, but self-assured typographer named Charles Kelly. Historians have found that a typical response to the arrival of a "tramp" army was for city government and business leaders to combine forces and either keep it from stopping or force it to move on. But for seven days, Omaha's wealthiest and most powerful citizens joined hundreds of their fellow citizens and became the sole means of support for Kelly's Army. They functioned as a cross-class network, which is rather surprising given that there were supposed to have been deep-seated class divisions in American society at this time. The actions of local people also anticipated the reform initiatives of the Progressive Era when it was decided that the federal government had a role to play in labor/management issues.

"FORETELL: A Multi-agent Prediction Market for Forecasting Event Outcomes"

JANYL JUMADINOVA
Faculty advisor: Prithviraj Dasgupta
Major: Information Technology, graduate

My research focusses on understanding and analyzing a category of financial markets called *prediction markets*, using software agent-based tools. Recently, prediction markets have become very popular as a forecasting technique for the outcome of important events that are going to happen in the future. They have been used in various scenarios such as predicting the outcome of U.S. presidential elections, determining the outcome of sporting events, and even for predicting the box office performance of Hollywood movies. Existing research on prediction markets has mostly focussed on building analytical models of the market. However these analytical models have certain deficits as they make limiting and unrealistic assumptions on the behavior of the market's participants such as their risk-neutrality in making decisions, short-sightedness in making calculations and truthfulness in making price bets. In my research, I have built a software agent-based prediction market that relaxes these assumptions and uses new parameters to capture pragmatic and important market features such as the availability and impact of information about events in the market. We have used accurate parameters for our agent-based market which were obtained from various sources such as existing models of financial markets, data from real prediction markets, and agent utility and belief theory. To verify the correct performance of our prediction market, we have performed rigorous experiments and compared it with other prediction market models and strategies. Our results show that our agent-based prediction market provides a better understanding and novel insights into the behavior of prediction markets and its participants.

"The Impact of Globalization and Technological Innovations on Crime and Punishment in the United States, 1945-2007"

DAE-YOUNG KIM
Faculty advisor: Candice Batton
Major: Criminology and Criminal Justice, graduate

Following WWII, the U.S. was characterized by unprecedented prosperity and growth in America's middle class, and then eventually there was the shift from an industrial to a post-industrial society due to globalization and technological innovations, which have driven the rise in economic inequality during the late post-WWII. This economic reconstrucing have had an impact on other social institutions and relations, such as jobs, education, families, crime, and punishment. Of particular interest in this study are changes in broad scale changes in economic conditions and their impact on incarceration. This is an empirical question that has not yet been addressed in the criminological literature. Using a conflict-oriented theoretical perspective and econometric modeling techniques, I examine the impact of globalization, technological innovations, and other economic conditions (nonlabor force participation, inequality, and unemployment) on U.S. incarceration rates. In addition, globalization and technological innovations are also conceptualized as historical context that affects the relationships between other independent variables and incarceration rates; thus, the other independent variables are more strongly, positively associated with incarceration rates in the late post-WII. The findings of the current study offer no simple, consistent answer to the question concerning the impacts of economic conditions on incarceration rates. First, two primary independent variables that pertain to changes in the mode of production were not significant. Second, income inequality was a critical determinant of variation in incarceration rates respectively. Finally, I discuss implications of the study for policy development and future research.

"Simulation and Analysis of Electromagnetic Characteristics of Railroad Cars"

PRADHUMNA LAL SHRESTHA
Faculty advisor: Hamid Sharif
Major: Telecommunications Engineering, graduate

High speed and reliable wireless communications is a major goal of telecommunications research labs and industries. However the capacity of wireless medium to realize this goal is always limited. A wireless network has many parameters to affects its performance, like power, distance, environmental conditions, expected and unexpected interferers, etc. Even simple things such as the presence of certain metals nearby, the shape, size and material of antennas and operating frequency may make a significant difference. Because of this, a wireless communication network often becomes unpredictable. It is not always accurate to mathematically analyze every scenario that a network may be subjected to, due the probabilistic nature of mathematical models.
In my project, I design and simulate a complex communication system for a railroad car. The objective is to analyze the physical layer electromagnetic effects of presence of other agents other than the radiating antennas. Particular interest of the analysis would include the effectiveness of the communication system in terms of power transmitted in a certain environment and possible changes that can be made to the system so as to deliver the desired results in adverse conditions.

"Paradoxical Groups and the Sets They Act Upon"

JOSEPH LEE
Faculty advisor: Andrzej Roslanowski
Major: Mathematics, graduate

The Banach-Tarski paradox states that a solid ball in 3-dimensional Euclidean space can be partitioned in such a way that by simply rotating and translating those pieces, you end up with two exact copies of the original ball you started with. We give a detailed decomposition of nine pieces and nine different isometries that can be used to produce two copies of the unit ball. We also show this paradox is specifically due to the fact that the group of isometries in 3-dimensional Euclidean space has a free subgroup with two generators. We also introduce the property that prevents this paradox from occuring and show the group of isometries on the number line and on the plane possess this property.

"Rate-Switching Unequal Error Protection for Wireless Electrocardiogram (ECG) Transmission"

TAO MA
Faculty advisor: Hamid Sharif
Major: Biology, graduate

Energy efficiency for mobile wireless electrocardiogram (ECG) communication is an important issue due to resource constraints in wireless Body Area Sensor Networks (BASN). Traditional high quality ECG transmission schemes require substantial amounts of energy usage, which may not available in BASN. Therefore, an adaptive approach is necessary to provide high quality ECG transmission with efficient usage of available energy resources. Related literature mainly focuses on data compression, where transmission energy is saved since the amount of data being transmitted is reduced. However, further reducing energy consumption based on communication strategy is rarely discussed in literature. In this paper, we analyze the characteristics of compressed ECG data, which show that different parts of the data are unequally important to quality ECG transmission in BASN. In this work, we propose a new Rate-Switching Unequal Error Protection (RSUEP) mechanism, which optimizes the distortion reduction of ECG data by adaptively assigning different

Rate-Compatible Punctured Convolutional (RCPC) codes to protect the differently important parts of the compressed ECG data. Simulation results demonstrate that our RSUEP scheme results in improved communication energy efficiency by at least 45 percent compared with traditional schemes in AWGN channel.

"The development of accurate sequence comparison tools for incomplete genomes using alignment-free approaches"

RAMEZ MINA
Faculty advisor: Hesham Ali and Dhundy Bastola
Major: Computer Science, graduate

Sequence comparison remains one of the most important Bioinformatics tool for establishing and discovering biological relationships. Comparing biological sequences is important to classify and cluster the sequences, which in turn lead to classify their functions and structures. Sequence alignment has been a popular method among researchers to estimate the degree of similarity between biological sequences. Sequence alignment is a useful tool that has been effective in various domains. However, when comparing incomplete genomes or genomes with high level of sequencing errors, alignment methods fail to accurately estimate the degree of similarity among sequences. This is considered a major problem since many genomes are currently obtained from high throughput sequencing devices that produces genomes in the form of large number of small DNA fragments. In this work, we propose the use of alignment-free methods to compare incomplete genomes or genomes represented by a large number of fragments. We tested two alignment-free methods, compression-based approach and motif-based approach, on various datasets and compare their accuracy with the traditional alignment algorithm. Our results showed that alignment-free methods outperform alignment for almost all datasets. Due the fine granularity of the alignment algorithms, the results also showed that the more incomplete the input sequences are the worse the results obtained using alignment. Within alignment-free methods, we show that compression-based algorithms using Lempel-Ziv compression algorithms produces the best comparison results for most input datasets.

"Variation in Gestational Cortisol Predicts Patterns of Growth and Maturation in Marmosets (Callithrix geoffroyi)"

AARYN MUSTOE
Faculty advisor: Jeffrey French
Major: Psychology, graduate

Cortisol levels associated with pregnancy can vary dramatically among individual females, and this variation can influence the somatic growth of offspring. Urinary cortisol was measured in the third trimester in 18 pregnancies for 5 white-faced marmosets (*Callithrix geoffroyi*) Somatic growth measurements of offspring were taken at day 2, 30, and 60 and thereafter at 60-day intervals until 540 days (n=21), and 29 offspring were measured through 300 days of age. We calculated a marmoset body mass index-BMI; (mass/(torso length) 2). Correlations between BMI and Gestational Cortisol trended negatively, day 180 being significant [r = -.45, p< .05]. For the full data set (n=29) we separated offspring into those exposed to high vs. low gestational cortisol. Differential exposure to cortisol impacted somatic measures as offspring developed. High-cortisol offspring had significantly lower BMI scores [F(6, 162) =2.94, p<.01], lower weights [F(6, 162)=2.17, p<.05], and longer torso lengths, [F(6, 162)=2.57, p<.05] during juvenile growth, relative to low-cortisol offspring. Post-hoc comparisons showed that BMI at 120 days through 420 days in high-cortisol offspring were significantly lower than in low-cortisol offspring [t's>2.3, p's<.05]. These data suggest that marmoset offspring exposed to high cortisol during the third trimester have delayed growth as juveniles, but exhibit catch up growth by adulthood.

"Black Orchestras in Omaha Before 1950"

JESSE J. OTTO
Faculty advisor: Bruce Garver
Major: History, graduate

Legendary Omaha Jazz musician Preston Love summed up Omaha's role in Jazz history by claiming, "If New York, Chicago, and Kansas City were the major leagues of jazz, Omaha was the triple-A. If you wanted to make the big leagues, you came and played in Omaha." Omaha's black community was home to a number of first-rate band leaders who mentored local

talent and attracted out- of-town musicians to relocate to Omaha. As Love's analogy indicates, many of these musicians eventually found employment in the most popular bands in the nation. In the early 1900's, some of the most popular black band-leaders in Omaha established a tradition of instructing and nurturing the next generation of musicians.

Interviews and contemporary newspapers provide the majority of the information in this thesis. I have conducted interviews with more than two dozen musicians and their acquaintances. From newspapers, books, and magazines I have assembled a collection of hundreds of interviews with musicians whose careers led them through Omaha. To provide historical context, I have also consulted appropriate secondary sources on the history of Omaha and the history of American music.

"A Dynamic Energy-Aware Model for Scheduling Computationally Intensive Bioinformatics Applications"

SACHIN PAWASKAR
Faculty advisor: Hesham Ali
Major: Information Technology, graduate

High Performance Computing (HPC) resources are housed in large datacenters, which consume huge amounts of energy and are quickly demanding attention from businesses as they result in high operating costs. Businesses are now even looking to re-locate their datacenters to places with low energy costs. Clearly "Energy" is becoming a key business driver. On the other hand HPC environments have been very useful to researchers in the Bioinformatics, Medical and related fields. The bioinformatics domain is rich in applications that require extracting useful information from very large and continuously growing sequence of databases. Most methods used for analyzing genetic/protein data have been found to be extremely computationally intensive, providing motivation for the use of powerful computers or systems with high throughput characteristics. In this paper, we provide a dynamic model for energy aware scheduling (EAS) in a HPC environment; we use a widely used bioinformatics tool running in a HPC environment. Our proposed EAS model incorporates 2-Phases, In the Offline Phase, we use sequences gathered from researchers and parallelize the runs to understand the run (speedup) profile of the program. In the Online Phase a feedback mechanism is incorporated between the EAS Engine and the master scheduling process. As scheduled tasks are completed, their AET is used by the EAS Engine to adjust the resources required for future task completion using the least number of nodes while still meeting a given deadline. The experiments suggest that for all the cases the deadline was met with minimum nodes thus reducing overall energy utilized.

"Analyzing the Evolution of Large Scale Dynamic Networks"

PRASHANT PAYMAL
Faculty advisor: Sanjukta Bhowmick
Major: Computer Science, graduate

Diverse areas, such as epidemiology, protein interactions, and ecology, are based on the study of systems of objects and their relationships, which are modeled as networks. These networks are generally expressed as graphs with the vertices representing objects, and edges representing the relationship between them. Our research concerns analyzing the structure and evolution of large-scale networks, which is crucial to areas, such as decision-making, where success depends on implementing correct responses to the changes in the system. The study of real-world networks has been identified as one of the "grand challenges" in science. A key feature in analyzing networks is the detection of communities, that is, closely connected groups of vertices. To date, most community detection algorithms focus on identifying highly associated groups of vertices in a non-evolving network. However, most real world systems such as social networks evolve with time, incorporating incremental changes at each time step. In this talk we will present an efficient method of tracking changes in the community structure as the network evolves and discuss their application to areas such as epidemiology, gene-networks and software engineering. We will also outline parallel computational techniques for applying this algorithm to large-scale graphs.

"Long Term Evolution OFDM based Physical Channel performance compared to Wimax"

FAHIMEH REZAEI
Faculty advisor: Hamid Sharif
Major: Computer and Electronics Engineering, graduate

Long term evolution (LTE), known as E-UTRAN (Evolved Universal Terrestrial Radio Access Network), is in process of standardization for future broad band wireless communication systems by 3rd Generation Partnership Project (3GPP). Orthogonal Frequency Division Multiple Access (OFDM) is proposed for LTE downlink due to its robustness to multipath fading, higher spectral efficiency and bandwidth scalability. However Single Carrier Frequency-Division Multiple Access SC-FDMA is selected for uplink which provides a smaller peak-to-average power ratio than OFDM, thus enabling less complex and/or higher-power terminals. LTE supports both frequency-division duplex (FDD) and time-division duplex (TDD), as well as a wide range of system bandwidths in order to operate in a large number of different spectrum allocations.
The main objective of my research is to analyze OFDM based channel capacity of LTE Release 8 and compare it to WiMax for MIMO 2*2 spatial multiplexing scenario. System bandwidth can be 1.4 MHz up to 20MHz and FDD scheme will be considered for downlink channel.

"The Ever Elusive Inanna/ Ishtar"

NICOLE ROBERTS
Faculty advisor: Joanne Sowell
Major: Art History/Anthropology, undergraduate

Scholarship done on ancient Mediterranean goddesses often focuses on broad ideas without conclusive data. Goddesses are lumped together based on similar attributes and functions. Inanna/Ishtar, an ancient Mesopotamian goddess of love and war, is seen as a prefigure of goddesses such as Astarte, Aphrodite, and Hathor. These goddesses share similarities and thus many scholars believe that, as the earliest deity, Inanna/ Ishtar is type to later Mediterranean goddesses. When focusing on similarities alone one can make a compelling argument for this theory. However, when the differences are brought to light, these goddesses become more individualistic. When studying ancient goddesses one must not only focus on similarities but also chronological, regional, and cultural differences. Jumping to conclusions using ambiguous similarities without conclusive evidence can cause a misinterpretation of the culture. There are many figurines found at Bethsaida, an excavation site that the Universtiy of Nebraska at Omaha takes part in uncovering, and they are automatically assumed to be Astarte, an early Hebrew Goddess, and thus an evolved form of Inanna/Ishtar. However, if these figurines do depict Astarte they should be studied as Astarte not as a later form of a previous goddess. By lumping goddesses together a crucial element of these different cultures is lost. One should study ancient Mediterranean goddesses as individual representations of the cultures with which they are connected.

"Mutagenesis of a Functionally Active Region of the Coxsackievirus B3 Genome"

BRITTANY ROBINETTE
Faculty advisor: William Tapprich,
Major: Biology, undergraduate

Study objective was to evaluate the extent that the simultaneous performance of cognitive tasks and walking affects kinematic gait variability. The experimental protocol: Twenty young adults walked on a treadmill for three minutes at their self-selected pace under the following conditions: without cognitive loading (control test) and while performing a secondary task (dual-tasks): naming, reading, semantic fluency, phonemic fluency, and dichotic listening. For each test the subjects walked for 3 minutes and adequate rest was provided between conditions. Data analysis: Gait variability measures were identified from both continuous (joint angles) and discrete variables (joint range of motion) for all strides of each condition. The Coefficient of Variation (CoV) was calculated to quantify the amount of variability in the discrete variables. The largest Lyapunov Exponent (LyE) was calculated to quantify the temporal structure of variability in the continuous variables. Results: As compared with the control test: 1/ CoV values for knee and hip range of motion significantly decreased in response to dual tasking, 2/ LyE values for all joint angles significantly decreased in dichotic listening tasks, and 3/ LyE values for knee and hip angles significantly decreased for the verbal fluency tasks. Discussion: Our results indicated that kinematic gait variability significantly decreased due to dual-tasks as compared to control test. Contrary

to reading and naming tasks, dichotic listening and verbal fluency tasks that require high-level of cognitive functioning affect the temporal structure of this variability by turning the system to a more periodic and rigid behavior in healthy young adults.

"A New Approach for Finding Protein Sorting Motifs"

CALEB SCHMID
Faculty advisor: Hesham Ali
Major: Bioinformatics/Mathematics/Computer Science/Chemistry, undergraduate

Translocation of proteins to their proper cellular destinations is important for the survival of any organism. Examples of known signal peptide systems include the LPXTG/sortase system and the PEP-CTERM/EpsH system. Due to the high conservation in these domains, it has been conjectured that similar sorting domains exist in other genomes. Thus, we can use motif-finding tools and multiple sequence alignment to search for such signals. Since a genome-wide search is unfeasible, we propose a hidden Markov model (HMM) based approach. Genomes are searched using the domain profile HMM compiled from LPXTG and PEP-CTERM-containing proteins after removing the motif. The resulting sequences are highly similar to the profile, and are used in a motif finding tool and/or multiple sequence alignment to discover any motifs that may be present in the sequences. We also use a reduced alphabet search option to find more sequences that contain a domain with hydrophobic amino acids followed by positive amino acids. The reduced alphabet search reduces the protein alphabet in the sequences groups of amino acids based on their properties. Using this approach, we were able to find sequences containing the LPXTG and PEP-CTERM domains in the genomes of *Staphylococcus aureus* and *Colwellia psychrerythraea* respectively, and to an LPXTG sorting domain in the genome of *Streptococcus agalactiae*. In addition, a full genome search of all bacterial genomes was performed using genomes obtained from NCBI's Bacterial Genome Database. The search revealed many new instances of the LPXTG and PEP-CTERM domains, and discovered occurrences of additional conserved motifs.
stations. The students' role in this experiment was to locate suitable sites for one permanent and 43 temporary stations across Nebraska through the use of maps, on site reconnaissance and public information resources, to initiate contact with, and to inform landowners of the purpose and intentions of Earthscope and the US Array. Criteria for sites were to include but were not limited to: well drained terrain, privately owned land, access to power source and communication utilities or cellular signal, and remoteness from public areas, heavy or regular traffic, pumping stations, railroads, large or fast moving bodies of water, or any other source of noise that could disturb readings.

"Building SPEC Dimensional Threat Model—Research in Modeling and Comprehension of Cyber attacks in SPEC Dimensions"

ANUP SHARMA
Faculty advisor: Robin Gandhi, William Mahoney , and Qiuming Zhu
Major: Computer Science, graduate

We are building a modeling system which is intended to acquire the Social, Political, Economical, and Cultural (SPEC) factors related to cyber attacks, evaluate the patterns of the attacks, and build a security model to assess the likelihood of similar attacks in the future. The goal of the project is to collaborate with and serve the Cyber community by providing early assessment and forecast of cyber threats. We begin by analyzing historical cyber attack events, identifying major factors in the SPEC dimensions, and mapping them to a set of attributes. Three key attributes (known as the "CIA") are Confidentiality (Whether the attack led to the unauthorized access to information), Integrity (Whether the attack led to the altering or destruction of information), and Availability (Whether the attack led to disruption of service, which otherwise, would be usable by an authorized user). We also look at the Motive (Motivation of the attacker behind the attack), Agent (the attacker), Means (methods, techniques, tools that attackers use), Victims of the attack, Outcomes and Consequences, and the source and target location. These attributes form a feature space for analysis. This analysis results in the concept formation which is derived by the use of reasoning rules. These rules are Formal Concept and Semantic Nets. Once a concept is formed, it is represented in an algebraic form as a model. This model will be a dynamic process that takes inputs (information such as news feeds), to produce an estimate (or a quantitative evaluation) of the threat levels.

"The role of an effective IT intervention for micro-enterprises"

CHANGSOO SONG
Faculty advisor: Kenneth Kriz
Major: Public Administration, graduate

Information technology (IT) interventions for micro-enterprises are fragmented and their approach lack theoretical and empirical foundations. While various researchers have conducted studies on the effects of IT adoption in micro-enterprises, little research has been conducted to explain critical aspects of an effective IT intervention for micro-enterprises from a theoretical perspective. This study aims to fill this gap and empirically investigate how IT interventions can effectively facilitate the process of IT adoption by micro-enterprises. The study draws on the concept of "Translation" of Actor-Network Theory (ANT) to analytically explain the process of IT adoption by micro-enterprises and the role of an effective IT intervention. Translation is composed of four process elements: problematization, interessement, enrollment, and mobilization. Based on these process elements, the study develops the theoretical lens through which a set of propositions are developed that enable IT interventions in micro-enterprises to be investigated. The processes of translation in micro-enterprises are identified through an interpretive case study approach. Through case studies of four micro enterprises, the role of IT interventions on IT adoption is analyzed. This paper suggests that effective IT interventions may have considerable potential for facilitating IT adoption among micro-enterprises across the United States and across the world in general. The key contribution of this study is an analytical model that may have potential for guiding IT interventions in micro-enterprises and assist researchers and practitioners in examining the effects of their IT interventions. This has implications for effective IT intervention policy development and implementation for micro-enterprises.

"User Perceptions on Online-Banking Systems"

SATISH MAHADEVAN SRINIVASAN
SACHIN PAWASKAR
Faculty advisor: Lotfollah Najjar
Major: Information Technology, graduate

Although the trend of on-line banking has increased in recent years, the customers have not shown enthusiastic participation in the past. This investigation examines whether there is any significant difference in the relevance of the dependent variables, specifically transactional security, information design, navigational design, visual design, web site trust, web site satisfaction and e-loyalty over successful promotion of on-line banking across different banks. A questionnaire of 23 questions classified under seven different categories was circulated among 150 participants identified to have banked with at most one of the banks. The results of the survey was analyzed both parametrically, using the MANOVA with seven dependent variables and a single independent variable, the different types of bank, and non-parametrically using the Kruskal-Wallis test.

"Influence of food availability on immune function"

ROBERT STANTON
Faculty advisor: Claudia Rauter
Major: Biology, graduate

Trade-offs exist between life-history traits such as physical activity, reproduction, and maintenance of the immune system. It has been suggested that organisms adjust immunological ability based upon a variety of factors including the amount of energy available over time. Utilizing this hypothesis, we investigated changes in immune response in the burying beetle Nicrophorus orbicollis when different food amounts were encountered. We predicted that immune function would be decreased as each beetle responded to reduced energy availability. Immunity was tested by measuring phenoloxidase activity levels in insect hemolymph. Loss of mass due to reduced energy intake was controlled for in statistical calculations. As their food intake declined, males and females showed a similar, significant decrease in protein concentration and phenoloxidase activity in hemolymph. Our results support general life history trade-off theory as immune system function was

reduced due to decreasing energy
availability. This would imply that in order to maintain a certain level of overall fitness, burying beetles adjust components of their physiology accordingly, including their levels of immune activity.

"The Effect of Distraction on Robot-Assisted Surgical Performance"

IRENE H. SUH
Faculty advisor: Ka-Chun Siu
Major: Occupational Health, graduate

Introduction: Operating rooms are generally full of distractions such as calls from the ward and consultations from the emergency department. Our aim was to investigate the impact of distractions on robot-assisted surgical performance.
Methods: Four medical students practiced in tying two intracorporeal knots with the DaVinci Surgical System. After practice, the participants were instructed to perform a suture tying task (ST) while at the same time were distracted with arithmetic problems, basic science problems, and a memory task. A control condition (no distraction) was also introduced. The time to task completion and the total distance traveled by the instrument surgical tips were used to evaluate performance. Because of the small sample size, independent T-tests were performed.
Results: A significant distraction effect was found for the arithmetic problems and the memory task in comparison to no distraction. The time to task completion increased by 132 sec (p=0.01) and 125 sec (p=0.03) for arithmetic problems and memory task, respectively. The total distance traveled increased by 984.78mm (p=0.04) for the arithmetic problems and 917.125mm (p=0.07) for the memory task.
Conclusions: Robot-assisted surgical performance was negatively affected by distraction. Performing surgical tasks requires cognitive functions as well as motor functions. Recognizing how surgeons respond to cognitive distractions while performing robot-assisted surgery is important in developing strategies for surgical education. Future studies will investigate the effect of combined distraction with noise from operating room and how it affects the outcomes.

"Law, Order, and Divine Female-Female S&M Role Play: An New Look at an Old Babylonian Tale"

DAVID SWENSEN
Faculty advisor: Rami Arav
Major: Religion, undergraduate

Since the 1950's scholars have been unable to understand why the goddess Ishtar would descend into the nether world in the ancient Mesopotamian text *The Descent of Ishtar into the Nether World*. However employing a queer re-reading strategy to the text, one which pre-supposes the existence of female- female erotic arrangements, reveals Ishtar's motivation for her descent into the realm of her S&M partner and dominatrix, Erishkigal, goddess of the nether world.

"Real-Time Fall Detection and Activity Recognition Using Wireless Sensors"

SUNDAR VAIDYA
DIVYA SINGH
NAVISH BAHL
Faculty advisor: Jong-Hoon Youn
Major: Computer Science, Management Information Services, graduate

Independent living requires one to be able to completely take care of oneself. While this may be an everyday routine to any healthy young individual, the case is rarely true for elderly people. Nursing homes welcome elderly individuals who require such assistant for living. Due to old age, some individual may have restricted mobility. This creates higher chances of acquiring injuries related to fall or complications that arise due to a fall if they move without support. The fear of falling, in turn, inhibits activities in the elderly and can affect their independent life. Numerous advances in health care technology have created an environment where anyone with reduced mobility may be just a button press away from care and support. In this paper, we present our findings from survey of papers that specifically address mobility monitoring. Also, we compare and contrast methods we have experimented with in providing reliable fall detection. In doing so, we believe we can assist in the independent living of elderly residents at the comfort of their own home by providing them with necessary tools.

"Perceptions of Probationers and Their Motivation for Successful Completion of a Probation Term"

STACY WAGONER
Faculty advisor: Lisa Sample
Major: Criminology and Criminal Justice, graduate

The numbers of criminal offenders on probation have been increasing in recent years; however, the numbers of individuals who successfully complete a probation term have decreased. For the sake of public safety, it is imperative to determine factors that may contribute to this trend. This study focuses on the perceptions of probationers in an effort to determine what factors may motivate them to succeed on probation. Data were gathered from probationers' files and semi-structured interviews with federal probationers and their probation officers. Specifically, data were gathered regarding both formal (e.g. treatment/programming) and informal (e.g. relationships, moral beliefs) social control mechanisms placed on probationers. The results of this research contribute in-depth knowledge of probationers' perceptions of motivational factors that may lead them to successfully complete probation terms.

"Multi-robot area coverage with dynamic map compression"

YI WANG
Faculty advisor: Prithviraj Dasgupta
Major: Computer Science, graduate

Covering the surface area of an initially unknown region using autonomous robots is a practical and important research topic in robotic systems. It is useful for humans to have robots cover or clear a region in various domains including agricultural crop harvesting, domestic vacuum cleaning, checking the surface of bridges, turbines and other engineering structures, humanitarian demining, etc. The objective of the robotic coverage problem is to design a technique that will enable multiple robots to cover a region while reducing the time and energy expended during their operation. My work has been to develop a coverage algorithm where each robot dynamically builds a partial map of the environment it covers and exchanges and fuses this map with the maps constructed by other robots that are within its communication range. To make the process more efficient, each robot compresses its coverage information and approximates the regions that have been previously covered. It then uses a virtual vector force field approach to avoid re-covering regions that have already being covered.

"A New Graph Theoretic Model for the Assembly of Short Read Sequences"

JULIA WARNKE
Faculty advisor: Hesham Ali
Major: Bioinformatics/Mathematics/Computer Science, undergraduate

Next-generation sequencing is becoming a strong platform in the biomedical field for accelerated, in-depth research of genome features, structures, and functions through the high throughput production of short read sequences. Like a genomic puzzle, these short reads must be assembled together before any clear insight into the original genome's features can be obtained. The sequence reads produced by next generation sequencing are short but plentiful; enough so that each region of a genome corresponds to multiple reads. Relationships between overlapping sequence reads assist the identification of fragments which are consecutive within the genome, allowing the recursive merging of these overlapping sequences until long stretches of contiguous genetic data, known as contigs, are recovered. Quite often this is a difficult task due to multiple issues such as overlap ambiguities, sequencing errors, and repeat regions within the original genome. To address the challenges of short read assembly, we are developing a computational model that employs graph theoretic techniques for sequence reconstruction. The model determines overlap relationships between reads and then maps the reads and overlap relationships, respectively, to nodes and edges in an overlap graph. Once an overlap graph is established, the algorithm finds a solution to the sequence reconstruction problem by first merging highly overlapping nodes into super-nodes and then traversing the reduced overlap graph. Results will include the performance of the model with various sequence read test data representing different types of genomic structure.

"Discourse marker use by non-native speakers: Analysis of stylistic variation in conversation"

ANN WOOLARD
Faculty advisor: Frank Bramlett
Major: Spanish, undergraduate

This linguistics research project was an investigation of patterns of use of discourse markers by non-native speakers of English. A transcription of one half-hour of undirected casual conversation between three participants was analyzed with regard to which discourse markers were chosen in an informal setting and their frequency of use in that context. The researcher expected that non-native speakers of English would use five common discourse markers: *I mean, like, oh, you know, and well*. Analysis of the data indicates an idiosyncratic pattern of DM use, including such expressions as *I tried to/not think/ remember, kind of, okay/alright, and yeah*. Research of this kind is important to the development of ESL programs that effectively teach natural-sounding English speech patterns to the burgeoning population of non-native speakers in the United States.

"Using Semantic Templates to Study Vulnerabilities Recorded in Large Software Repositories"

YAN WU
Faculty advisor: Harvey Siy and Robin Gandhi
Major: Information Technology, graduate

This study is an evaluation of an academic clinic in which parents are taught to implement academic interventions for their children in their homes. Survey data were used to examine the relationship between treatment integrity and child outcomes both at the time clinic services ended and at the time the parent completed the survey. Changes in parent knowledge, attitudes, and use of the intervention were also assessed. The types of changes and reasons for change were examined. The results indicated that child and parent outcomes were not impacted by treatment integrity; however, continued use of the intervention was related to more positive outcomes for both parents and children. Directions for future research are discussed.

Performances

"Mav'N Around"

JOSHUA GRAY
JOSHUA BUDA
Faculty advisors: Mark Dail and Gary Repair
Major: Broadcasting New Media, undergraduate

During our internship at UNO TV Josh Gray and Josh Buda met and decided to team up and utilize UNO's TV station and equipment to better our resumes. We figured out UNO TV doesn't have much comedy involved in their programs and we wanted to bring more creativity and laughter to this TV station. UNO TV has programs on the knowledge network and (TKN) which is all about learning and gaining knowledge. So we decided to make a show that teaches you how to do things in a small manner and make you laugh at the same time, so the show can air on TKN within their guidelines of learning. We began to brainstorm ideas and then create storyboards and scripts for a half an hour TV show we eventually named Mav'N Around or shall I say Maverick'n Around. We then started asking our fellow crew members to get involved and join our crew. Josh Gray and Josh Buda are also the secretary and President of (N.B.S.) national broadcasting society and entered this TV show into their comedy program contest and are one of the finalists as of February 18, 2010.

"The Unaccompanied Flute Solo: A Discussion and Performance"

SARA SCHUHARDT
Faculty advisor: Christine Beard
Major: Music Performance, graduate

The unaccompanied flute solo originated in the eighteenth century in a collection of flute music written by Jacques Hotteterre. Many other unaccompanied flute works were composed in this century, and their popularity increased in the nineteenth century, though style changed considerably. In the twentieth century, unaccompanied flute solos became rather innovative, incorporating extended techniques and radical new performance mediums. From both pedagogical and performance standpoints, unaccompanied pieces have notable advantages, which will be discussed in presentation of this material. A performance of an unaccompanied flute solo, Sonata Appassionata in f# minor, op. 140, will also be given. This piece was written by the German composer Sigfrid Karg-Elert in 1917, and its duration is approximately 5 minutes, 20 seconds.

"Mobile Phone Orchestra"

TIMOTHY VALLIER
Faculty advisor: Kenton Bales
Major: Music Composition, graduate

I propose to collaborate with the UNO Music Department students, faculty and alumni to present a performance from the UNO Mobile Phone Orchestra. The Mobile Phone Orchestra, powered primarily by the Apple iPod Touch and Apple iPhone devices, is a new music ensemble formed during this spring semester. The ensemble serves two direct purposes, to present new music in an approachable and interesting setting, and to support the creation of new music collaboratively and through non-traditional means. This performance will include a brief demonstration and overview of the ensemble and their devices. The group utilizes custom made battery powered speaker gloves, which have the benefit of allowing each performer to generate sounds directly from their body. The gloves also allow the group to be fully mobile. The performance will then include three vignettes highlighting the types of music being composed for the group. The first is a short Bagatelle composed and performed with the use of traditional notation and sheet music. The second is a concept piece. This piece utilizes some of the device's unique capabilities such as the accelerometer, touch screen, microphone sensor, GPS, and camera to create sounds. The score does not contain notes, but instead gives the ensemble written cues and orders of execution to perform the piece. Last is a brief improvisational work which will demonstrate a new style of conducting invented to show the possibilities of direction in manipulating the touch screen devices.

Poster presentations

"A Review of Anonymity in Collaborative Settings"

RUBA ALJAFARI
Faculty advisor: Gert Jan de Vreede
Major: Information Technology/Collaboration Science, graduate

Modern Computer Mediated Communication (CMC) technologies are increasingly leveraged in business settings to improve the quality of group work. Such technologies an be configured to enable or disable the anonymity of participants, as anonymity is believed to have an effect on collaborators' performance through neutralizing factors like fear of speaking and domination. Anonymity has been shown to affect group performance in various ways. Embedding it in new generations of CMCs provides expanded capabilities for different types of (semi)-anonymity. To better utilize these capabilities to enhance group performance, we need to have a deeper understanding of the effects of anonymity on group interactions and performance.

This study first reviews existing literature in the group work literature on anonymity to present the current state of knowledge regarding this concept. The study then identifies critical issues in this area, such as the degree of clarity in anonymity definition and measurement in particular contexts, types of anonymity, formation of anonymity, and theoretical frameworks used to study anonymity. The review concludes with providing directions for future research on anonymity in the context of virtual worlds.

"Mannose 6 Phosphate / Insulin-like Growth Factor II Receptor Dimerization"

JENNA ALLISON
Faculty advisor: Jodi Kreiling
Major: Chemistry/Biology, undergraduate

The mannose 6-phosphate/insulin-like growth factor II receptor (M6P/IGF2R) is a growth/tumor suppressing protein capable of protein dimerization. This protein consists of 15 similar domains that form five triplet repeats. Prior research indicates the protein contains several interaction sites. To test the importance of specific domains on dimerization, our goal is to see if the triplet containing domains 7-9 is able to interact with all five M6P/IGF2R triplets. The hypothesis is that association between two triplets will be stronger for identical domains and/or domains sharing common function. The triplet proteins were co-expressed by cellular transfection using lysates from Human Embryonic Kidney 293A cells. Immunoblots were performed to test protein expression, followed by immunoprecipitation assays to test interaction strength between two triplets. The results indicate that 7-9 stably associates with all five triplets, suggesting that the M6P/IGF2R does not require alignment of identical domains to form protein dimers.

"Exploring the Effects of Convergence Intervention on the Artifacts of an Ideation Activity Prior to Organization"

VICTORIA BADURA
AARON READ
Faculty advisors: Gert Jan de Vreede and Robert Briggs
Major: Information Technology, graduate

Organizations must enlist the efforts of groups to solve important problems. Six patterns of collaboration describe group behavior as they work towards solutions. The convergence patterns of collaboration-- reduce and clarify are key in helping a group focus effort on issues that are worthy of further attention. These group behaviors have not been extensively studied in the literature. In the current study, we further this research effort by exploring and characterizing the effects of a fast focus intervention on an ideation artifact. Researchers conducted an observational case study of executives addressing a real task within a large organization. Analysis of the problem statements generated during a problem identification and clarification session revealed several implications about convergence activities. The FastFocus thinkLet was found to reduce the number of concepts from 620 down to 145, a reduction of 76%. Ambiguity was reduced from 55% in the ideation artifact to 6% in the converged artifact. A serendipitous event during analysis allowed researchers to observe that the artifact created during a convergence activity may impact the cognitive load of future collaborative activities. Implications for brainstorming instructions were identified that may contribute to reduced ambiguity in ideation artifacts.

"Self-Directed Collaboration in Fan Fiction: How work is done?"

VICTORIA BADURA
Faculty advisor: Gert Jan de Vreede
Major: Information Technology, graduate

Online collaboration is increasingly vital to the success of organizations. However, it is not easy. One domain where online collaboration seems to be successful is in fan fiction. Since the advent of computer technology fans have been using the computer to gather together to share and expand the worlds of their favorite characters. Within this domain natural patterns of collaboration have emerged without being restricted by corporate organizational structures. An exploration of how collaborative work is accomplished in online fan fiction communities could lend insight into ways in which more traditional organizations could accomplish their online work. This study looks at the domain of fan fiction, poses research questions and suggests future directions for further examination.

"Impact of Income and Attendance on an Omaha After-School Program"

CARMEN BARNES
Faculty advisor: Jeanette Harder
Major: Social Work, graduate

This poster presentation showcases research and program evaluation of the Bethesda After School Academy, an Omaha after-school program for grade school students. The data was compiled from teachers' surveys and evaluation of each participant's academic progress throughout the school year. An MSW student from a graduate-level research course analyzed participants' attendance, academic performance, and family income levels in order to determine how the relationships affected the students' academic progress. The results showed that there was neither a statistically significant relationship between the students' family income levels and their academic performance nor between students' daily program attendance and their academic achievement. The implications are that students in the after-school program are performing academically regardless of their family income level or attendance record. Further implications and limitations will be discussed. From this presentation, the audience will gain an understanding of the Bethesda after-school program and how this research impacts Omaha children and after-school programs in the community.

"Through Thick and Thin: An Analysis of the Female Body Image and Attitude Change in Advertising"

JESSICA BERNHARDT
Faculty advisor: Chin Chung (Joy) Chao
Major: Communication, graduate

Over the past few decades, the topic of body image perception, distortion, and satisfaction (Furnham, Badmin, & Sneade, 2002) has developed significant interest. When looking at magazines, it becomes apparent that it is the media's fault for "spreading the message that women must be thin" (Polivy & Herman, 2004). The media has been blamed for "promoting certain body types as being socially ideal and desirable" (Sohn, 2009). This paper will research the topic of the ideal body image in advertising and find the reality of the female body image and what society deems realistic and ideal.

The thin body image ideal has been very obvious in magazine advertisements. Over the past few months, magazines have made changes to the body sizes of females used within their pages. For example, one fashion magazine that has made recent significant changes with the models used is *Vogue*. Based on these changes, this study hopes to determine the relationship between the body image of models used in magazines and the attitude change of the viewers. An analysis will be performed on selected advertisements in *Vogue* magazine.

This research will assist the communication discipline by helping determine what types of advertisements will create attitude change. The findings will help bring to light what causes viewers to react the way they do and what causes their attitudes to change.

"Health Rocks! Program Evaluation"

ZARA BLACK
JESSICA CHRISTIAN
Faculty advisor: Ruth Xia
Major: Child, Youth, and Family Studies/Psychology, undergraduate

This research focuses the program evaluation of the *Health Rocks! Youth Training*. Health Rocks! is a youth program that was brought to students across the country, grades 4 through 10, in order to promote healthy lifestyles. *The Health Rocks!* program is split into two levels of training, based on grade level and age. Elementary level training is comprised of children ages 8 to 12, and intermediate level training includes ages 12 to 14. Youth participants were given post-pre survey to assess how much the program affected the student's choices and lifestyles. The questionnaire was divided into four sections "I know that…", "I believe that…", "I am confident that…", and "In general…", to evaluate the increased knowledge, awareness, skills and likelihood of behavior change. Open-ended questions were also asked. This poster presentation will report summary results of the survey and comments from youth participants.

"Effects of Mood and Availability of Criteria on Evaluations of Solution Quality"

ANDY CALLENS
Faculty advisors: Lisa Scherer and Roni Reiter-Palmon
Major: Psychology, graduate

We are confronted each day with conflicting demands to assure accuracy of decisions while minimizing cognitive effort. Simply providing a rater with a set of bench marks as a decision heuristic doesn't guarantee better ratings. This study examined the effects of mood and ratings criteria on interpersonal and intrapersonal idea evaluations. We found that the availability of ratings criteria influenced the average ratings of solutions generated by others, but not oneself. Further, an interaction was found between mood and ratings criteria such that participant solution ratings more closely mirrored those of expert raters only when the participants were in a negative mood and given solution quality norms.

"Selection of an Organizational Facilitator"

ANDY CALLENS
BRAD HULLSIEK
STEPHANIE STEPHENS
Faculty advisor: Gert Jan de Vreede
Major: Psychology, graduate

Wasted meeting time costs American companies up to $37 billion dollars annually. In order to optimize meeting profitability, many companies have hired professional facilitators to lead their meetings. Although numerous texts and curriculum exist to teach facilitation skills, to date, research has failed to examine how to select the best possible organizational facilitator from a pool of candidates claiming to possess facilitation skills. For this study, we first asked an international sample of facilitators to the criticality of common facilitator tasks. Next, we determined what skills and abilities are necessary to perform these tasks. Finally, we used established research on employee selection to propose a facilitator selection protocol to evaluate facilitation skills. Finally, we examined the fairness and utility of our proposed selection test.

"Potential Climate Signals Revealed by Surficial Geologic Mapping of the Missouri River Floodplain"

JEFFREY CARRITT
Faculty advisor: Robert Shuster
Major: Geology, undergraduate

Large continental river systems record climatic alterations as either aggradational or degradational phases and/or changes in river pattern. Differences in sediment input and discharge drive these changes. Tectonic deformation along the valley floor of the Missouri River Valley within the study area is negligible during the Holocene; therefore changes in river pattern are attributed to responses to climate. Surficial geologic mapping conducted during the summer of 2009 along the Missouri River Floodplain, from South Sioux City, NE to Onawa, IA, identified several features indicative of climatic shifts in the Holocene deposits of the Missouri River. A widespread terrace within the study area spans the description of the Missouri River noted by the Lewis and Clark expedition. This incision event likely occurred during the Little Ice Age (1300-1850); however the exact

timing of the incision is unclear. Mapping efforts also documented the transitional phase of the Missouri River from a meandering to a braided system, the timing of the transition is also unknown, but well predates the incisional phase. This pattern shift might record a decrease in discharge relative to sediment supply that resembles a similar shift known from farther downstream that began approximately three thousand years before present. Samples collected for optically stimulated luminescence (OSL) dating will help constrain the timing of these alterations in river behavior. These samples will also provide quantitative information on river meander propagation rates in this region of the Missouri.

"Walk—Roll—Win: A program for Omaha Metropolitan Schools to encourage students to become more physically active through walking and biking to school"

MIDGE CHANDLER
Faculty advisor: Jennifer Huberty
Major: Community Health Education, graduate

Participation in physical activity among US youth has declined which can have an impact on their personal health. Along with the decline in physical activity, the prevalence of overweight children and adolescents has more than doubled since the 1960s. Another decline since the 1960s is the number of children who walk or bike to school. In 1969, 42% of children walked or biked to school and in 2001 only 16% of children walked or biked to school. Activities for increasing physical activity participation among children could include an active mode of transportation before or active school. During the month of April 2010, Omaha Metropolitan Schools will take on a challenge to encourage students and parents to walk or bike to school. Each day during the month, any student that walks, bikes, or scooters their way to school will be counted as an active participant in the challenge. Data will be collected weekly from participating schools consisting of children that use active transport to/from school. The school with the most walkers or bikers for that week will be rewarded with the Smoothie Making Bike Blender (a pedal-powered stationary bike w/blender attached). The bike blender is great way for students to interact and have fun while enjoying a healthy dairy drink. In essence, this challenge is a WIN-WIN for everyone. Our youth win by developing healthy lifelong habits both, physically and socially and the entire community wins by promoting a safer environment for kids to walk and bike to school.

"Enhancing Robot-Assisted Fundamental Surgical Proficiency using Portable Virtual Simulator"

JUNG HUNG CHIEN
Faculty advisor: Nick Stergiou
Major: Public Health, graduate

Robot-assisted surgeries are widely adaptable in various medical fields; however training programs using actual surgical robots are costly. The development of Virtual Reality (VR) training platform provides an inexpensive interface. The purpose of this study is to use a portable and low-cost virtual simulator to determine whether the VR training effect is transferable to an actual performance using actual robot.

Method: 10 participants were randomly assigned to either the experimental (VR) group or the control group. Two fundamental surgical tasks, Bimanual Carrying (BC) and Peg Transfer (PT), were developed identically in both actual and virtual environments. In the VR group, participants completed two surgical tasks in the Da Vinci Surgical System (dVSS) (Intuitive Surgical, CA) before and after a VR training. For the control group, participants completed the same procedures but practiced to maneuver two simulators in three-dimensional space in a PC video game. Time to task completion and total distance travelled of the instrument tip of dominant side were analyzed. The two-sample t-Test was used to analyze pre and post VR training effect.

Results: A significant reduction in the time to task completion ($p < 0.01$) and total distance travelled ($p < 0.05$) in both BC and PT tasks were shown for the VR group after simulated surgical skills training.

Conclusion: Our preliminary results showed that training with our custom portable virtual simulator improves the robot-assisted surgical proficiency. In addition, only training with simulated surgical tasks could transfer training effect to the actual performance in surgical robot.

"Coordination and nonlinear dynamics in the development of infant sitting postural control"

FABIEN CIGNETTI
Faculty advisor: Nick Stergiou
Major: Motor Control, post-doctoral research associate

We determined the relationship of the trunk-pelvis phasing with the center of pressure (COP) nonlinear dynamics as sitting posture develops over time. Ten typically infants were followed as they developed the ability to sit upright. Coordination was evaluated using the mean absolute relative-phase (MARP) between the trunk and the pelvis. Lyapunov Exponent (LyE) and Approximate Entropy (ApEn) of the COP data were also calculated. All dependent measures were obtained from both the anterior-posterior (AP) and medio-lateral (ML) planes of motion. Spearman correlations between MARP and LyE/ApEn were conducted. MARP values were negatively correlated to both LyE and ApEn values in the AP plane of motion. Accordingly, the more the out-of-phase (MARP values close to 180°) was the coordination between the pelvis and the trunk as sitting posture developed, the smaller were the values of the LyE and ApEn, reflecting more regular COP oscillations with less divergence in the movement trajectories. No significant correlations were observed in the ML plane of motion. The relationships identified in the AP plane of motion between the coordination and COP variability indicated that more out -of-phase movement patterns between the trunk and pelvis relate to better controlled and more stable postural behavior. The absence of relationships in the ML plane of motion suggested that development of early sitting postural control mostly occurs in the backward-forward direction. As infants develop greater sitting independence, the degrees of freedom of the pelvis and trunk appear then to be released to allow greater stability with small adjustments of the COP.

"Use of the multinomial function to map variations in the degree of organization in fracture systems"

BART CUBRICH
Faculty advisor: Harmon Maher
Major: Geology/English, undergraduate

Polygonal fracture arrays are common (e.g. mudcracks, columnar jointing, polygonal fault systems, and some vein networks). Generated by internal processes such as dessication, cooling, and syneresis, the fracture strikes are expected to have a random distribution. This expectation can be tested using a Chi square test with a sufficient number of data points. In published images of polygonal fault systems, however, fracture patterns that test as statistically random appear to be organized and non-random in portions. Thus, the fracture pattern consists of a mosaic of organized subareas that constitute a larger array without preferred directions. The Chi-square test cannot be used for the subareas, however, the use of the multinomial probability function can provide a local measure of the degree of organization , allowing visualization of the mosaic pattern. This was applied to published polygonal fault maps by digitizing the faults into representative line segments. The resulting maps identify some organized subareas readily evident to the eye, and some that are not, and help document the pattern where locally organized fractures contribute to a regionally random pattern. Comparing maps generated from the same data set, but with increasing n, provides additional useful information. Such maps could also explore why less organized subareas exist in ordered fracture sets.

"Non-Aeronautical Revenue Generated by Privatized Airports vs. Public Airports"

HOWARD DAVIS
Faculty advisor: Pat O'Neil
Major: Air Transportation Administration, undergraduate

Airports across the United States have not been immune to the recent economic downturn. In a struggle to break even, many airports have attempted to increase non-aeronautical or commercial revenue streams. To improve revenue streams airports may add retail, concessions, or new services. In the United States

commercial airports are operated entirely by government entities, often counties, cities, or quasi-governmental authorities. However, in Europe and many other parts of the world, airports have been leased to the private sector. In April of 2009, a plan to privatize Chicago's Midway Airport fell through in the midst of economic turmoil. Despite this setback, the push towards U.S. airport privatization is still strong. Proponents argue that privatized airports may be better at generating critical non-aeronautical revenue. This study investigates whether privatized airports generate more non-aeronautical revenue than their public counterpart. Preliminary data from the annual reports of 5 public U.S. airports and 4 private companies, which operate 10+ airports in Europe and Japan, were compared from 2001 to 2008. The results indicate that private airports generated approximately twice the amount of non-aeronautical revenue per passenger than their public counterparts.

"Former Low-Track Student Reactions in Heterogeneous Junior English"

KIMBERLY DE LA CRUZ
Faculty advisor: Wilma Kuhlman
Major: Reading, graduate

The purpose of this study was to describe the reactions of three students who had previously been in a low-track sophomore English class with high teacher expectations and subsequently enrolled in a heterogeneously-grouped, college-bound English class as juniors. For three academic quarters, data were collected on the students' responses to the heterogeneous junior English course. Collected data included student interviews, student observations, samples of student work, and researcher notes in a journal. At the end of the study period, data were triangulated to determine responses of individual students and themes present in each of the case students. The following themes were evident across the case students: a) The teacher-student relationship plays a role in student motivation and achievement, b) opportunities for socialization and collaboration increase classroom engagement, c) case students are not full members of the college-bound Discourse community, and d) achievement on standardized reading tests loosely predicts success in the college-bound English classroom.

"Performance of dual-tasks requiring language perception, attention, and executive control processes have differential effects on stride width in young adults"

LESLIE DECKER
SARA MYERS
Faculty advisor: Nick Stergiou
Major: Motor Control and Cognition, post-doctoral research associate

We investigated the effects of varying cognitive demands on mean step width and step width variability (SWV) in healthy young adults, by exploring both the amount of variability and the fractal-like structure of variability of the step width time series through dual-task conditions. The experiment consisted of two sessions. In one, participants were only tested with the cognitive tasks to evaluate auditory attention and executive functions. At the other session, participants first walked on a treadmill for three minutes at their preferred walking speed without an explicit cognitive requirement, the single-task walking condition. Then, in the dual-task conditions, they walked at the same speed while performing three conditions of a dichotic listening (DL) test. No effects attributable to setting (sitting vs. walking) were found with respect to DL performance. Yet, increased right ear advantage was observed during the non-forced (free attentional focus) DL condition while walking compared to sitting. Amount of SWV significantly increased during the forced-left (focused attention to left ear) condition of the DL test, whereas the fractal structure of SWV was significantly deteriorated during both the non-forced and forced-left conditions of the DL test. The present study is the first to demonstrate that, contrary to the central tendency measure, both linear and nonlinear variability measures were sensitive not only to the effects of dual-tasking but also to the different levels of cognitive demands imposed by the DL conditions.

"Physiological Responses of Recreational Badminton Match Play"

PALLAV DEKA
Faculty advisor: Kris Berg
Major: Exercise Science, graduate

The epidemic in obesity and related health concerns is related to the sedentary nature of the modern lifestyle. It is of interest and value to know the energy expenditure of different types of physical activities including games and sports. The energy cost of recreational badminton match play has not been accurately measured using direct measures of oxygen cost. Therefore, it is not know if recreational badminton play is of sufficient intensity to meet the recommended guidelines set by the American College of Sports Medicine (ACSM) for aerobic fitness. Hence, the study aims to find the physiological responses of recreational badminton players during match play. Sixteen healthy badminton players aged 19-50 years of age will participate in the study. Subjects will be paired up and each subject will participate in a treadmill testing session to assess peak oxygen uptake and two badminton match play sessions lasting 30 minutes. Oxygen cost, blood lactate, heart rate and step count will be monitored during match play. Statistical analysis includes descriptive statistics and one way ANOVA to compare physiological measures over 10 minute period of play.

"The Influence of Brain Hemispheric Dominance on Mate Selection"

KYLE DUNOVAN
Faculty advisor: Rosemary Strasser
Major: Psychology/Neuroscience, undergraduate

In this study, hemispheric brain dominance was analyzed with respect to its implications in attraction and mate choice. Two vignettes were used to portray potential mates of right and left hemispheric brain dominance that participants rated based on the measures of attractiveness, suitability as a long term partner, eagerness to better get acquainted with the target, the target's fitness as a potential soul mate, and similarity. We hypothesized that participants would be more likely to select the target with a similar hemispheric dominance as a potential mate. The results confirmed our hypothesis, as participants were significantly more likely to choose the target with a corresponding hemispheric dominance to their own.

"Measuring Stress and Attachment Behaviors of Shelter Cats"

KATHRYN DYBDALL
Faculty advisor: Rosemary Strasser
Major: Psychology, graduate

A recent study, Dybdall and colleagues (2007) found behavioral stress of cats surrendered by their owner (OS) significantly higher than that of stray (S) cats suggesting that OS cats may represent an under recognized group at greater rist for the effects of stress in shelters. The first part of the present study aimed to validate a behavioral measure for cat stress (Kessler & Turner, 1997) by comparing it to levels of the stress hormone, cortisol, collected in fecal samples in shelter cats. The second part of the study tested the hypothesis that the increased stress observed in OS cats was due to the severing of a social-bond with an owner. Thus, it was predicted that OS cats would exhibit attachment behaviors towards humans when given the opportunity. For attachment behavior, 46 cats in the adopt area were videotaped and scored for approach and proximity time to a human. Data from this study did not find a relationship between fecal cortisol measures and behavioral stress scores. However, cortisol is one measure of stress and other measures, such as heart rate, may be more representative of the existing behavioral state. Results from the attachment behavior study suggest that adoption decisions are likely multi-factorial and attachment behaviors may play a role. Latency to approach and proximity to humans may represent dimensions of cat personality which may influence adoption rates for shelter cats. This study is important in assisting shelters recognize and address stress in cats and increase our understanding of the cat-human bond.

"Efficacy of Religious Rituals for Persons in Late Life Maintaining Spiritual Well-Being"

PAUL FALKOWSKI
Faculty advisor: James Thorson
Major: Gerontology, graduate

The purpose of this study was to determine, among persons in late life, i.e., over the age of 65, the efficacy of the practice of religious rituals to produce and/or maintain a sense of spiritual well-being. For people experiencing the challenges of late life, religious rituals may become a salient factor for maintaining spiritual well-being (Friedman, 2003). Participants were selected from the population in Omaha independent living facilities and senior centers. Four scales were used: 1) "Ritualistic Scale - Five Dimension Scale of Religiosity" (Faulkner & DeJong, 1966), 2) "Ritualism Scale – Maranell's Religiosity Scales," (Maranell, 1974), 3) Religious Orientation Scale (Allport & Ross, 1967), and 4) the "Spiritual Well-Being Scale" (Paloutzian & Ellison, 1982). The results were used to determine correlations between the subjects' preference for formal ritualism in their worship services, the frequency of formal rituals in their daily lives, their current intrinsic/extrinsic religious orientation, and their self-reported spiritual well-being. Correlational analysis and multiple regression analysis of the data shows that a positive relationship of .27 where $p<0.5$ exists between test scores that measured positive attitudes about religious rituals and spiritual well-being.

"Effects of resistance training with vascular occlusion on brachial artery flow mediated dilation"

AMANDA FLETCHER
KELSEY BLUNCK
Faculty advisor: Kris Berg
Major: Exercise Science, graduate

Traditional weight training in persons with cardiovascular disease exposes people to some risk. A new and novel technique has been developed to reduce this risk. This method restricts blood flow to the working muscles using a tourniquet to occlude the artery while the person lifts. The methods for this study will be to examine how this type of resistance training affects dilation of the brachial artery. Doppler ultrasound equipment will be used to examine changes in arterial diameter. This training technique has not previously been used to assess improvements in arterial diameter. Participants in this study will be randomly chosen and assigned to one of the following groups: traditional resistance training, or resistance training with vascular occlusion. Each group will perform bicep curls. Participants in the traditional resistance training group will have no occlusion during exercise, will lift 80% of their peak load, and will compete three sets of 10 repetitions. Those in the occlusion group will perform at 40% of their peak load and will complete three sets, each to exhaustion. An independent t test will be used to compare differences in brachial artery diameter between the two groups, and a dependent t test to find differences within the groups, pre and post training. These results may show that resistance training with vascular occlusion is an effective mode of exercise for improving resting arterial diameter.

"Mapping Surficial Features in the Missouri River Valley"

TIMOTHY FREED, SR.
Faculty advisor: Robert Shuster
Major: Geology, undergraduate

In 2008, I participated in a study of the Missouri River valley from Vermillion, SD to Jefferson, SD mapping the river's movements during the Holocene. The study was part of a REU granted by the National Science Foundation to the University of Texas-Arlington (supervised by John M. Holbrook, Ph.D.) and the University of Nebraska-Lincoln (supervised by Ronald J. Goble, Ph.D.) and included nine other students. My research included analysis of: a) aerial photos; b) topographic maps; c) data compiled from boreholes drilled by manual auger; and d) field observations. I also collected a sand sample for Optically Stimulated Luminescence dating. Our group then traveled to Lincoln, NE where I assisted in sample preparation for processing. Using data obtained, I mapped surficial features in my area. Other students performed similar research nearby and our efforts resulted in six surficial maps in this segment of the Missouri River. Aerial photos reveal scars where the river previously flowed. Elevations on both sides of the river provide evidence of at least one paired terrace. Core samples from our drill sites confirm old channel and point bar locations. We also identified several splays from aerial photos and core sample analysis. Analysis of the data indicates that

changes in this area of the Missouri River valley reflect a response to a change in climate. The progressive drop in elevation of the valley is evidence of decreasing river discharge as glaciers receded. Changes from braided to meandering channels were observed in the surficial record demonstrating climatic variations.

"How have airline baggage fees impacted passenger complaints?"

JOSEPH FRERICHS
Faculty advisor: Pat O'Neil
Major: Aviation—Air Transport Administration, undergraduate

This study has investigated how the addition of airline baggage fees has affected consumer complaints. A time-series analysis methodology was used to identify significant points of interest involving airline baggage complaints overtime. The Department of Transportation annual air travel consumer reports were examined as the primary research tool. Other areas of interest that were taken into consideration were airline mishandled baggage rates and airline baggage revenues. The study concluded the most significant factor affecting consumer complaints was the mishandled baggage rate. The study provides data relative to airline baggage fees and as well as a list of variables for other possible contributing factors.

"The Impact of an Online Intervention on Physical Activity and Self-Worth in Women"

BARBARA KAY GRANT
Faculty advisor: Jennifer Huberty
Major: Physical Activity in Health Promotion, graduate

Fit Minded is a physical activity (PA) book club for women, which promotes healthy lifestyles by focusing self-worth (SW) to increase PA. It is based on four years of research (Women Bound to Be Active) which shows a book club format that offers social support and PA education can significantly increase PA and SW in women. Fit Minded is mediated both face-to-face and online. Members in Omaha participate weekly for 12 weeks in a face-to-face book club meeting streamed live to Fit Minded members online. Members discuss fiction and non-fiction books related to a syllabus based on Social Cognitive Theory and Transtheoretical model to facilitate discussion about SW and PA education. Goal-setting is facilitated with pedometer logs online or a written pedometer diary. Online members may also chat with their peers and with a PA health promotion professional. Current research shows online interventions may be feasible to increase PA in adults, however, to our knowledge, there is no online-mediated research that has focused on SW to increase PA in women specifically. Therefore, the purpose of this study is to determine the effects of a PA book club, mediated online and face-to-face, on PA levels and SW in women.

"Fate of seeds after incomplete recovery of scatterhoards by a seed-eating rodent"

LISA GROBECK
Faculty advisor: Jeremy White
Major: Environmental Studies—Life Sciences, undergraduate

Scatterhoarding is a behavior in which an animal buries seeds beneath the surface of the ground for later retrieval. This behavior is an important means of dispersal for many plants if scatterhoards are not recovered, or if seeds are overlooked during recovery. Ord's kangaroo rats (*Dipodomys ordii*) transport seeds in their cheek pouches, scatterhoard seeds, and incompletely recover many of these scatterhoards. After recovery, some seeds remain buried in the cache, kicked out of the cache and lightly covered with sand, or exposed on the surface near the cache. The purpose of our study was to determine whether incomplete recovery by *D. ordii* enhanced germination and establishment of seeds of Soapweed yucca (*Yucca glauca*) compared to abiotic dispersal (i.e., gravity and wind). We collected yucca seeds, exposed some seeds to cheek pouches of kangaroo rats, and planted seeds in a laboratory under different burial conditions that imitated abiotic dispersal and incomplete recovery by *D. ordii*. Handling by kangaroo rats had no effect on germination or establishment of seeds; however, burial conditions influenced germination and establishment. Significantly more covered seeds germinated than buried or exposed seeds. Moreover, covered seeds were the only seeds that established in soil, suggesting that depth of burial is important for establishment of Soapweed yucca seedlings. The optimal depth for successful establishment may occur when seeds drop from plants and are covered with sand by wind, or when kangaroo

rats scatterhoard seeds, kick seeds out of caches during recovery, and unintentionally cover them with sand.

"Walk to School Day 2009 at Jackson Elementary School"

SARAH HANIFY
Faculty advisor: Erin Porterfield
Major: Social Work/Public Administration, graduate

My poster presentation for the 2010 UNO Student Research and Creative Activity Fair will utilize information from a project created in the spring of 2009 for a Generalist Practice II class in the MSW curriculum. My project group worked with Activate Omaha, a non-profit that works to encourage people to live more active, healthy lives, and Jackson Elementary School. Our focus for this project was to highlight the importance of health and well-being throughout a child's life. With the help of our two community partners, we planned a Walk to School Day event, as well as created some incentives for encouraging the students to walk to school more frequently. My project group considered the event a success, with almost full participation from the students at Jackson Elementary. The principal let us know the day of the event that only seven students were absent that day, and the rest of the school was participating, for a grand total of 263 students. In addition, we had approximately 30 – 40 teachers, administrators, and parents in attendance as well. The students were excited to participate and enjoyed having a chance to be outside on the beautiful April day. Via a follow-up call to the principal, I learned that though this specific event has not been replicated, the school has continued to emphasize a healthy lifestyle through providing fruits and vegetables as snacks everyday as well as participation in a UNO-sponsored program that encourages students to be active during recess.

"Negative Creativity: The Effects of Task and Emotional Intelligence"

DANIEL HARRIS
Faculty advisor: Roni Reiter-Palmon
Major: Psychology and English, undergraduate

Negative creativity (NC) is an aspect of creativity that has received little theoretical attention and practically no empirical attention. This study attempted to develop a measure of positivity vs. negativity and link this to a personality variable (Emotional Intelligence). This study used available data from 187 participants: 66 men (35%) and 121 women (65%), with a mean age of 22. Participants, among other tasks, completed an emotional intelligence (EI) test (BarOn EQ-I) and one of three problem-solving tasks. The important research questions for this study are whether EI predicts NC, if there are task-based differences in NC, and if EI and task effects interact in predicting NC. Preliminary analyses indicate that particular indices of negative creativity are significantly negatively correlated not only with the participants' composite EI scores, but also with certain EI subscales, namely emotional self awareness, assertiveness, interpersonal relations, social responsibility, reality testing, and impulse control.

"Stochastic Vibration as a Therapeutic Modality to Improve the Development of Sitting Posture in Children with Cerebral Palsy"

JOSHUA HAWORTH
Faculty advisor: Nick Stergiou
Major: Biomechanics, graduate

Sitting posture is a critical motor milestone allowing for increased attention, exploration, and perception of the environment leading to enhanced learning (Rochat & Goubat, 2000). Perceptual-motor therapy has been shown effective in improving sitting posture in children with cerebral palsy (CP) (Harbourne et al, 2006). Stochastic mechanical vibration at the base of support has shown to improve posture in adults with stroke, balance problems, and diabetic neuropathy (Liu et al, 2002). This experiment evaluates a combined perceptual -motor and vibration therapy to develop sitting posture in children with CP. Six children, 18-72 months, with moderate or severe CP were assigned to one of two treatment groups; provided twice weekly for twelve weeks. Both treatments incorporated a perceptual-motor approach emphasizing child-directed, self-initiated movement designed to promote the exploration of the motor requirements for controlling sitting posture. One also provided non-perceptive, stochastic mechanical vibration at the surface. Measures of the amount of postural sway included root-mean-square, range, and sway path. Measures of the temporal structure of movement trajectories of postural sway included

Approximate Entropy (repeatability of these movements) and Lyapunov Exponent (divergence of the movement trajectories).

A mixed 2x4 ANOVA (month X treatment) revealed between groups effects for all variables, $p<0.05$. Within groups differences and interactions were not observed. However, many of the variables exhibit similar trends between the vibration treatment and typically developing infants (age 4-8 months), suggesting that children with CP, given vibration treatment, are able to approximate the development patterns of typically developing children.

"After School Program Attendance and Classroom Behavior: Findings from an Evaluation of an Out-of-School Time Program"

KRISTINA HAYNIE
Faculty advisor: Jeanette Harder
Major: Social Work, graduate

The effectiveness of after school programs has been a point of contention among researchers. While some studies have found that participation in these programs is positively correlated to good behavior, others have found the opposite effect. This study was designed to evaluate the relationship between after school program attendance at a local elementary school and participant behavioral outcomes in the regular, school-day classroom. This program provides hot meals, academic tutoring, and enrichment activities to students in kindergarten through sixth grade from low-income families. After reviewing the components and demographics of this program, a review of the literature will be presented. An explanation of the outcome measurement tool will be followed by a discussion of the results and implications. A positive correlation was found between these two variables. On average, participants who attended the program more days received higher behavioral scores on a teacher survey. These findings seem to contradict the findings from a major evaluation of federally-funded after school programs. Further study is needed to evaluate the impact of after school programs on participant behavioral outcomes.

"Basic Biomechanical Parameters in Patients with Peripheral Arterial Disease: A Critical Review of the Literature"

NEIL BARRINGTON HUBEN
Faculty advisor: Nick Stergiou
Major: Biotechnology, undergraduate

Peripheral arterial disease (PAD) is a manifestation of atherosclerosis in the lower extremities which significantly reduces arterial blood flow causing muscle ischemia during physical activity and abnormal gait. Abnormal gait can be defined according to temporal and spatial parameters. The current study critically reviewed and summarized the data pertaining to basic gait parameters in PAD patients. Previous studies have explored the effects of PAD on gait speed, cadence (steps/minute), and stride length. This study concluded that PAD results in significantly altered gait compared to controls during ambulation. The majority of papers examining gait parameters in PAD patients and controls documented that PAD patients have significantly decreased gait speed, cadence, and stride length. There is a paucity of data examining gait parameters as compared to (a) rudimentary measurement of initial and absolute claudication times and distances and (b) subjective measurement of the Walking Impairment Questionnaire (WIQ). The baseline gait parameters examined in this study suggest the presence of ambulatory abnormalities in PAD patients; however they provide limited pathophysiological explanations. Future studies should implement the use of advanced biomechanical analysis to overcome current limitations in order to further understand the underlying neuromuscular mechanisms associated with PAD.

"Linear and Nonlinear Assessment of Postural Control in Multiple Sclerosis Patients"

JESSIE HUISINGA
Faculty advisor: Nick Stergiou
Major: Biomechanics, graduate

Disturbances in balance and postural control are some of the first reported symptoms of Multiple Sclerosis (MS). Lack of measures to objectively quantify movement impairments in MS is a major clinical problem. A protocol is needed to assess postural stability

of MS patients. Center of Pressure (COP) measures from the base of support could provide the necessary precision to define balance deficits in MS. Balance of 19 MS patients and 15 healthy controls was assessed with eyes open and closed. Variability of COP sway was quantified with Root Mean Squared (RMS) (a linear measure of amount of sway), Lyapunov Exponent (LyE) and Approximate Entropy (ApEn) (nonlinear measures of the temporal structure of the sway patterns). MS patients had a significantly higher RMS value compared to controls. MS patients also had a significantly lower LyE value compared to controls and a significantly lower ApEn value compared to controls. Based on RMS, there is an increased amount of sway of MS patients compared to controls, but both LyE and ApEn reveal less complexity in the sway paths of MS patients compared to controls and differences in the temporal structure of variability as a result of sensory input. Overall, there is a decrease in complexity due to identified pathology that corresponds well with the optimality of variability hypothesis. These results can provide the foundation for the development of the protocol needed to assess onset and severity of MS as well the effect of therapeutic interventions for these patients.

"Effects of Cadence on Cycling Efficiency and Performance"

ROBERT JACOBS
Faculty advisor: Kris Berg
Major: Exercise Science, graduate

Purpose: The purpose of this study is to examine the influence of three different cadences on cycling efficiency in well-trained cyclists. **Methods:** 1) The first day of testing well-trained cyclists will perform a VO2max test on their own racing cycle mounted to a Computrainer Pro cycle ergometer (RacerMate Inc. Seattle, Washington) in order to determine peak wattage (Wpeak). 2) Subjects will perform three cycling tests consisting of a five minute warm-up followed by a six minute period performed at 60% of Wpeak. The tests will be performed at cadences of 60, 75 and 90rpm with a 15 minute rest period between sequential tests. The cadences will be randomly assigned in order to avoid an order effect, and sequential testing days will be performed within 7 days of one another. Oxygen consumption will be assessed via a Parvo Medics metabolic cart (ParvoMedics, Sandy, Utah), blood lactate levels will be assessed with a Lactate Pro Handheld analyzer (Nova Biomedical, Waltham, Mass). Heart rate will be monitored with a Polar Heart Rate monitor (Polar Electro, Lake Success, New York). The findings of this study may provide a better understanding of how cadence in competitive cycling can affect efficiency. This information may aid in the development, design and implementation of training programs for competitive cyclists and their coaches.

"Synthetic Air Traffic Management System for Non-Towered Airports"

NICHOLAS JOHNSON
GRANT GARGETT
NICHOLAS SIEBKEN
AMBER KEYES
Faculty advisor: David Byers
Major: Air Transportation, undergraduate

This project investigates the use of available technologies to improve situational awareness at airports that do not have an air traffic control tower, thereby reducing risk of midair, runway, and ground incursions. Specific research regarding different technologies available to airports including NextGen Automatic dependent surveillance-broadcast system (ADS-B), passive and active radar systems, and ground surveillance systems that may be utilized to mitigate air traffic risks at busy, non-towered airports by separating air traffic during normal periods, and to create alerts during busier times, possibly requiring human air traffic controller interaction. This research may provide alternative means to safely separating traffic in the air and on the ground rather than defaulting to installing expensive and labor intensive air traffic control (ATC) facilities.

"Gait Variability Measures Reveal Differences between Multiple Sclerosis Patients and Healthy Controls"

JEFFREY KAIPUST
Faculty advisor: Nick Stergiou
Major: Exercise Science, graduate

Multiple Sclerosis (MS) is a neurological disorder involving progressive gait impairment such that only two thirds of MS patients will retain the ability to

walk 20 years after the diagnosis. Temporospatial measures have revealed that MS patients have a shorter stride length and spend more time in double support compared to healthy controls, but no studies have assessed gait variability differences. Considering that gait variability was shown to be a strong predictor of pathology and falls during gait, such an assessment seems very important. Walking kinematics during three minutes of treadmill walking were collected from 10 MS patients and 10 healthy controls. The Coefficient of Variation, Approximate Entropy (ApEn) and Detrended Fluctuation Analysis (DFA) were used to investigate the fluctuations present in stride length and step width from continuous strides. CoV showed no differences between groups using either stride length or step width. ApEn revealed that MS patients had significantly lower values than healthy controls for stride length ($p<0.001$) and for step width ($p<0.001$) for step width. Both ApEn and DFA reveal a more predictable and less complex time series for MS patients. The decrease in complexity implies that MS patients have reduced capacity to adapt and respond to perturbation during gait. These results are in agreement with the optimality of movement variability hypothesis proposed by Stergiou and colleagues which suggest that identified pathological populations have less than optimal movement variability.

"Lower Extremity Joint Kinematic Variability as Produced by Virtual Reality During Backward Walking"

DIMITRIOS KATSAVELIS
Faculty advisor: Nick Stergiou
Major: Biomedical Sciences, graduate

In the present study, we explored how changes in visual feedback, using a virtual reality (VR) environment, affects gait variability during backward walking (BW). Six healthy young adults underwent three backward and one forward condition on the treadmill at their self selected pace (SSP), while kinematics was recorded with a motion analysis system. Subjects were asked to walk for 8 minutes at each of the following randomly presented conditions: (1) backward walking with no optic flow, (2) backward walking with optic flow perceptually equivalent to their SSP, (3) backward walking with optic flow perceptually equivalent to the SSP, but in the opposite direction, and (4) forward walking with optic flow perceptually equivalent to their SSP. Gait variability was assessed from the lower-limb joint angles in terms of the sagittal ankle, knee and hip joint's range of motion (ROM) from 350 gait cycles. The ROM time series were then evaluated with measures of the amount (CV: coefficient of variation) and the structure (ApE: approximate entropy; LyE: Lyapunov Exponent) of the variability present. Besides the expected reduction of the SSP and the restricted ROM during the BW conditions, linear analysis showed that CV values were very sensitive to differentiate amount of variability between forward and backward conditions, but not among BW conditions. Nonlinear analysis as expressed by ApE supports the notion of higher complexity during BW, while LyE values were inconclusive. These findings were expected, since BW is not only more physiologically demanding, but also is a novel task for most people.

"Correlation Dimension Can Describe Infant Sitting Postural Development"

ELENA KOKKONI
Faculty advisor: Nick Stergiou
Major: Exercise Science, graduate

We examined how Correlation Dimension (CoD) changes with development in typically developing (TD) infants during sitting posture. CoD quantifies how the center of pressure (COP) from the infant's swaying body is organized within the state space; evaluating the degrees of freedom of the swaying system. Thirty five TD infants scoring above -0.5SD on the Peabody Developmental Scale came to the lab twice per month for four months. A physical therapist ranked sitting behavior according to three stages: 1) Prop sitting, 2) Variable, about 10 seconds of sitting, and 3) independent sitting all the time. Stage of sitting was considered the appropriate variable of development, because of the age variability which infants began to sit. For each session, three trials of unsupported sitting were recorded using a force platform for 8.3 seconds. CoD was calculated for both the anterior-posterior (AP) and the medial-lateral (ML) directions. We performed one-way repeated measures ANOVA with a post-hoc test for linear trend among the stages of sitting. Significant differences ($F=27.879$, $p<0.001$) among stages were observed only in the AP direction. Stage 1 was significantly greater than Stages 2 and 3, while Stage 2 was significantly greater than Stage 3, with a significant decreasing linear trend ($F=51.579$, $p<0.001$). These results show a decrease in CoD, meaning that as the infants became more experienced

and the sitting skill improved, dimensionality decreased allowing better control of the degrees of freedom.

"Infant sitting posture under distorted visual and proprioceptive information"

ANASTASIA KYVELIDOU
Faculty advisor: Nick Stergiou
Major: Medical Sciences interdepartmental area in Pediatrics, graduate

We examined how the distortion of visual, proprioceptive information and the combination of both will affect sitting posture patterns in typically developing infants. Seven typically developing infants were recruited when they were able to sit independently for more than 30 sec, within an age range of 7 to 9 months. For sway data acquisition, infants sat on an AMTI force plate and were tested under four different sensory conditions which were randomly assigned: control (sitting on the force plate), dark (sitting and lights off), foam (sitting on a foam pad) and foam+dark (sitting on foam with lights off). The center of pressure data were analyzed using measures of the amount (root mean square, RMS, range and sway path) and structure (Lyapunov exponent, LyE) of variability present for both the anterior/posterior (AP) and medial/lateral (ML) direction. Only RMS in the ML direction presented statistically significant differences across sensory conditions. The control condition presented significantly lower RMS values in ML than all sensory conditions. Furthermore, there were significant linear trends found for RMS in ML, LyE in AP and LyE in ML. RMS in ML presented a statistically significant increasing linear trend as infants sat on the force plate from the least challenging condition up to the most challenging condition). Similarly, LyE values in both directions presented a statistically significant increasing linear trend. Under distorted sensory condition infants exhibit increased amount of sway in the ML direction, while the sway patterns become less regular as the sensory conditions become more demanding.

"An intergenerational program for immigrant families using senior volunteers: A pilot program for Korean immigrants in Omaha"

KWANGYEOP LEE
Faculty advisor: Kristin Williams
Major: Social Work, graduate

This presentation shows to the audience an intergenerational pilot program for the immigrant family using senior volunteers. This program has two main purposes: improve intergenerational relations and provide volunteer opportunities to retired seniors, including baby boomers. The goals and objectives of this program are as follows:

Goals

☐ To provide immigrant families opportunities to become familiar with their culture of origin.
☐ To provide opportunities to narrow the generational gap between grandparents (1st generation) and their grandchildren (3rd generation)
☐ To provide retired seniors opportunities to volunteer in their community.
☐ To establish a pilot program that could be recreated for use by other ethnic minority immigrant groups in the future.

Objectives

☐ The alleviation of generational gaps between immigrant elders and their grandchildren.
☐ Improvement in the quality of intergenerational relationships within Korean nuclear and extended families
☐ Opportunities for retired seniors to experience the rewards of vvolunteering

The target population will be the Korean immigrant families in Omaha. According to the Omaha Korean Community Association, there are over 2,200 Koreans in Omaha. From this program, the author expects not only to provide opportunities to become familiar with their culture of origin but also to improve the quality of the intergenerational relationship between the elderly and their nuclear and extended family members. As a result of my presentation, I expect the audience to be familiar with a muti-cultural intergenerational program for immigrants. Also they will have an opportunity to look at one kind of senior volunteer program in Omaha.

"Levy Distributed Search Behaviors for Mobile Target Locating and Tracking"

WILLIAM LENAGH
Faculty advisor: Prithviraj Dasgupta
Major: Computer Science, graduate

Often we look towards nature to provide us with inspiration for attacking and formulating solutions to hard problems. Evolution is the ultimate distributed system, and the innovative and emergent behaviors that arise suggest paradigms that can be extracted and modeled in simulation. In this case, the inspiration is derived from search patterns exhibited by honeybees, as well as other foraging animals, and is applied to a multi-robot scenario, specifically the problem of searching for and tracking mobile and stationary targets in an environment. Implementing two honeybee behaviors based on a Levy probability distribution, a timed random walk and a looping search pattern, we find that these goals can be accomplished, and moreover by fine-tuning the search parameters performance can be enhanced for a target domain.

"Performance of dichotic listening task under various attentional instructions have different effects on functional gait asymmetry in young adults"

MIRA MOMCILOVIC
SARA MYERS
Faculty advisor: Nick Stergiou
Major: Exercise Science, graduate

Recently the relationship between cognitive function and gait has received considerable attention. Limited research addresses whether gait asymmetry (GA) depends on cognitive function and if it is sensitive to cognitive loading. We investigated the effects of cognitive loading on GA and left-right lower limb differences in stride-to-stride variability through dual-task conditions. Twenty two young adults were recruited. Lower limb kinematics was recorded while subjects walked on a treadmill for three minutes. For cognitive assessment, a consonant-vowel syllables dichotic listening task was performed under three conditions: non-forced (NF), forced-right (FR), and forced-left (FL). Gait measures were identified from joint angles and joint ranges of motion. GA was derived from mean values of discrete variables. Left-right differences in stride-to-stride variability were quantified in terms of amount (CoV: coefficient of variation) and temporal structure of variability (LyE: largerst Lyapunov exponent). Single-subject analysis was performed to identify different response strategies among individuals. Paired-t tests were used to determine changes in GA or left-right differences in stride-to-stride variability under dual-task conditions. GA significantly increased for two and decreased for thirteen subjects. As the cognitive load increased, more individuals demonstrated left-right differences in stride-to-stride variability, with a decrease in the amount and increase in the structure of variability. GA and left-right lower limb differences in stride-to-stride variability rely on cognitive input and attention even in healthy young adults.

"The Effect of Augmented Visual Feedback on Motor Learning of Reaching Movements in Novel Dynamic Environments in Chronic Stroke Survivors"

MUKUL MUKHERJEE
Faculty advisor: Nick Stergiou
Major: Biomechanics, post-doctoral research associate

The control of limb dynamics is difficult after a stroke. However, augmented visual feedback may make such tasks easier to learn. The purpose of this study was to test if augmented visual feedback could improve learning in chronic stroke survivors. Chronic stroke subjects were randomly assigned to either a control group or an experimental group. Subjects performed reaching movements while holding the handle of a robotic system on 3 different days. During training, control subjects received true feedback of their movement while experimental subjects received augmented visual feedback. Subjects were tested for improvement in *normal reaching* (no force field) and in *dynamic control* (with force field). The dependent variable was movement error.

Dynamic Control: There was a significant decrease in movement errors for the experimental group ($p=0.021$) but not in the control group. Moreover this decrease was significantly higher for the augmented feedback group than the control group ($p=0.039$).

Normal Reaching: There was a significant difference in the change in movement errors from baseline trials on the first day to the baseline trials of day 3 between the two groups (p=0.044). Movement errors for normal reaching decrease significantly only for the augmented feedback group (p=0.018) but not the control group. Augmented visual feedback has the potential to cause greater learning of dynamic motor tasks in stroke subjects than training with true feedback. This learning also has the potential to cause larger improvements in normal reaching movements. The implications of these findings are very important for stroke rehabilitation.

"Gait variability can predict cognitive performance on the semantic fluency test"

SARA MYERS
Faculty advisor: Nick Stergiou
Major: Biomechanics and Motor Control, graduate

Recent research has shown that gait requires higher level control. Gait variability is one measure that has been related to neural control and muscle function. Therefore, changes in gait variability may indicate cognitive decline in the brain areas that control gait. This study examined whether gait variability could predict cognitive performance. Healthy young subjects walked on a treadmill while performing the semantic fluency test. The semantic fluency test assesses executive function in speech production. Amount and temporal structure of gait variability was identified from continuous (joint angles) and discrete (joint range of motion) time series. Total number of responses, errors, and repetitions were recorded to determine cognitive performance. Stepwise linear regression analyses were performed to predict semantic fluency performance using gait variability. The number of correct responses was associated with amount of variability of the knee joint movement ($r^2=.272$; $p = .018$). Amount of variability of the ankle and knee and structure of variability of the ankle joint movement predicted the number of errors pronounced ($r^2=.569$; $p = .003$). Additionally, amount of variability of the ankle, knee, and hip and structure of variability of the ankle and knee joint movement predicted the number of repetitions ($r^2=.715$; $p = .002$). The relationships indicated that as amount of variability increased and structure of variability became more complex, the number of errors and repetitions increased. Thus, gait variability is related to cognitive performance and alterations to gait variability may be an early marker of cognitive decline.

"Idea convergence in distributed environment"

CUONG NGUYEN
Faculty advisor: Gert Jan de Vreede
Major: Information Technology, graduate

Brainstorming is an important and popular process in group meetings. The quality of a brainstorming session positively corresponds to the number of ideas that a group can generate. However, a thousand of ideas generated from a productive brainstorming might become a nuisance if the groups do not have a proper mechanism to help them filter out the nuggets from this huge yet unrefined list of ideas in efficient ways. The process of reducing a big set of ideas to a smaller but more valuable set of ideas is called idea convergence. Up to date, several idea convergence techniques have been developed and proved to be efficient in face to face meetings. However, with the increasing popularity of virtual meetings i.e. meetings in which participants are in different places and communicate with one another via telecommunication and information technologies, could these techniques still remain their effectiveness and if not, what should we do to drive groups to converge ideas efficiently in this very context? This study try to answer these questions by identifying the differences between face to face and virtual environment and proposing some techniques based on these differences. The techniques have been tested in some pilot sessions and the strengths and weaknesses of the techniques are reported in this paper.

"Generating User Stories in Groups"

CUONG NGUYEN
AARON READ
ERIN GALLAGHER
RUBA ALJAFARI
Faculty advisor: Gert Jan de Vreede
Major: Information Technology, graduate

Communicating about system requirements with user stories is a distinctive feature of Agile Software Development methods. While user stories make system requirements intelligible to both customers and technical developers, they also create new challenges for the

requirements elicitation process such as personal bias and requirements coverage. Evidence in the literature showed that telling stories in groups supported evaluation of experience, surfaced conflicts in goals among users and enabled them to create shared understanding. In this study we propose that when elicited from groups instead of individuals, the number of requirements generated and the comprehensiveness of the stories is likely to increase. A lab experiment design to examine these hypotheses was conducted. Initial experiment results indicated that the hypotheses were not supported. However, some of the factors that might reduce the group effect were pointed out, which paved the way for the improvement of the experiment design of this ongoing research.

"Diagenesis in Tertiary Strata and the Formation of Chalcedony Vein horizons: Badlands National Park, South Dakota"

BROOKE NICHOLSON
BART CUBRICH
BRIAN TIPTON
NATHAN HEGDAHL
RACHAEL HINES
JONATHAN KINKADE
Faculty advisors: Robert Shuster and Harmon Maher
Major: Geology, undergraduate

Tertiary strata found in Badlands National Park in southwest South Dakota contain stratibound chalcedony vein horizons within the Brule and Chadron Formations of the White River Group. These veins and accompanying clastic dikes are thought to have formed due to diagenetic processes. Mapping and sampling the abundant clastic dikes and tiered chalcedony horizons in order to characterize the complex diagenetic interactions in the park was the focus of an undergraduate research expedition in the summer of 2009. X-Ray diffraction analysis was performed on clay mounts taken from inside and outside chalcedony horizons with hopes of identifying any mineralogical differences and diagenetic signatures. Initial XRD results from a vein horizon in the middle of the Brule Formation appear different from an earlier study on older strata at the Chadron-Brule contact. The different signatures suggest multiple mechanisms may be operating to generate the chalcedony veins. Analysis of grain mounts has identified the existence of unaltered volcanic ash in some of the siltstone and claystone samples. Well preserved volcanic ash is puzzling, given that diagenesis could be expected to have altered the glass. Observed stratigraphic differences in glass preservation and instances of devitrification also point to a complex diagenetic history. Future work on this project includes further clay XRD analysis, petrographic analysis of thin sections, a comparison of mineralogies within and outside of clastic dikes and further analysis of other vein horizons. This poster presentation will be displayed at the 2010 Regional GSA meeting in Branson, MO.

"Personality Dimensions and their Effect on Learning Proficiency in Stray versus Surrendered Shelter Dogs"

KRISTA NORDSIDEN
KATIE SHARP
Faculty advisor: Rosemary Strasser
Major: Psychology, undergraduate

A questionnaire from Golsing et al. (2003) was used to measure four dimensions of personality in seven stray and nine owner-surrender dogs *(Canis familiaris)*: *aggression, activity, responsiveness to training*, and *fearfulness*. The number of reinforcements earned in training was used to measure learning proficiency in these same dogs, which were all from the Nebraska Humane Society. Strays and owner-surrendered dogs were compared in areas of personality and learning, and personality was compared to learning proficiency across both groups. There were no significant differences in learning latencies between the two groups of dogs, and no significant differences were found in personality subtypes and their relation to learning. Strays showed significantly greater amounts of fear, older dogs showed more fear than younger, and there was an interaction between dogs' age and intake type in levels of fear. Furthermore, younger dogs scored higher on levels of activity. These findings have great implications for shelters in promoting knowledge to potential owners.

"My Guild, My Team: Exploring the Use of Massively Multiplayer Online Games in Virtual Project Teams"

DAWN OWENS
Faculty advisor: Deepak Khazanchi
Major: Information Technology, graduate

Millions of people are playing Massively Multiplayer Online Games (MMOGs). MMOGs are a fast growing computer game genre where thousands of players interact daily in highly complex virtual environments. These players self-organize, develop skills, and settle into various roles. MMOGs mirror the business context more than one would think and while there are many differences, these environments may offer important characteristics that may help virtual project teams. The issue of managing complex, distributed information technology projects has been a difficult problem for practitioners and academics. Challenges of managing a remote workforce across different spaces, time zones, and cultures often results in communication gaps and challenges with coordination and control of project activities. MMOGs are a growing trend that encourages group participation and leadership. The purpose of this paper is to identify the characteristics of MMOGs and suggest how these characteristics can be used in virtual project teams to influence project outcomes and reduce the challenges of managing a distributed workforce.

"Path integration of human walking on curvature tasks: Evidence of the Parallel Map Theory"

KOUTAKIS PANAGIOTIS
Faculty advisor: Nick Stergiou
Major: Motor Control, graduate

Path integration is the continuous update of direction and position in space relative to a starting point and is utilized to study space navigation. The most prominent theory is the parallel map hypothesis that proposes that updates for path integration are the product of encoding directional and positional cues in two separate maps into the hippocampus. The bearing map is composed from directional cues and the sketch map from positional cues. An integrated map arises when cues from these two maps are combined. Our study aimed to determine the effect of a curvature task on path integration. Forty healthy young adults completed curvature walking tasks with two different levels of sensory demands. In all conditions, subjects walked blindfolded with their comfortable self selected pace. A significant increase of the directional error was found when the circular path was compared with the figure eight path. In addition, the directional error significantly increased when the previously seen was compared with the guided condition. On the contrary, the positional error increased significant only for the circular path in both conditions. The differences found in the directional error were not found for the positional error demonstrating that the integrated map is formulated by two different maps. The bearing map is dominating in updating the integrated map through path integration and especially with information derived from vision. Furthermore, increasing path complexity affects path integration by relying more on the bearing map, which suggests independency between the bearing and the sketch map in the formulation of the integrated map.

"GARBASE—a database of wrongly annotated genes"

SANJIT PANDEY
Faculty advisor: Dhundy Bastola
Major: Computer Science, graduate

Genome annotation is a process of identifying biologically relevant information on a genome, which is composed of the letters A, T, G and C. This biological knowledge associated with different sections of any genomic sequences is appended to its record and stored in public sequence repositories such as the GenBank, EMBL and DDBJ. The process of identifying biological information, particularly gene finding, typically uses homology based searching of previously published genomic information. This approach provides an opportunity to propagate incorrectly annotated information. The objective of our project is to establish a balancing database of peptide sequences that have been wrongly annotated as protein or part of proteins, due to the error in published sequence data. In this presentation we report a framework for collecting number of evidence which support our classification of "wrong annotation" of protein sequences. When integrated into any automated genome annotation pipeline, we expect the GARBASE database to significantly contribute in breaking the cycle of propagating wrongly annotated genes.

"Risk Factors Associated with Dog Bites"

ALICIA PHILLIPS
Faculty advisor: Rosemary Strasser
Major: Psychobiology, graduate

Understanding risk factors associated with dog bites is necessary in order to provide the appropriate preventative strategies to at-risk populations and decrease the likelihood of bite incidents. In the present investigation, dog bites reported to the Nebraska Humane Society between January and July of 2009 were analyzed to determine what information collected by animal control officers can be used to predict bite severity and frequency. Results indicated that bite severity increased as victim age increased, whereas bite frequency decreased as victim age increased. Children were more likely to suffer bites to the head or torso, whereas adults were more likely to be bit on the extremities or in multiple locations. Bite severity was not influenced by whether the dog was owned or stray or by victim-dog relationship. Median income by zip code did not affect bite severity or frequency, even when number of households per zip code and number of pet licenses per zip code were included. However, a relationship was observed between median income and bite severity when moderated by victim-dog relationship, suggesting bite severity decreases as area income increases when the victim is a stranger, but does not fluctuate when the victim is the dog's owner or family. Such conclusions will allow the community to understand what variables may predict dog bites so that the necessary preventative measures can be taken.

"Relationships Among Reported Stress, Salivary Cortisol Levels, and Illness Incidence and Severity in College Students"

RYAN PLACZEK
Faculty advisor: Jeffrey French
Major: Psychology, undergraduate

Do people who experience multiple everyday annoyances and major life stressors increase their chances of getting sick and staying ill? In order to test whether exposure to these stressors increases the hormone cortisol, we gathered student's saliva samples using salivettes and had them fill out questionnaires based upon reliable and valid tests to measure daily hassles as well as major life stressors. Lastly, an inventory was used to measure physical symptoms in order to see whether there was a correlation between stress, immunity, and illness. Our results were consistent with our predictions and rationales. We found that both males and females who were exposed to higher frequencies of stress were more likely to have higher cortisol levels, as well as more physical symptoms.

"Open Source Software Reliability: An Experimental Analysis"

COBRA RAHMANI
Faculty advisor: Azad Azadmanesh
Major: IT/Software Reliability, graduate

Reliability growth modeling in software system plays an important role in measuring and controlling software quality during software development. One main approach to reliability growth modeling is based on the statistical correlation of observed failure intensities versus estimated ones by the use of statistical models. Although there are a number of statistical models in the literature, this research concentrates on the following seven models: Weibull, Gamma, S-curve, Exponential, Lognormal, Cubic, and Schneidewind. The research determines the best model for fitting the failure history as well as predicting the future failure pattern based on prior failure data. The outcome reveals that the best model fitting the failure history is not necessarily the best predictor model.

"Collaboration Tools in Information Technology Education: Use of a Wiki in a Service Learning Course"

RJ REDDEN
Faculty advisor: Peter Wolcott
Major: Public Administration/Management Information Systems, graduate

The teaching of highly technical information to those with little or no technology experience is a fascinating and problematic venture. Pedagogy is not a process that can be experimented with in strictly scientific, measurable ways, since no two class periods are exactly alike. In the UNO service learning course "IT for Development", students from all areas of campus

form teams of two for the purpose of providing technical assistance to microenterprises in the Omaha metro area. This project illustrates the use of a highly collaborative Web 2.0 tool (wiki) to encourage teamwork among the entire group of classmates, in order to enhance the learning experience of all. The wiki was chosen for ease of use and flexibility factors, as well as its potential for collaboration. A demonstration of the wiki will be provided, as well as an analysis of the extent to which the wiki assisted in the overall experience of the class.

"Effect of Incentive Contrast on Instrumental and Consummatory Behaviors in Shelter Dogs"

MARIA REY-HUGHES
Faculty advisor: Rosemary Strasser
Major: Psychology, undergraduate

Does incentive contrast affect instrumental and consummatory responses in shelter dogs? Incentive contrast was examined under two contrast conditions (downshift, upshift) across three shift trials (preshift, postshift, test). Proportion of food accepted for *Watch Me* was assessed for the downshifted and upshifted conditions following the presentation of a high or low value incentive (chicken, puppy chow). The preshift–postshift trials yielded the greatest difference in responding, as compared to the postshift–test and preshift–test trials. Additionally, simultaneous contrast effects were significant in the postshift and test trials for each contrast condition. We conclude that negative contrast effects are due to a previous experience with a high magnitude reward, and positive contrast effects are a result of a prior experience with a low magnitude reward.

"Tranquility and Questions"

WINDY ROTTENBUCHER
Faculty advisor: Peter Szto
Major: Social Work, undergraduate

Tranquility and Questions is a visual exploration into the use of photography as a personal tool of communication in social work. The intention of these photographs is not only to display some of the often overlooked beauty in the world, but to also inspire some internal dialogue in the viewer. By triggering this inner dialogue and storytelling, people are provided a distraction, an existential focus, and an opportunity to let their imagination run wild. Every interpretation of the image will be different, as each individual has their own lens through which they view the world. Each story elicited from the images will be unique, allowing the viewer to express their distinctive interpretation, and to contrast their understanding with that of the individuals around them. This interpersonal collaboration is the essence of social work practice that is to be represented in these images.

"CyCast – Website for Intelligence Gathering, Monitoring and forecasting Cyber Attacks in SPEC Dimensions"

ANUP SHARMA
RANJANA
JINHUA ZHANG
Faculty advisor: Robin Gandhi, William Mahoney, and Qiuming Zhu
Major: Computer Science, graduate

Cyber security is a major concern today. Cyber attacks are frequently occurring in our everyday life due to changes in social, political, economical, and cultural (SPEC) conditions. For example, consider two of the most recent cyber attack: the Cyber attack on Google [1] by hackers in China to obtain intellectual property and access to the Gmail accounts of human rights activists, and the Cyber attack and defacement of Twitter [2] by Iranian Cyber Army. What changes in the SPEC conditions led to these cyber attacks? This is the question which our research addresses. Evidence is growing that more cyber attacks are associated with SPEC conflicts. Therefore, the socio-technological status of the cyber attackers, their backgrounds and motivations are essential elements in predicting, preventing and tracing cyber attacks. The CyCast website we are developing maintains a database of past and current cases of cyber attack events that stem from disturbances in the SPEC dimensions. The CyCast website allows browsing cyber attack events based on the time of attack, the type of attack, the sources of attack and the target, etc. The website allows one to view various graphical representations of cyber attack events, as well as point out the sources and target of these events on maps.

"Location-Allocation of Girl Scout Service Centers, using GIS"

STEVEN SHERWOOD
Faculty advisor: Rex Cammack
Major: Geography, graduate

The Girl Scouts of Nebraska have a number resources spread across the state for their troop leaders and volunteers to utilize. However, recent developments have called the allocation of these resources into question. With the request from the Girl Scouts of Nebraska, a combination of location models, quantitative survey results and geographical information systems (GIS) software will be used to allocate the most efficient sites for these resources. Using these methods, we are able to allocate the best sites for the major 'services centers' to be re-located, so that the head volunteers can have easy access to these facilities. Along with these service centers, which will act similar to an airport hub network, our methods also develop a network of 'communities' that these head volunteers will supervise. These 'communities' will comprise of the entire Girl Scout troop leader and volunteer force. Using the described methods above and the overall discipline of geography, it is the ultimate goal to produce a more efficient system that the Girl Scouts of Nebraska can use to properly access their needed resources, while also offering better coverage area for the entire state.

"ABA Renewal in Shelter Dogs"

LAURA SILVEY
CAITLIN ELLIS
SHELLY PETERS
Faculty advisor: Rosemary Strasser
Major: Psychology, undergraduate

This study was designed to test the rate of renewal of a conditioned response (CR) after extinction in dogs. Six dogs from the Nebraska Humane Society were selected based on their age, breed and gender. First, the dogs were taught to perform a "hand-touch" in a training room (context A). The dogs were then moved to a "get-acquainted" room (context B) where the "hand-touch" was extinguished by omitting the reward when the CR was performed. The dogs were tested in context A as to whether or not the CR would reappear (renewal). The results indicated as a group, the dogs did not show renewal. However, the findings demonstrate a trend towards the renewal effect and the need for a larger sample size to investigate this.

"Data Aggregation in Synchronous Partially Connected Networkss with Hybrid Fault Modes"

SATISH MAHADEVAN SRINIVASAN
Faculty advisor: Azad Azadmanesh
Major: Information Technology, graduate

In a distributed environment, *data aggregation* (DA) refers to the ability of inferring global information from local information. Some applications of DA are in cooperative control of unmanned aerial vehicles, formation control of satellite clusters, clock synchronization, scheduling of automated highway systems, and network load balancing. Such applications require cooperation of local entities referred to as agents that run on network nodes. This study investigates the DA problem for partially connected networks in synchronous communication systems in the presence of hybrid failure modes, with the following in mind: 1) agents use messages from their immediate neighbors only, i.e. no relay of information is allowed, 2) hybrid failure modes are assumed; therefore the DA algorithm is flexible enough to be tuned for various failure settings, 3) impact of failures and threats rather than their source are considered; hence significant number of misbehaviors are hashed to a small number of failure modes, and 4) the network can tolerate any number of failures as long as the maximum number of faults encountered by each agent does not exceed a defined threshold.
The results show that the upper bound on the number of rounds to reach global convergence (agreement) and the asymptotic convergence per round of message exchange depend on intertwined parameters such as precision of convergence, node degree, number of agents in the network, level of fault tolerance, and the network diameter. It has been illustrated that the network diameter has the most impact on the speed to reach global convergence.

"An Improved Sequence Comparison method for High Performance Computing Environment"

SRIRAM SUPRAPANENI
Faculty advisors: Hesham Ali, Dhundy Bastola, and Sanjukta Bhowmick
Major: Computer Science, graduate

Nucleic acid can be represented as a sequence of characters (bases) represented by A, T, G, C for DNA and A, U, G, C for RNA. The order in which these bases occur in the DNA has been successfully used to determine and classify various organisms. Many alignment-based algorithms are widely used to compare short sequences. However, recent availability of large genome sequences requires the use of non-alignment based comparison methods. The goal of our research is to develop a non-alignment based sequence comparison method that can be used in a high performance computing (HPC) environment like the Holland Computing Center at the Peter Kiewit Institute. In this presentation we will demonstrate the use of Longest Common Subsequence algorithm (FAST_LCS) in comparing DNA sequences.

"Changes in rate of perceived exertion during isometric activity"

DIANNE WEBB
Faculty advisor: Kris Berg
Major: Exercise Science, graduate

Numerous psychological constructs affect a person's physical work performance. Among these are knowledge of the time or distance remaining to complete a task (e.g., 10 km run) and the presence of observers during the task. The purpose is to determine the effects of these two variables (feedback during task and being observed) on performance of a specific muscular task which will consist of the time a person is able to sustain a large muscle exercise. Ten young adults between 20-35 years of age will participate in this study. Each subject will be randomly assigned to four separate conditions: isometric activity with time feedback, without time feedback, with incorrect time feedback, and no feedback while being observed with additional persons. Each test will be conducted until the subject's exhaustion on four separate test days. During each testing session, a pre and post blood lactate test will be measured as a biomarker for muscle fatigue and rating of perceived exertion will be assessed every 15 seconds during the test. The main effects will be analyzed with a repeated measures 2x2 factorial ANOVA with $p < .05$

"Changing Health Behaviors Together: A Glimpse Into Family-Centered Healthy Lifestyle Interventions for Overweight/Obese Children"

DANAE WOLCOTT
Faculty advisor: Jennifer Huberty
Majors: Physical Activity in Health Promotion, graduate

Childhood obesity has increased across several age groups for decades. Finding effective interventions that can prevent or treat obesity in children is imperative. The literature suggests that including families as a means of treating childhood obesity may be effective. There are several types of family-centered programs for overweight or obese children. This study aims to explore the impact of Healthy Families, a community-based family-centered healthy lifestyle intervention for overweight/obese children, on nutrition and physical activity behaviors in low income and minority populations in Omaha, NE.

"Frequency Analysis of Ground Reaction Forces Shows Differences in Gait in Multiple Sclerosis (MS) Patients"

SHANE WURDEMAN
Faculty advisor: Nick Stergiou
Major: Biomechanics, graduate

Introduction: Gait disturbance is a common disabling symptom of MS. Gait analysis in MS patients has been limited to spatiotemporal parameters. Thus, our goal was to quantify gait parameters of MS patients using frequency analysis of ground reaction forces (GRF). We hypothesized that the median frequency, 99.5% frequency, and the frequency bandwidth of the vertical and the antero-posterior (A-P) GRF's would be different in MS patients compared to

healthy subjects. ***Methods:*** 18 MS patients and 18 healthy controls walked across a 10 meter walkway while an embedded force platform collected GRF's. The A-P and vertical GRF were evaluated in the frequency domain throughout stance using fast Fourier transformation, which breaks down a signal into all of its component frequencies. In this manner, the original signal can be thought of as a summation of many frequencies resulting from the varying motions of different parts (e.g. joints, bones, muscles). The resultant curve allows for analysis of the median frequency, frequency bandwidth, and the frequency that contained 99.5% of the signal. Independent t-tests ($\alpha = 0.05$) were used to compare the identified variables between groups. ***Results:*** Differences between MS patients and healthy controls were found only in the vertical direction; MS patients had significantly lower vertical 99.5% frequency ($p=0.006$) and lower vertical median frequency ($p<0.001$). ***Discussion:*** The frequency domain results from a summation of all frequencies of oscillations from different components acting in a coordinated manner to provide the motion. The lower values in MS patients may suggest a more careful, slower gait pattern to compensate for muscle weakness due to axonal degeneration and conduction block.

"Aging and dual task alter amount and structure of lower limb kinematic variability during gait"

JENNIFER YENTES
SARA MYERS
Faculty advisor: Nick Stergiou
Major: Biomechanics, graduate

It has been demonstrated that decrements in executive functioning are correlated to decrements in motor performance in the elderly under the dual-task paradigm. However, how cognitive decline results in changes in gait variability has not been investigated. We investigated the effects of cognitive challenge on gait variability, by exploring both amount and temporal structure of gait variability through dual-task conditions. Twenty-two young adults and ten healthy older adults participated in the study. For cognitive assessment a dichotic listening test was used consisting of three conditions non-forced (NF), forced-right (FR), and forced-left (FL). Lower limb kinematics was recorded while subjects walked on a treadmill for three minutes. Linear (CoV: coefficient of variation) and nonlinear (LyE: largest Lyapunov Exponent, ApEn: approximate entropy, DFA: detrended fluctuation analysis) measures were used to quantify variability in joint ranges of motion using two-way (group x condition) repeated-measures ANOVAs. Compared to control, significant decreases were found at the 1) ankle joint for CoV for NF and FL and for LyE and ApEn for all conditions; 2) knee joint for CoV for the FR, LyE for NF, ApEn for NF and FR, and DFA for FL; 3) hip joint for LyE for NF and ApEn for NF and FR. Significant interactions were found for CoV and LyE at the ankle joint. Older adults under dual-task conditions became more rigid in their walking patterns and less complex at the ankle which is a joint that was found to demonstrate significant losses of strength due to aging.

"Building Shared Mental Models in Global Virtual Teams: An IT Capabilities' Perspective"

XIAO-DAN YU
Faculty advisor: Deepak Khazanchi
Major: Information Technology, graduate

Global virtual teams (GVTs) are becoming an integral part of most organizations to attain certain benefits (e.g. reducing cost, working round the clock, no snow days, et al.). While, there are also risks associated with the GVTs. This draws researcher's attention to the GVTs' performance management. Among several approaches to enhance the GVTs' performance, we here present a cognitive perspective, shared mental models (SMM). The SMM perspective of team performance contends that team performance will be enhanced to the extent that team members share accurate and similar and mental models of the task-related work and team-related work. In this paper, we first discussed the role of shared mental models in the GVTs' performance based on previous studies and identified the gap existed—little research examined how to build SMMs in the GVTs; second, we proposed an information technology (IT) capabilities view to account for the development of SMMs in the GVTs through a conceptual model. This model describes our understanding of the relationships between the shared mental models, adaptive use of IT capabilities, and the GVTs' performance. Propositions were further developed as well. Implications and future directions were discussed in the end.

"Virtual World Opportunities and Challenges for Organizations: Results from a Delphi Study"

JEFF ZDAN
Faculty advisor: Gert Jan de Vreede
Major: Information Technology, graduate

As the adoption of virtual worlds is expected to rise among all industries and organizations within the coming years, the levels of investment and involvement are dependent on the emerging strategic views of potential adopters of the technology. The participants in the Delphi study reported in this paper performed a SWOT analysis that provided insights to support organizations in their strategic decision making regarding their involvement with virtual worlds. The research participants produced an ordered list of organizational perceptions as they relate to adoption and entry-issues for virtual worlds. The results provide insight on the diverse set of opportunities and challenges organizations face when entering the virtual world space. Our findings further provide direction for future studies that will benefit organizations as they enter into virtual worlds.

"A Cross-Layer Parallel Handover Optimization Scheme for WiMAX Networks"

TING ZHOU
Faculty advisor: Hamid Sharif
Major: Computer Engineering, graduate

Handover performance plays a crucial role in guaranteeing the quality of real-time application services in WiMAX networks. In general, the handover process can be divided into four stages: i) cell reselection, ii) handover preparation, iii) link layer handover, and iv) IP layer handover. In this paper we propose a cross-layer parallel handover optimization (CPHO) approach to reduce the handover signaling overhead and latency at each stage. The key idea of our proposed approach is that the knowledge achieved from the backhaul inter-BS communications is used to reduce the HO control message load in wireless links and, in parallel, execute the link layer and IP layer handover process. Therefore the mean of the handover interruption time can be significantly reduced. The numerical analysis and simulation results show that the proposed approach significantly enhances the handover performance, and outperform the existing scheme under the same network scenarios.

HONORS PROGRAM SPRING SENIOR THESIS SYMPOSIUM

Oral Presentations

"Great is Thy Faithfulness"

HOLLY BYERS
Faculty advisor: John McKenna
Major: History
College of Arts and Sciences

This is a work of creative non-fiction, consisting of several short personal essays centering on the idea of faith, especially faith as a part of everyday life. Faith gives us strength to stand up for our principles and stay strong against temptation of quick satisfaction. It helps us to give our troubles to God, and to understand that everything will work out in the end, especially in my journey as a deaf person.

"Anxiety and Depression in Diabetic and Non-diabetic Native Americans: The Role of Serum Cortisol"

ERIN CAMERON
Faculty advisor: Jessiline Anderson
Major: Psychology
College of Arts and Sciences

Previous research has established that the prevalence of depression and anxiety on Native American reservations tends to be higher for diabetic tribal members than non-diabetic members. It is possible that the increased incidences of depression, anxiety, and diabetes are due to the inheritance of anxious traits, known as the *transgenerational transmission of trauma*. The current study is an expansion of previous research addressing anxiety and depression in diabetic patients of the Omaha tribe at Macy, Nebraska. The role of the "stress hormone" cortisol in the prevalence of diabetes, depression, and anxiety was assessed. Measurements included Beck Depression Inventory (BDI -II) scores, State-Trait Anxiety Inventory (STAI) scores, serum cortisol levels, and fasting blood sugar (FBS). The correlations of serum cortisol and fasting blood glucose levels with depression and anxiety scores were also considered. Members with diabetes tended to have higher mean scores for both depression and state anxiety than non-diabetic members. In addition, a significant positive correlation was found between cortisol and trait anxiety scores for diabetic tribal members. Understanding the relationships between cortisol secretion, diabetes, depression, and anxiety will be a step toward defining if transgenerational transmission of trauma exists and if so, what treatment approaches could prevent it.

"Investigating the Existence of RINTELs in Bacteria"

ADAM CORNISH
Faculty advisor: Dhundy Bastola
Major: Bioinformatics
College of Information Science and Technology

In bacteria there currently exist two known methods of transcription termination: rho-dependent termination, and rho-independent termination. By investigating a peculiar set of stem-loop repeats in *Coxiella burnetii*, we believer we have stumbled upon a third type of transcription termination; however its mechanism is likely similar to the current model for rho-independent termination. The purpose of this project was to create an automated tool to more generally and easily identify these Repeats In TErminator-like Locations (or RINTELs). This was done using a combination of already well-established bioinformatics tools: repfind, blast and the hmmer package. With these tools in hand we have performed a search of all currently available bacterial genomes in the genbank database and have identified stem-loop homology groups which could be potentially interesting. These homology groups are a perfect match to the RINTELs we were hoping to find.

"Perceptions of Political Bias in the College Classroom"

KELLY DUNLAP
Faculty advisor: Thomas Sanchez
Major: Sociology
College of Arts and Sciences

The possibility of political bias in higher education has become an increasingly common subject of study and topic of concern in recent years. However, there is a lack of adequate research to paint a clear picture of the current state of political bias. For that reason, my thesis is aimed at studying the perspectives of college professors and students regarding political bias in the classroom. This study involves a literature review, a numbers analysis and an internet-based observation. The literature review reveals that most studies show that more students tend to shift towards the left than to the right of the political spectrum by the end of their college years. Furthermore, few researchers deny that the college professoriate is predominately liberal. These facts alone do not prove or disprove the existence of political bias in the classroom. Therefore, the numbers analysis compares data regarding professors' and students' perspectives on the existence and prevalence of bias. Further, the internet-based observation documents the organizations involved in the recent debate regarding bias and academic freedom. It also notes whether professors, students, scholars, or activists are leading the organizations, and whether they are aimed at defending academic freedom or fighting against alleged bias. This thesis found several significant findings.

"Quadratic solutions to $x^4 + y^4 = D^2z^4$"

MELISSA EMORY
Faculty advisor: Griff Elder
Major: Mathematics
College of Arts and Sciences

The Austrian mathematician Alexander Aigner proved in 1934 that there are no nontrivial quadratic solutions to the Fermat equation, $x^4 + y^4 = z^4$, except in $\mathbb{Q}(\sqrt{-7})$. This result was reproved in 1960 by the Russian mathematician D. K. Faddeev. The argument was simplified in 1969 by the British/American mathematician L. J. Mordell. This talk discusses work to extend Aigner's result to beyond the case $D = 1$.

"Evaluating Potential Modifiers of Parkinson's Disease Using A *Drosophila* Model of PD"

LOKESHCHANDRA KALEKAR
Faculty advisor: Bruce Chace
Major: Biology
College of Arts and Sciences

Sporadic Parkinson's disease (PD) affects 1 to 2 percent of adults over age 50, but its etiological basis is largely not understood. Substantial insights into the disease have come from the analysis of rare forms of familial Parkinson's disease (FPD). FPD has been associated with mutations in over a dozen loci and genes. It is striking that even in monogenic forms of FPD that arise due to the same genetic lesion, the severity of disease and the age of onset can be highly variable even within one kindred. This phenotypic variation may arise from unknown environmental contributions or genetic modifiers. Since many of the genes in which mutations cause FPD have products that function in the pathogenesis of PD, understanding the environmental and/or genetic factors that contribute to disease severity in FPD is likely to offer insight into the development of therapeutic interventions that can delay or prevent the onset of PD.

Earlier work (Markopoulou et al. (2008) *Acta Neuropathologica*, 116:25-35) demonstrated that the most severely affected member in a large kindred where FPD is caused by a dominant mutation in SNCA (the G209A mutation producing A53T alpha-synuclein) also is homozygous for a rare genetic variant at PARK2 (*parkin* 167N). Though dominant and recessive alleles at PARK2 can lead to FPD, individuals homozygous for 167N parkin do not exhibit a FPD phenotype. However, in some genome-wide association studies, S167N heterozygotes appear to have an increased risk of PD. Both 167N parkin homozygotes and A53T alpha-synuclein heterozygotes are rare, making it unlikely that multiple individuals with both A53T alpha-synuclein and 167N parkin will be identified. Thus, it is difficult to evaluate the hypothesis that 167N parkin exacerbates the phenotype associated with A53T alpha-synuclein by studying parkinsonian individuals. Therefore, we are evaluating this hypothesis using a *Drosophila* model for PD. Transgenic *Drosophila* expressing human A53T alpha-synuclein exhibit death of dopaminergic neurons and motor deficits. To assess whether parkin N167 affects the severity of the A53T-alpha-synuclein associated neurodegenerative phenotype, we are constructing

doubly transgenic animals that express both A53T alpha-synuclein and N167 parkin, and evaluating the severity of dopaminergic cell death and motor deficits in these animals compared to controls with S167 parkin and animals with no parkin transgene. We suggest that this is a useful experimental paradigm to evaluate the importance of rare genetic modifiers of dominant mutations associated with neurodegenerative disease.

"The Economic Effects of Nationalization: An Analysis of Toast"

NATHAN KIRKLAND
Faculty advisor: Janet West
Major: Economics
College of Business Administration

The nationalization of industries has occurred throughout history as governments step in to increase their revenues, flex their political muscle, or save a failing sector of the economy. Although their purported intents are initially for the betterment of the country the results are habitually detrimental to long-term growth and negatively affect the consumer's well-being. This thesis explores several cases across the world and throughout time to analyze the effects of nationalization while eliminating biases in the data. Zimbabwe's land reform pushed out the white commercial farmers and eliminated the motivation for workers to be productive, sending the country into a downward spiral. Russia's recent economic boom has been stunted by the country's infrastructure in disarray prevent the efficient transportation of resources and finished goods. The government in Argentina has placed restrictions on select crops and livestock which pushed production away from the country's staple exports. After WWII the British coal mines were nationalized, consequently creating a steady fall in output and a continuation of the unsafe working conditions. Amtrak's inefficiencies not only impact the passengers it hauls, but restrict the profitability of the railroad companies within the United States. These trends are present in nationalized industries throughout history and will continue into the future.

"Strategic Case Analysis: Ryanair Airlines"

SPENCER KNIPE
Faculty advisor: Dave Blair
Major: Accounting
College of Business Administration

The purpose of this thesis is to provide an in-depth analysis of the strategy of the European low-cost airline, Ryanair. With the use of business analysis tools such as PESTEL Model and Porter's Five Forces, this paper will analyze the competition, supplier relationships, among other significant environmental factors. Using sources such as Ryanair's Annual Report, Financial Statements, and business articles, the analysis will also include an explanation of the strategic factors, resources, and procedures that Ryanair uses to operate its business including the company's financial position, market segmentation, and competitive advantages. In conclusion, the paper will identify several strategic alternatives that the company should consider to implement to sustain or improve its current market position. In summation, the paper will compare the success of Ryanair in the European low-cost airline industry and Southwest Airlines in the United States low-cost airline industry.

"Ironwood Redevelopment Project"

MELISSA LETAK
Faculty advisor: Gary Krause
Major: Civil Engineering
College of Engineering

With the Ironwood Redevelopment Request for Proposal (RFP), DK Investments has embarked on an ambitious path to redevelop the site of the former Ironwood Golf Course. Culslick & Lansen Engineering and DK Investments have worked diligently together to develop a plan that responds directly to the development goals articulated in the RFP. Our proposal offers a clear, achievable goal in successfully integrating the existing clubhouse into the new development as a fitness center. This proposal also offers a specific development plan for the Ironwood site. Lots will be allocated predominately as single-family, incorporating multi-family areas as permitted. The Hell Creek floodway inhibits a large portion of the property. Thus, a retention pond will be created to utilize an area that otherwise prohibits

development. The pond will increase property value by establishing water front property and is aesthetically pleasing. Our proposal locates the stores, offices, residences, public services, and recreation spaces within walking distance of each other. The Mixed-Use Development will be oriented along Pacific Street and 132 Street, the neighborhood's main arterials. Five acres of LEED-ND certified neighborhood will be provided in the form of a sustainable apartment complex located near the Mixed Used Development.

"S.W.O.T. Analysis on Airbus"

REBECCA LIU
Faculty advisor: Dave Blair
Major: Banking, Finance and Law; Investment Science and Portfolio Management
College of Business Administration

Airbus, from the ingenuity of the major European countries coming together, created one giant company to compete
worldwide against the United States' Boeing. The countries that are the major players in Airbus are France, Germany, United Kingdom, and Spain. Recently, Airbus has done very well in gaining global market share for airplanes. Airbus is continually trying to expand its market share by trying to reach out to new emerging markets.

In this analysis of Airbus, it is revealed that there are many things in which Airbus does exceptionally well. Airbus is very safe in that airplane manufacturing is such a large business that it limits other from entering their market. Airbus also has a large share of the market coming in second to rival Boeing. Although Airbus has many strengths and opportunities ahead, it also has some major weaknesses and threats that face them in the future. Airbus will have to keep with the new technologies that come out every few months. These technologies are crucial to help cut the large costs of manufacturing each airplane. Airbus will also have to keep striving for environmentally clean factories/ airplanes since the world becomes more polluted each year. Airbus will have to make changes on some of its plane to meet the growing demand.

"A Simpler Computer Programming Language for Beginners"

DAVID LOSCUTOFF
Faculty advisor: William Mahoney
Major: Computer Science
College of Information Science and Technology

This paper presents a new computer programming language, Zephyr, tailored to computer-programming beginners. Motivation for the language's creation is discussed, followed by decisions on language properties and syntax; strategies for and descriptions of the implementation; limitations; and opportunities for future work. The Zephyr implementation and a number of sample programs are provided on an attached compact disc.

"Financial Crisis: Risk Management"

SETH NELSON
Faculty advisor: Wei Rowe
Major: Finance, Banking and Law
College of Business Administration

The primary content of the thesis is devoted to understanding the benefits and consequences of derivative use and misuse. It begins with a historical comparison between the Great Crash of 1929 and recent Financial Crisis. Next, an explanation of derivative pros and cons is provided. This is followed by a discussion of the abuse of derivatives by a business unit and its effect on the parent company, using AIG as an example. The impact to the financial system both domestically and globally is also discussed. Policy responses from the Federal Reserve are mentioned towards the end of the document. The scope is at the macroeconomic level. The primary focus of the thesis is aimed at the U.S. financial market, with secondary emphasis on the global linkages. The Federal Reserve is the main institution being examined; using speeches and commentary made by Chairman Ben Bernanke for understanding the future direction of the institution. The thesis ends with the conclusion that derivative use should be marginalized until at least some semblance of valuation can be standardized. Regulation must also be more comprehensive primarily by increased monitoring of liquidity, capital levels relative to risk exposure, and disclosure of off balance sheet transactions.

"Brickwork Business Plan"

JAKE OLSEN
ROSS OLSEN
Faculty advisor: Amy Rodie
Major: Accounting; Banking and Finance
College of Business Administration

This project created a business plan for a hypothetical, unique business that fills a currently underserved market niche. In this plan, many aspects of the business were analyzed such as defining the target market, potential products, costs of production of the different products, distribution considerations, future expansion, and feasibility of the overall plan. Research was done through the internet, and searches were done to identify potential competitors, as well as other current companies in the market. Competition was analyzed to compare similarities in business models, as well as size and potential overlap. A prototype was also created to demonstrate the first possible product design, and instructions were created using a LEGO CAD program. After research, few direct competitors were found, and those that were similar had a different product offering and model to their businesses. Based on the projected costs for creating the first products, the start-up costs were found to be low, and the business would be feasible.

"Lightweight Software Verification Tools"

MATTHEW PINNT
Faculty advisor: Harvey Siy
Major: Computer Science, Mathematics
College of Information Science and Technology

The purpose of this thesis is to study the problem of software verification and see what options for approaching this problem exist. In particular, we will examine and compare two different software verification tools in terms of functionality and usefulness. The two tools will all be extensively tested, and the results compared, in order to assess their effectiveness and identify their limitations in automating the verification of software products. While providing a final solution for effectively verifying software is out of the scope of this thesis, we will discuss some of the essential problems remaining and attempt to outline some possible solutions.

"Nebraska's Anti-Meth Law: Too little, too late?"

ELIZABETH SALZMANN
Faculty advisor: James Bogner
Major: Criminology and Criminal Justice
College of Public Affairs and Community Service

The year 2010 marked two five year anniversaries in Nebraska. Unfortunately, one event proved to be a sober reminder of the desperate need for the second. On January 4, 2005, a Creighton University student and her boyfriend, lost in a snow storm and so strung out on meth that they were unable to tell rescuers their location, froze to death. The deaths of Michael Wamsley and Janelle Hornickle made the meth problem, which six months later Newsweek magazine called "America's Most Dangerous Drug," personal to Nebraskans. A few months later, on May 31, 2005, Governor Dave Heinemann signed LB 117, then referred to as "Nebraska's Comprehensive Anti-Methamphetamine Legislation," into law. Looking through the lens of history, some may wonder if Nebraska's response to what many have called the "meth epidemic," which was proven to have a particularly devastating impact on rural states, was too little, too late. Has reducing access to pseudoephedrine and stiffening penalties for offenders reduced the meth problem in Nebraska? Or has the law prompted a set of new problems? Examination of the legislative process, statistical outcomes and views of key stakeholders through this project illustrate that while Nebraska has made some progress in addressing the meth problem in the state –the obstacles that were inherent in the legislative process resulted in flawed public policy.

"Outer Membrane Protein Detection Using Bioinformatics"

CALEB SCHMID
Faculty advisor: Dhundy Bastola
Major: Bioinformatics
College of Information Science and Technology

The outer membrane is a protective coat for Gram-negative bacteria. For these bacterial cells to receive the proper nutrients and signals, they require a way to selectively exchange solutes. Outer membrane proteins allow solutes into the inner membrane space. These proteins show conserved alternating hydrophobic and hydrophilic amino acids. This forms a structure called a

β-barrel from anti-parallel β sheets. Using known sequences, an expert system can be made to find new examples of this class of sequences. A multiple sequence alignment (MSA) of known classes of sequence can be used to make a profile hidden Markov model (HMM) to search a system of sequences. If a sequence matches multiple classes, it is more likely to be a real outer membrane protein. Thus, if a sequence occurs in multiple searches it is classified as an outer membrane protein. It is yet to be seen if this is an effective method for determining outer membrane proteins from full genome searches.

"My Internship with the United States Postal Inspection Service (The Silent Service)"

JENNIFER SHIMEK
Faculty advisor: Brooke Clements
Major: Criminology and Criminal Justice
College of Public Affairs and Community Service

- Job description
  - The inspectors allowed me to organize evidence, assist in an arrest, enter data into an excel spreadsheet, etc
- USPIS is called the Silent Service because they didn't seek publicity for most of the 20th century
  - No longer a silent service
  - Information is now available to those who want to know more about the service
- History
  - Benjamin Franklin was the first postal inspector
  - A few different name/title changes occur in the 18th century for those who inspect the post office
  - Forensic labs were established for the USPIS in 1940
    - USPIS organized the mail during World War II
  - In 1971, they were one of the first government agencies to hire women
  - In 2001, biological warfare was sent through the mail for the first time
    - USPIS now responds to more than 20,000 suspicious pieces of mail and anthrax hoaxes

"UNO Bike Lock System"

NICHOLAS SPINTIG
RONALD TYSON
Faculty advisor: Herbert Detloff
Major: Computer Engineering
College of Engineering

The UNO Bike Share Program makes bicycles freely available to students across UNO's campus. The UNO Bike Lock System is an effort to provide bicycle security, user accountability, system monitoring, and statistical use information to the Program's administrators. The system utilizes kiosks placed next to UNO's bike racks (to physically interact with the bicycles and users) and a web application (to provide control functions and to show kiosk information). The system's kiosks each contain an embedded computer system that interfaces with a UNO MavCard reader (to identify students), Ethernet and wireless modules (to communicate with the system's web server through UNO's computer network), and four cables that connect to up to four bicycles (using mounting brackets placed on the bicycles' frames). The ends of the cables have RFID readers (for bicycle detection and identification) and electric locks (to secure the bicycles). The system's databases communicate with kiosks to receive status and bicycle check-in and check-out transaction information. The web application uses the information in the databases to show administrators status information (such as what bicycles are at which kiosk), outstanding transactions (who has which bicycle currently checked out) and statistical use information (such as which kiosk is used the most).

"*The Miracle Worker:* Exploring the Character of an Effective Stage Manager"

ANN STENEHJEM
Faculty advisor: Scott Glasser
Major: Theatre
College of Communication, Fine Arts and Media

In theater, the role of the stage manager is often difficult to define, and the required skills are often complex. My theatrical training led me to the question, "What separates an adequate stage manager from an effective one?" Through my work stage managing *The Miracle Worker*, I strove to find the answer to this question, documenting each step along the way. It became clear that a stage manager must have a wide skill

set, with the ability to call upon specific skills unique to each step in the process. Beyond the required skills, I began to realize that the truly effective stage manager possesses not only quantifiable skills such as time management, effective communication and quick-thinking skills, but she must also possess both an infinite amount of love and passion for what she is a part of, and the drive to never quit. *The Miracle Worker* showed me how to be an effective stage manager, and reminded me to take a step back occasionally and be proud of the beauty I am privileged to help create.

"Middle Eastern Wildcard: The Kurds—21st Century Aspirations and Realities"

AMY SWANSON
Faculty advisor: Thomas Gouttierre
Major: International Studies
College of Arts and Sciences

This thesis focuses on the struggle for balance in the Middle East between Turkey and its Kurdish population. It begins with a history of the Kurds and their role in the area that is now present-day Turkey and continues to the time of the founding of the Turkish Republic in 1923 under Ataturk's reign. After the rise of Kurdish nationalism in the 1960's and into the 1990's, the Gulf War and the War in Iraq raised awareness in the West of the Kurd's struggle. Tensions between the Turks and the Kurds have strained preexisting relationships between Turkey and NATO, the United States, and the European community. Without resolving its Kurdish question, Turkey will have great difficulty becoming a true democratic state in the eyes of the West. In the past two decades, a series of changes has been implemented to promote dialogue and a non-violent means of negotiation between Turkey and its Kurds in hopes of increasing ethnic rights and equality in Turkey, as well as cementing Turkey's place as an economic and political hub between the Middle East and the Western world.

"Beginning Pottery: Hand—Building Techniques and Projects"

ROBIN WALKER
Faculty advisor: Saundra Shillingstad
Major: Education
College of Education

This honors project was written while student teaching at Benson Magnet High School in Omaha Public Schools. It is about the three basic hand building techniques used in a Beginning Pottery class and projects using these techniques. The three basic hand building techniques are pinch, slab, and coil. The projects covered are: a pinch pot, a slab tile, a coil pot, a slab box, a pinch vase, a mold bowl, and a cup cake.

"Flood Stage Monitoring With the Google Maps API"

AUSTIN ZACH
Faculty advisor: Robert Fulkerson
Major: Computer Science
College of Information Science and Technology

My thesis project involves the creation of a web site for the United States Army Corps of Engineers. This web site acquires flood level data from the U.S. Army Corps of Engineers, parses the data, and stores it in my database to be displayed on the map. I've created an interface that allows users to filter the stream gauge data based on the gauge's geographic location. The markers on the map indicate the location and the flood level of the river at that location. Each marker also contains a link to flood data from the last two weeks at that location. This project fulfills a real-world business need, and hopefully the U.S. Army Corps of Engineers will be able to make use of my project to monitor their river gauges in north central United States.

"Ironwood Redevelopment"

CLAIRE ZHAO
Faculty advisor: Tian Zhang
Major: Civil Engineering
College of Engineering

The project aims to develop the current Ironwood Golf Club, located on the southeast corner of 132nd Street and Pacific Street in Omaha, Nebraska, into a modern, high-density mixed-use neighborhood complying with the City of Omaha Master Plan for future development. The proposed 150 acres development will consist of parks, single-family and multi-family residential areas, and 30 acres of mixed-use area with office spaces and retail/commercial spaces for rental. The existing club house will be preserved and turned into a community center for the businesses and residents to take advantage of through memberships. The addition of a daycare facility will allow residents as well as employees of the mixed-use buildings easy daycare drop-off and pick-up. One major focus of the proposed project is to develop using Leadership in Energy and Environmental Design – Neighborhood Development. The guidelines and concepts are applied to the entire site because the design team feels strongly that not only will the rating system keep the project environmentally responsible, but is also an excellent guideline to improve the quality of living for the residents. A preliminary construction schedule shows the entire project can be completed in roughly three years. Furthermore, the total project cost is estimated to be $815,000,000.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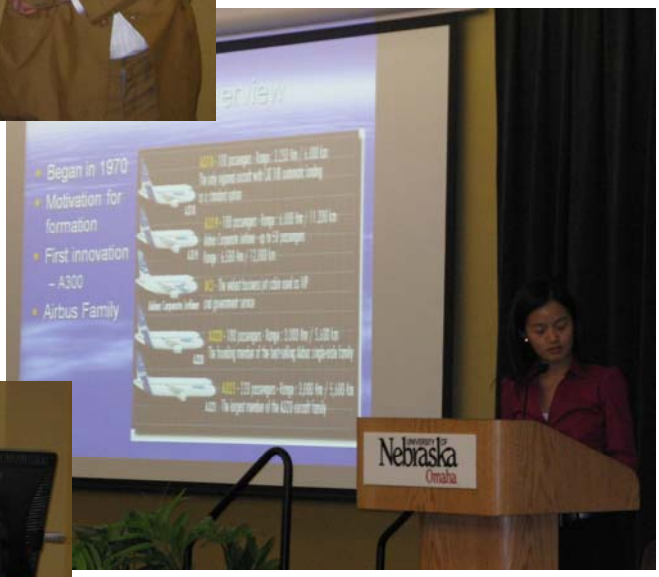
Began in 1970
Motivation for formation
First innovation – A300
Airbus Family
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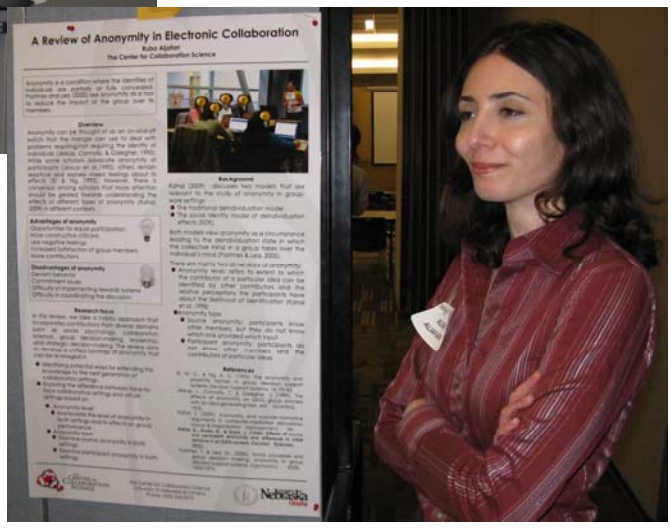
Omaha


A Review of Anonymity in Electronic Collaboration
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