

UNDERGRADUATE SYMPOSIUM ABSTRACTS 2009

Celebrating research, creative endeavor and service-learning



THE UNIVERSITY
of
WISCONSIN
MADISON

Undergraduate Symposium 2009

Celebrating Research, Creative Endeavor and Service-Learning

**University of Wisconsin–Madison
Great Hall, Memorial Union
April 16, 2009**

- 9:45 a.m. *Welcome to Student Participants*
Aaron Brower, Vice Provost
for Teaching and Learning
- Noon *Celebrating Undergraduate Education at a
Research University*
Carolyn “Biddy” Martin, Chancellor
Undergraduate Research Awards Ceremony
Carrie Kruse, Director of College Library

Oral Presentations, Poster Sessions, and Performances

Check the registration table outside Great Hall on the 4th floor for specific times and locations.

- 10:00–11:30 a.m. Session I: Oral Presentations
12:15–1:30 p.m. Session II: Oral Presentations
2:00–3:30 p.m. Session III: Oral Presentations
- 10:00 a.m.–4:00 p.m. Posters and displays will be on view in
Great Hall, Class of '24 Room and
Tripp Commons.

Refreshments will be available throughout the day in Great Hall.

Undergraduate Symposium 2009

Celebrating Research, Creative Endeavor and Service-Learning

University of Wisconsin–Madison

April 16, 2009

The 11th annual Undergraduate Symposium is a celebration of undergraduate students' accomplishments across the many schools and colleges at UW–Madison. The Symposium includes presentations, posters, and displays by groups and individuals representing the arts and humanities, biological sciences, physical sciences, and social sciences. These original works showcase the vast range of talent and creativity within the university's undergraduate population.

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A Special Thanks!

We would like to thank the faculty and staff for promoting academic and creative excellence and for making the Symposium possible through their roles as mentors and sponsors. We would like to thank the student participants and the many individuals who have helped to organize this symposium. It has been a great team effort.

A special thanks is also extended to Ruthi Duval of The Wisconsin Union; Melissa Tedrowe of the Writing Center; Kent Hamele, Jeff Jerred and Linda Kietzer of University Communications; Jeff Crucius of the Division of Information Technology; Patricia Iaccarino at the College Library; and Karen Lederer and Jan Lucchesi of the College of Letters & Science, Student Academic Affairs.

2009 Undergraduate Symposium Organizing Committee

Jane Harris Cramer, Maya Holtzman, Noel Howlett (coordinator), Svetlana Karpe, Linda Kietzer, Laurie Mayberry, Janice Rice, Julie Stubbs, Melissa Tedrowe, Randy Wallar.

Cover photos provided by the Office of University Communications.

Congratulations!

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The Undergraduate Symposium has become *the* premier campuswide event showcasing our students' incredible talents in research and scholarship, creative works, and community involvement. I want to congratulate you on your achievement, and I want to encourage you to explore the accomplishments of your colleagues. Leaf through this program booklet and take a look at others' work presented and displayed throughout the Union today.

We take great pride in what you've done and take every opportunity to brag about you. Former Symposium presenters have gone on to brilliant careers in academia, law, medicine, business, the arts, and the sciences. We look forward to hearing what you accomplish next.

Again, congratulations and enjoy the day!

Aaron M. Brower, Ph.D.
Vice Provost for Teaching & Learning
Professor, School of Social Work
Harold C. Bradley Faculty Fellow

EXPLORING CDC-42'S ROLE IN CELL POLARIZATION AND ASYMMETRIC CELL DIVISIONS IN *C. ELEGANS*

Jen Apodaca, Nicole Perna (Mentor), Genetics

Asymmetric cell division is a key process in producing diverse cell types. In *C. elegans*, CDC-42 and PAR proteins must polarize cells in the early embryo for asymmetric cell division to occur, but it is unknown if this mechanism is utilized in later asymmetric cell divisions. We found that CDC-42 and its active form are expressed in polarized larval structures shown to exhibit defects when CDC-42 or PAR proteins are reduced. We will continue to explore if CDC-42 activity and the PAR proteins are polarized among late and post-embryonic cell divisions in a manner consistent with the early embryo asymmetric cell division model. If this model is conserved in *C. elegans*, future research may determine if this mechanism is consistent among all organisms.

IDENTIFICATION WITH THE MEDIA AND BODY ESTEEM

Rachel Reinders, Janet Hyde (Mentor), Psychology

Today's media portray many unrealistic images that may influence adolescents. Identification with the media, or how similar people believe they are or should be to the images, has been shown to be positively correlated with later violent behaviors. Studies have also shown media exposure and body esteem to be negatively correlated. The current study looked at how body esteem correlates with the consumption of and identification with the media. Adolescents participated when they were 15 years old. In boys, identification was negatively correlated with body esteem, and there was an interaction between media identification and media exposure. Relationships between identification with the media and body esteem for girls were found in some analyses, but not others. No significant relationship between media exposure and body esteem was found.

PAIN MANAGEMENT IN INSTITUTIONALIZED OLDER ADULTS WITH DEMENTIA

Momodou Jammeh, Heather Abercrombie, (Mentor), Psychiatry

Despite substantial efforts by both clinicians and researchers, 70 to 80 percent of nursing home residents regularly experience pain that is either untreated or inadequately treated (Horgas, 2007; Snow, 2004). Efforts to manage pain are complicated by dementia. (Horgas, 2007; Kovach, 2000). Research has documented the inadequacy of pain management in residents with dementia, but we know very little about the reasons for this inadequacy (Zwakhalen, 2007). The purpose of this study is to answer the following questions: 1) How do nurses identify pain in residents with dementia? 2) What factors influence their decisions to offer analgesic interventions? This study will consist of interviews with nurses from three facilities. Interviews will be transcribed and analyzed using the dimensional analysis (Caron & Bowers, 2000; Schatzman, 1991).

TCDD'S DOWNREGULATION OF SOX9B IN ZEBRAFISH AND ITS ROLE IN JAW DEFORMATION

Alex Gooding, Warren Heideman (Mentor), Pharmacy

Environmental toxicants have frequently been linked to developmental defects in various species of vertebrates. Our lab has investigated the adverse effects of exposure to the toxin 2,3,7,8-tetrachlorodibenzo-p-dioxin, or TCDD, on skeletal development in zebrafish, focusing specifically on jaw malformation. Prior research in the lab has revealed that TCDD downregulates the gene *sox9b*, and this downregulation has been confirmed as a critical event in producing jaw deformation. We are currently working to determine the mechanism by which decreased expression of *sox9b* causes jaw deformation. We predict that TCDD inhibits *sox9b* transcription by AHR interactions at the *sox9b* promoter. To test this hypothesis, we will clone the zebrafish *sox9b* promoter and construct 5' deletions of varying lengths of this promoter. These deletions will be placed upstream of *egfp* in a Tol2 transposon system. We will test whether exposure to TCDD downregulates *egfp* transcription downstream of each deletion, thus revealing which segment of the *sox9b* promoter TCDD interacts with.

WORKING MEMORY CAPACITY PREDICTS REGULATORY ABILITY OF PAIN, ATTENTION AND EMOTIONAL RESPONSES

Kevin Schmidt, Stacey Schaefer (Mentor), Psychology

Individuals often have different responses to the same stimuli. What factors contribute to these individual differences in areas such as emotion, pain, and attention? We propose that working memory capacity (WMC) is related to one's ability to regulate one's attention, emotional, and pain responses. We will measure WMC with an operation span WMC test, and will measure both individuals' ability to modulate their responses to pain and emotional stimuli as well as their attention in an emotional context with psychophysiological and/or electroencephalographic data to confirm their response level. If our findings are conclusive, we may catalyze research into developing exercises to strengthen working memory to help people better adapt to stress/negative affect caused by their emotions, attention, and pain.

STOCKING SHELVES AND DELIVERING DENTAL EDUCATION: UW SCHOOL OF NURSING AND LUSSIER COMMUNITY EDUCATION CENTER

Nicole Wenner, Yvette Egan (Mentor), Nursing

On October 16, 2008, the Wexford Community Center moved to a new location and was renamed the Lussier Community Education Center (LCEC). The LCEC opened the door for new opportunities to serve the community. With a larger food pantry, multi-purpose classrooms, and recreational facilities, the new building is full of possibilities. The larger facility brought new expenses and challenges that two groups in the UW-Madison School of Nursing were able to help with. Group A's problem: The Lussier Community Education Center food pantry had recently lost a yearly donation of \$5,000 from an anonymous donor and the need for food had increased due to the economy and the newly visible facility. Group A's project: Grant Writing to Roundy's Foundation for \$10,000 cash and food. Group B's problem: The Wexford community identified a lack of dental hygiene education and access to affordable dental care. Group B's project: Educate Wexford community on dental hygiene and access to services.

ROLE OF HOST PLANT PHENOLOGY IN THE FEEDING BEHAVIOR AND REPRODUCTION OF AN INVASIVE FOREST INSECT

Michelle Jordan, Kenneth Raffa (Mentor), Entomology

We investigated whether host plant age affects the feeding behavior and reproduction of an invasive weevil. *Phyllobius oblongus* adults emerge in spring, feed on maple, and then switch to other species. Whether this reflects changes in plant suitability or merely subsequent availability of later-season plants is unknown. Weevils were tested using young maple, old maple, and young raspberry leaves to simulate natural conditions. In behavioral choice tests, leaf area consumption was compared. In no-choice tests, mated pairs were provided one host type until death. Leaf consumption, oviposition, and survival were recorded. Weevils preferred, survived longer and laid more eggs on, young maple and raspberry leaves over old maple leaves. Leaf phenology and plant community composition may, therefore, interact to affect population dynamics of *P. oblongus*.

INTERVENTION FIDELITY IN A STUDY OF COGNITIVE- BEHAVIORAL STRATEGIES FOR CANCER SYMPTOMS

Ashley Rusch, Kristine Kwekkeboom (Mentor), Nursing

Intervention fidelity, carrying out an experimental treatment exactly as planned, is a key methodological characteristic of a strong research study. The purpose of this study was to evaluate intervention fidelity in a trial of a cognitive-behavioral intervention for pain, fatigue, and sleep disturbance in cancer patients. A fidelity checklist was drafted based on the intervention training manual, and recordings of 14 patient-nurse interactions were reviewed to determine whether the nurse interventionists consistently delivered each component of the cognitive-behavioral intervention. While most components of the intervention were present, there appeared to be a few components that the nurse interventionist frequently missed. Use of the intervention fidelity checklist in monitoring future delivery of the intervention will help to achieve consistency and will enhance validity of study findings.

CONSTITUTIONS AND WOMEN'S RIGHTS

Elizabeth Budnik, Aili Tripp (Mentor), Political Science

A country's constitution can have a large impact on the overall gender equality of its citizens. We are finding that constitutions express women's rights in different ways. Some focus on women's rights as individuals, whereas others adopt a more collective approach. By closely examining the wording and framing of women's rights in various countries' constitutions regarding women's rights, we hope to determine patterns in the ways in which gender equality is pursued cross-nationally. The conclusions drawn here will be extremely valuable in understanding both the possibilities and limitations of constitutions for the advancement of women in many societies.

THE LEGAL IMPLICATIONS OF DIVORCE ON PARENT-CHILD RELATIONSHIPS IN JAPAN

Melinda Sarnicki, James Raymo (Mentor), Sociology

This research examines the effects of divorce laws on parent-child relationships in Japan. I analyze both English and Japanese-language documents in order to evaluate how the current legal structure and laws on divorce support or hinder parent-child relationships in Japan. Initial research suggests that existing divorce laws no longer reflect the current reality of rapidly increasing divorce in Japan. Current laws fail to support and encourage parent-child relationships during and after divorce. This research highlights the limitations of current divorce laws and poses questions for further research.

THE EFFECT OF EXERCISE ON AGITATION IN PEOPLE WITH DEMENTIA

Kristen Lund, Barbara Bowers (Mentor), Nursing

The purpose of this study is to determine the effects of a structured exercise program on agitation in older adults with dementia attending a day center. The intervention is comprised of a single educational session for day center staff and follow-up collaboration with the staff on designing an exercise program for people with dementia attending their day center. Agitation levels will be measured prior to the intervention and eight weeks following the beginning of the exercise program using the Cohen-Mansfield Agitation Inventory. Agitation is expected to decrease during the eight-week intervention. A decrease in agitation of day center attendees would display the benefits of enhancing the knowledge of day center staff regarding the effects of exercise on agitation.

EXAMINING MOUSE EMBRYONIC STEM CELL BEHAVIOR USING LIVE CELL IMAGING

Kelly Boyle, Jayne Squirrel (Mentor), Molecular Biology

Previous studies suggest that embryonic stem cells (ESCs) maintain cell-cell contact, facilitating intercellular communication to influence cell fate and behavior. We used long-term 4D multi-photon fluorescence microscopy of mouse ESCs expressing a fluorescently tagged DNA marker to document cell behavior. We found that ESC colonies are motile and that mitotic cells may promote this motility. By combining ESC colonies of different cell lines with different fluorescent markers, we will assess whether they exhibit a preference for colony interaction. Ultimately, we will document behavior during ESC differentiation to examine the mechanisms used to generate multiple cell types.

SALT EFFECTS UPON THE STABILITY OF A SHORT DNA DOUBLE HELIX

Timothy Wendorff, M. Thomas Record (Mentor), Biochemistry

Salt concentration contributes greatly to protein and nucleic acid conformational stability in solution. Ions contribute a Coulombic effect arising from localized charges, an osmotic effect from hydration of the bio-molecule, and a Hofmeister effect arising from competition for bio-molecule surface area between water and ions which, unlike the first two effects, is specific to ion identity. No quantitative information about Hofmeister contributions to stability has been available. Recent work in our laboratory separated these effects for globular proteins using spectroscopy and Poisson-Boltzmann coulombic calculations. We applied this approach to melting experiments on 12 base pair DNA double helix, covering a broad range of types and concentrations of salts. From these experiments we separated ion-specific Hofmeister effects, and related free energy of dissociation to ion identity and surface area type exposed.

EFFECTS OF G-PROTEIN COUPLED RECEPTOR 30 (GPR30) AGONIST G1 ON RAPID ACTION IN PRIMATE LHRH NEURONS

Nicholas Shiel, Ei Terasawa-Grilley (Mentor), Pediatrics

Recent studies in this laboratory indicate that 17 β -estradiol (E2) rapidly stimulates activity of luteinizing hormone releasing hormone (LHRH) neurons and that the estrogen receptor antagonist ICI 182,780 did not block the E2-induced intracellular calcium oscillations and LHRH release in LHRH neurons. These results led to the hypothesis that GPR30 is a possible mediator of E2 activation. This project further investigates whether the GPR30 agonist, G1, stimulates LHRH release. Cultured primate LHRH neurons were challenged with G1, and LHRH levels in perfusates were assessed using a radioactive immunoassay. The results indicated that G1 stimulated LHRH release, similar to E2, suggesting that GPR30 is involved in the rapid action of E2 in primate LHRH neurons.

THE REGULATION OF THE NUCLEOTIDE RECEPTOR P2X7 BY GLYCOSYLATION

Ziyi Wang, Paul Bertics (Mentor), Biomolecular Chemistry

The nucleotide receptor P2X7 is activated by extracellular ATP at sites of injury and infection, regulating the inflammatory response through several mechanisms. Inflammation is exacerbated in diseases such as asthma. Although the signaling pathways by which P2X7 regulates the immune response have been investigated, relatively little is known about the biochemistry of P2X7, including whether the receptor is glycosylated. We mutated five putative N-linked glycosylation sites in P2X7 and showed that each site is glycosylated. Using ERK1/2 activation tests, we have also found that some of the mutants exhibit reduced activity. This study is the first report showing that P2X7 is glycosylated and that these modifications regulate the receptor's activity. Understanding the regulation of P2X7 activity will be crucial in designing drugs that reduce inflammation.

UNNATURAL RESOURCE: EXPLOITING THE VAMPIRE LEGEND FOR ECONOMIC SUCCESS IN A SMALL CROATIAN VILLAGE

Ryan Carpenter, Tomislav Longinovic (Mentor), Slavic Languages

Humankind has always been attracted to the undesirable, a fact long exploited by entrepreneurs. The undesirable is dangerous but exotic, offering what we deny ourselves. Dark tourism, tourism associated with death and the macabre, is one example. Kringa, a Croatian village, offers a unique case of dark tourism. It is the site of a vampire legend, which has, since 2006, been used by local entrepreneurs. The entrepreneur faces many obstacles in marketing dark tourism and Kringa suggests three inherent conflicts: creating tourism versus local backlash; history versus sensationalism; and fulfilling expectations versus authenticity. These conflicts exist in other dark sites and may predict success or failure, as in Romania's Dracula Park. These examples show that exploiting the undesirable does not come without costs.

PSYCHOLOGICAL PREDICTORS OF SLEEP QUALITY AMONG CANCER PATIENTS RECOVERING FROM STEM CELL TRANSPLANT

Ashley Nelson, Erin Costanzo (Mentor), Psychiatry

The present study examined changes in sleep quality following hematopoietic stem cell transplant (HSCT) and investigated potential risk and protective psychological factors. Cancer patients undergoing HSCT (N=120) completed measures of sleep quality, mental health, and mood pre-transplant and at one- and three-months post-transplant. Results revealed declines in sleep quality from pre-transplant to one-month post-transplant, followed by improvement by three-months post-transplant (all p values less than .05). Hierarchical multiple regression models indicated that pre-transplant negative affect and anxiety predicted poorer sleep quality post-transplant, while psychological well-being predicted better sleep quality (all p values less than .05). In sum, individuals who experience greater distress and anxiety are most at risk for decline in sleep quality post-transplant, while a sense of psychological well-being may be protective.

RECOVERY TIME AND POST-OPERATIVE PAIN IN NEPHRECTOMY PATIENTS OF VARIOUS HAND PORT INCISION LOCATIONS

Scott Klasek, Daniel Kaplon (Mentor), Urology

Background/Purpose: Hand-assisted laparoscopic nephrectomy (HALN) is a procedure for removal of the kidney for either benign or malignant purposes. The procedure is performed via a hand port and laparoscopic ports. Optimal site for the hand port is controversial. Methods: We reviewed pain medicine requirements and overall recovery time in 100 patients grouped by hand port incision site. These included subcostal (18), lower quadrant (42), paramedian (8), and midline (32). Results: No statistical difference was observed between the groups with respect to pain medication requirement. However, patients who underwent subcostal incisions experienced a slightly longer recovery time than those with other incision types. Conclusion: Subcostal incisions may be associated with slightly longer recovery time after HALN. This should be considered when selecting the incision location.

PEER VICTIMIZATION: AN ANALYSIS ON BULLYING RELATIONSHIPS

Rebekah Blocker, Amy Bellmore (Mentor), Educational Psychology

A common misconception is that bullies have low self-esteem and poor social skills. In fact, bullies are sometimes the most popular amongst their peers. This research is dedicated to understanding what types of people become friends with bullies. A survey was designed in order to assess bullies, victims, bully-victims and their relationships as individuals. With the survey, I seek to gain understanding about the relationships bullies have with friends and also the characteristics of their friends. Upon receiving the results from this survey, it is expected that bullies will have friends who are of a passive nature rather than an aggressive one. These findings may prove helpful in preventing bullying situations in the future.

PERINATAL EXPERIENCE OF FATHERS WITH HIGH-RISK MULTIPLES

Caitlin Joyce, Megan Treacy, Kristin Lutz (Mentor), Nursing

The incidence of multiple births (MB) has increased due to reproductive technologies and delayed childbearing. Overall, MB infants have a higher risk of adverse outcomes; little is known about the effect of high-risk MB on fathers. The study purpose is to review literature about high-risk MB and fathers, and compare this data with participant data. We will examine the effects of high-risk MB, from the perinatal period through postpartum on the fathers, and identify common themes. Data are from a prospective, longitudinal, mixed-method study. Nineteen families were recruited, four fathers participated. Audiotaped interviews were conducted during three phases and measures of parental stress and depression completed. We will utilize electronic databases to locate articles and analyze fathers' data using thematic analysis and descriptive statistics.

GROOMING TENDENCIES OF CAPTIVE, FEMALE JAPANESE MACAQUES, *MACACA FUSCATA*

Amy Olsen, Charles Snowdon (Mentor), Psychology

Grooming in primate species extends beyond hygienic importance and plays an important role in primate relationships. Grooming themes addressed in this study are reciprocity, kin preference, and grooming directionality. Data was collected on 9 adult females at the Minnesota Zoological Gardens using focal and scan methods. Scans of the whole troop were conducted every 30 minutes with 15-minute focal session on one female in between. Females were shown to prefer kin for grooming ($Kr= 30$, p less than 0.05) and to tend to groom up the hierarchy ($Kr= 45$, $p=0.059$). However, no evidence of grooming reciprocity was found in this study. When comparing actor matrixes and their inverses, grooming instances were not reciprocal ($Kr= -8$, p greater than 0.65) and total grooming time between individuals were not reciprocal ($Kr= 23$, p greater than 0.14).

MODELING THE FORMATION OF IMIDAZOLE FROM VINYL CARBENE AND NITROGEN WITHIN TITAN'S ATMOSPHERE

Matthew Biller, Robert McMahon (Mentor), Chemistry

Titan, the largest moon of Saturn, has long been considered a location in which to study pre-biotic chemistry such as the formation of biologically relevant molecules. One such molecule necessary for life is imidazole. It is known that vinyl carbene and nitrogen exist within Titan's atmosphere, and it is possible for these starting materials to react via several steps to yield imidazole. This project explores if the energy present in Titan's atmosphere is sufficient for imidazole formation by using computational chemistry to quantify the amount of energy needed in each reaction step. Specifically, Gaussian 03 is used to determine the energy required by each reaction while Variflex calculates how fast each reaction occurs.

EFFECT OF AQUATIC SUBSIDIES ON TERRESTRIAL HERBIVORE DENSITY AND GROWTH

Erica Nystrom Santacruz, David Hoekman (Mentor), Entomology

Midges (*Chironomidae*) emerge en masse from lakes in northern Iceland and deposit much of their biomass onto the surrounding land. Consequently, these shorelines experience a high influx of nutrients in the presence of midges. I investigated the relationship between plants (*Salix lanata*) and herbivores (*Tenthredinidae: Pontopristia spp.*) around two lakes that differ in their influx of midges. I hypothesized that plants surrounding a high-midge lake would support more herbivores than plants surrounding a low-midge lake, and that herbivores fed plants from a high-midge lake would grow larger than herbivores fed plants from a low-midge lake. Results, however, showed the opposite: plants supported more herbivores at the low-midge lake, and herbivores fed plants from the low-midge lake grew larger. Next summer we will investigate how individual plants absorb and allocate nutrients from midges to help explain why herbivore density and growth were adversely affected.

FOLIC ACID ENHANCES NEURONAL ELONGATION *IN VITRO*

Krista Stewart, Bermans Iskandar (Mentor), Neurological Surgery

We have previously shown that folic acid supplementation enhances regeneration of the injured central nervous system *in vivo*. To determine whether folate acts at the level of the neurons or glia, we studied the behavior of folate in an *in vitro* model of neuronal regeneration. After 24 hours of growth, the dorsal root ganglia neurons of folate-pretreated Sprague-Dawley rats produced a significantly greater percentage of long axons than those of untreated animals. In addition, growth of folate-treated neurons occurred 20 hours earlier than the control group. Folic acid acts at least in part through the neuronal cell body to enhance regeneration. Such an effect, if confirmed in humans, could lead to novel treatment and prevention measures for patients with degenerative and developmental CNS problems.

THE ROLE OF NA⁺/H⁺ EXCHANGERS IN THE PH REGULATION OF NEURONAL DENDRITES

Lucas Vitzthum, Dandan Sun (Mentor), Neurological Surgery

Regulation of pH in the nervous system is a crucial homeostatic process during healthy and pathological conditions. Transient changes in pH_i can significantly affect several physiological functions such as neuron excitability and activation of ion channels, while more severe fluctuations can lead to delayed or immediate cell death. Na⁺/H⁺ exchangers (NHEs) are robust acid extrusion proteins that facilitate the secondary exchange of sodium and hydrogen ions during acidosis. Regulation of pH and NHE activity are known to differ between the soma and processes, but the cellular mechanisms for how they differ is not fully understood. Recently developed microfluidic technology can serve as an excellent culturing model, to study the isolated mechanisms of pH regulation in dendrites versus soma. The results of this cross-disciplinary study will shed light on how neurons regulate pH_i which will improve understanding of pathologies such as ischemic cell damage, and could thus help in the development of therapeutic stroke treatments.

NOVEL APPROACH FOR FINDING NEW THERAPEUTIC DRUG FOR LONG QT SYNDROME

Kassandra Holzem, Craig January (Mentor), Medicine

The human ether-a-go-go-related gene (hERG) encodes the hERG potassium channel, and mediates the rapidly-activating delayed-rectifier current (I_{Kr}) in native cardiac myocytes. Some mutant hERG channels fail to integrate into the cell membrane; this reduces I_{Kr}, and causes Type-2 Long QT syndrome (LQT2), an underlying cause of cardiac arrhythmia. Various compounds, such as E4031 and astemizole, cause pharmacological rescue of hERG mutants to the cell membrane; however usage of these compounds as treatment for LQT2 is limited, as many render the channel nonfunctional (block). Small molecule analogues of E4031 and astemizole can also rescue hERG mutants, some without blocking or adhering completely to the channel. This study identified mechanisms behind pharmacological rescue and block of the hERG channel, which has implications for LQT2 therapy.

PSYCHOSOCIAL IMPACTS OF NEONATAL CYSTIC FIBROSIS DIAGNOSIS ON PARENTS

Carrie Sabo, Nicole Voigt, Audrey Tluczek (Mentor), Pediatrics

The purpose of this study was to identify the challenges of parenting an infant following a cystic fibrosis (CF) diagnosis that resulted from newborn screening. This study focused on the qualitative portion of a mixed method longitudinal project. Grounded theory methods guided the dimensional analysis of six interviews from two families at three data points during their infant's first year. The major themes identified were: 1) keeping child healthy; 2) uncertainty and worry about the future; 3) dealing with responses from others; 4) dealing with illness; and 5) coping with emotional distress. Parents also identified coping strategies related to each of the identified challenges.

**CONTROVERSY, COQUETTERY, AND CONFORMITY:
PROBLEMS OF PERFORMANCE IN THE ART
OF P.A. BAUDOIN**

Aurelia Moser, Gail Geiger (Mentor), Art History

My research objective is to identify and explain the peculiar artistic inclinations of Pierre Antoine Baudouin (1723–69), whose repeated decisions to depict controversial and coquettish subject matter seem to conflict with the mythological, historical, and theatrical implications of the Chazen Museum’s drawing, “Marriage of Peleus and Thetis.” Often recognized for his Rococo “genre” paintings and miniatures, for his polemical position in connection to the French court and critics, Baudouin defies precedent in attempting both to negotiate and to rebel against the Académie and the French monarchy. Reconciling Baudouin’s standard artistic interests with a decidedly uncharacteristic piece, I argue that the themes in this drawing correspond with the aesthetics that define most of Baudouin’s work, and echo historical and political developments prior to the Revolution (1789).

**PREVALENCE OF STRESS REFERENCES ON COLLEGE
FRESHMEN’S FACEBOOK PROFILES**

Katie Egan, Megan Moreno (Mentor), Pediatrics

High stress levels are associated with medical problems including weight gain, depression and Type II Diabetes. Early identification of stress may prevent its complications. The social networking site Facebook is used by 75 percent of UW–Madison students, and may present an innovative venue to identify students at risk for stress complications. We examined 200 randomly selected public Facebook profiles of UW–Madison freshmen. Of 200 profiles, 68 percent were age 18 and 61 percent were female. Stress references were present on 35% of profiles and were positively associated with female gender (OR=2; CI: 1.5–5.9), mental illness references (OR=2.4; CI: 1.2–4.7), and weight references (OR=4.6; CI: 1.4–15.7). Facebook may be a useful venue to identify adolescents at risk for stress-related conditions.

**EARLY AMERICAN INTELLIGENCE: RACE AND GENDER
TACTICS IN THE AMERICAN REVOLUTION**

Matthew Costello, Jean Lee (Mentor), History

My project explores the roles of women and African Americans in colonial America and their subsequent roles in the War for Independence. While they became incredibly crucial to the maintenance of the American economy, they also aided the war effort by fighting, serving as logistical support in camps, and in the realm of intelligence. Both sides employed the services of these groups, but my bigger question is: how were they successful in obtaining information? My research indicates that standing perceptions of inferiority were to blame, along with the maladministration of the British army in North America, which allowed access to numerous cohorts throughout the war.

**CONTRIBUTION DIFFERENCES BETWEEN
ACROMYRMEX LEAF-CUTTER WORKER CASTES
IN DEFENSE AGAINST PARASITISM**

Derek Abramowski, Cameron Currie (Mentor), Bacteriology

The fungus growing ant-microbe symbiosis has been studied as a paradigmatic example of host-parasite dynamics and interactions. Fungus-growing ants rely on their cultivar fungus for survival, but microfungi in the genus *Escovopsis* parasitize this relationship. The ants utilize a combination of chemical and behavioral defenses to limit or prevent spread of infection by *Escovopsis*. I propose investigating the differing responsibilities of the two worker size castes, in order to determine the importance of behavioral differences. I will examine the physiological differences of the two worker castes by comparing the sensing structures present on their antennae. I will also test the effectiveness of each worker caste in defending their fungus garden from *Escovopsis* by measuring their ability to reduce the impact of established infections.

ARE EPA TESTING PROCEDURES STRINGENT ENOUGH? THE EFFECT OF INERT INGREDIENTS ON PESTICIDE ABSORPTION

Erin Conrad, Martin Zanni (Mentor), Chemistry

Current EPA testing procedures that focus on the health effects of pesticides test the active ingredients alone, without their full commercial formulations. However, the inert ingredients in pesticide formulations have been shown to increase dermal absorption of the active ingredient. This enhanced absorption may be caused by the inert ingredients interacting with lipids in skin cells, which would have implications about what classes of inert ingredients are dangerous. Here several methods are proposed for determining whether there is a difference in vesicle uptake between a commercial pesticide Roundup and its active ingredient glyphosate, and if this uptake results from an interaction of the pesticide with the lipids.

DIGIT RATIO AND CORTISOL LEVELS IN HEALTHY INDIVIDUALS

Kyle Swinsky, Heather Abercrombie (Mentor), Psychiatry

Digit ratio (2D:4D; length of index finger compared to ring finger) is a trait that serves as an index of the steroidal environment during development in utero. Digit ratio may be related to the development of steroid receptor functioning in the brain. In men, the second digit tends to be shorter than the fourth, and in women the second tends to be the same size or slightly longer than the fourth. This study seeks to determine whether there is a relation between digit ratio and the steroid cortisol in healthy individuals. The digit ratio was calculated by measuring the ratio of the lengths of 4D and 2D. Salivary cortisol samples were collected at five time points across two days. We hypothesize that poorer diurnal regulation of cortisol will occur in individuals showing digit ratios in the direction opposite to the typical direction for their sex.

THE DEVELOPMENT OF HABEAS CORPUS AS THE WRIT OF LIBERTY

William Thomson, Johann Sommerville (Mentor), History

In both England and America the writ of habeas corpus is celebrated as a fundamental guarantor of personal freedom and the rule of law. And yet, for all of its storied association with liberty and due process, the origins and early development of habeas corpus did not suggest its potential as a defense against arbitrary imprisonment. I argue that the protection of personal liberty did not come to be seen as the purpose of the writ until 1628, when a select group of common lawyers in parliament, engaged in a struggle with the Crown over what they saw as threats to their freedom, transformed habeas corpus into something it had never been—a dedicated defender of due process.

ENHANCED PROANGIOGENIC ACTIVITY OF LUNG ENDOTHELIAL CELLS PREPARED FROM TSP-1 DEFICIENT MICE

Travis Guelig, Shannon Elliott (Mentor), Business

Thrombospondin-1 (TSP1) is an endogenous inhibitor of angiogenesis. To better understand its role in angiogenesis, we have established lung endothelial cells (EC) from wild type (TSP1+/+) and TSP1-deficient (TSP1-/-) mice. Here we have compared the proangiogenic characteristics of these cells. We show TSP1-/- lung EC are more proliferative and migratory and organized poorly on Matrigel compared to TSP1+/+ cells. This is perhaps due to alterations in their adhesive and migratory properties. TSP1-/- lung EC were less adherent and expressed reduced levels of alpha4 and beta1 integrins compared to TSP1+/+ cells, while similar levels of alpha6, alpha5beta1, and alphavbeta3 integrins were observed. The study of TSP1 and its mode of action in EC will provide insight into the role of TSP1 in regulation of angiogenesis.

COMPLEMENT IMPROVES UPTAKE AND RETENTION OF MYCOBACTERIUM IN EARLY PHAGOSOMES

Molly Kelley, Matyas Sandor (Mentor), Pathology

Recombinant Mycobacterium bovis BCG strains engineered to express fluorescent proteins have been used in phagocytosis assays. Flow cytometry measurements of the uptake of BCG by murine peritoneal macrophages and bone marrow-derived dendritic cells indicated that bacteria opsonization with C3-containing serum facilitates phagocytosis. Fluorescence live cell imaging of phagosome maturation was performed on Rab5-EGFP-transfected macrophages. A significantly higher proportion of bacteria were found to reside for extended time in Rab5+ non-maturing phagosomes when C3 sufficient serum was used for opsonization, as opposed to serum from C3-deficient animals. Opsonization with C3+ serum was also associated with a higher rate of Rab5+ recycling endosomes docking to bacterial phagosomes. Preliminary data indicate that presence or absence of serum C3 did not translate into significant differences in antigen presentation. Higher uptake and retention in Rab5+ endosomes favors survival of mycobacteria, hence these data suggest that live mycobacteria might benefit from opsonization with complement. These results provide an example for the advantage an intracellular pathogen might gain from host innate immunity.

ADSORPTION OF PHOSPHOLIPID BILAYERS ON METAL OXIDE SURFACES

Anthony Giuffre, Nita Sahai (Mentor), Geology and Geophysics

The specific aims of the project are to establish the effects of particle loading (mass of oxide per liter of solution) and particle size (micron versus nanometer-sized) on particle aggregation which, in turn, affect available surface area for phospholipid (PL) adsorption and self-assembly, at pH 7.2 and 55°C. In particular, I will measure the adsorption of dipalmitoylphosphatidylcholine (DPPC), a common cell-membrane PL, on the surfaces of quartz and corundum at different ratios of particle loading of oxides almost equal in size (~ 1 micron). Further, I will determine DPPC adsorption isotherms on an oxide of the same composition but different particle sizes, namely, micron- and nano-sized SiO₂. The stability of PL membranes on oxide substrates has relevance to design and function of biocompatible implants, biosensors, and to the earliest stages of cell membrane evolution in pre-biotic chemistry.

ADVANCE CARE PLANNING IN AIR-FLIGHTED PATIENTS TRANSPORTED TO THE HOSPITAL

Mariah Hall, Maggie VanAbel, Ana Schaper (Mentor), Nursing

Helicopter patient transportation has increased. The rate of infection and organism prevalence in this population is unknown. Management of infections during hospitalization may be influenced by a patient's advanced care plan. The objective was to document the proportion of air-lifted patients having advanced directives prior to emergency hospitalization. A retrospective chart review was completed on 140 patients randomly selected from a population of patients transported from September 2006 through June 2007. Data were collected on patient demographics, clinical profile, site of patient pick up, criticality of the patient, incidence of infection, and the presence of an advanced care plan at admission and discharge. Baseline data on advanced care plans may help prepare systems for the most appropriate emergency response for patients arriving by helicopter.

DIFFERENCES IN SMOKING CESSATION OUTCOMES AMONG PEOPLE WITH AND WITHOUT DIABETES

Clare Baumann, Erin Clements, Douglas Jorenby (Mentor), Medicine

Diabetes and smoking are not only detrimental to health, but diabetes may in fact be exacerbated when combined with smoking (Fiore et al., 2008). Limited amounts of research have been done on the differences between people with and without diabetes during smoking cessation efforts. Analysis of data from 72 smokers with diabetes and 1,432 smokers without diabetes was performed. Hemoglobin A1c, breath carbon monoxide levels, weight and cigarettes smoked per day were analyzed. There were no statistically significant differences between the groups in time to first cigarette following quit date, time to relapse, number of cigarettes smoked pre-study or ratio of genders. This suggests that, when provided with the same treatment as individuals without diabetes, individuals with diabetes are as likely to succeed in cessation.

IDENTIFICATION OF A NOVEL STRUCTURE THAT ORGANIZES THE FETAL/MATERNAL VASCULAR CONNECTION

Jacob Daane, Karen Downs (Mentor), Anatomy

The umbilical cord is essential for the proper exchange of nutrients, wastes and gases between a fetus and its mother. Given this vital role, it is not surprising that there are many abnormalities associated with defects in cord length and vascular patterning. The umbilical cord develops from a structure called the allantois, which elongates from the fetus to fuse with the placenta. The outer covering of the allantois, the mesothelium, has previously been shown to mediate this fusion. Our results revealed that the mesothelium may also regulate both vascular patterning and the maintenance of an allantoic stem cell niche. Thus, the outer covering of the future umbilical cord may regulate the fetal/maternal vascular connection.

HEALTH NEEDS ASSESSMENT OF HMONG ELDERLY: MENTAL HEALTH ISSUES

Lee Her Lee, Ana Schaper (Mentor), Nursing

Hmong elders have a high rate of depression due to past trauma and ongoing stressors. The objective was to assess for depression in elders. A survey based on the Behavioral Risk Factor Surveillance System was mailed to 324 Hmong. Of the 36 elders responding, 18 reported a chronic disease and 25 indicated "fair health." There were 8 elders who indicated being "a little satisfied/dissatisfied" with life with 11 elders indicating many days of feeling sad, worried, or lonely. Data indicated 27 elders exercised. Research suggests that exercise may be effective in managing mild to moderate depressive symptoms. Culturally appropriate interventions defined by elders include the use of pedometers and a Hmong storycloth (*pandau*) depicting ways in which the elderly can walk and socialize with others.

GPU COLLISION DETECTION USING SPATIAL SUBDIVISION

Hammad Mazhar, Dan Negrut (Mentor), Mechanical Engineering

This work concentrates on the issue of rigid body collision detection, a critical component of any numerical method employed to approximate the dynamics of multibody systems with frictional contact. Presented here is a scalable collision detection algorithm designed for massively parallel computing architectures. The approach proposed is implemented on a ubiquitous GPU card, and demonstrated to achieve a 30x speedup over state-of-the-art CPU implementations when handling multi-million object collision detection. The proposed methodology is expected to have a significant impact on a wide range of granular flow dynamics and smoothed particle hydrodynamics applications when dealing with hundreds of millions of collisions scenarios.

THE IMPACT OF RISKY HEALTH BEHAVIORS ON DATING COUPLES' RELATIONSHIP SATISFACTION

Kathryn Abrams, Jenna Acker, Aviva Levi, Lauren Papp (Mentor), Human Development and Family Studies

Risky health behaviors are defined as self-imposed choices that affect an individual's ability to actively control his or her health. While many behaviors pose risk to people's health, eating patterns and alcoholic drinking behaviors are of particular interest given their prevalence among young adults. Studies reveal that abnormal eating and drinking behaviors may negatively impact individuals' mental and physical well-being. However, limited research has been conducted on the impact of these risky health behaviors in intimate relationships. The current study explores the correlation between intimate partners' risky health behaviors and dating relationship satisfaction. The sample included 101 dating couples who participated in a study on partners' communication and well-being. We hypothesize that partners' use of risky behaviors will be positively associated and that higher levels of partners' risky behaviors will predict lower levels of their own and their partner's relationship satisfaction.

MODEL OF MACULAR DEGENERATION IN PRIMATE RETINAS

Josh Clermont, Lynda Wright (Mentor),
Ophthalmology and Visual Sciences

This research lab studies inherited and acquired eye diseases that end in the degeneration of photoreceptors and retinal pigment epithelium (RPE), which can terminate sight. We model retinal development and potential cell-based treatments for these diseases. In this lab we hope to 1) investigate cellular and molecular events that happen during retinal creation, and 2) provide rescue cells that give therapy for retinal degenerative diseases. To do this, we use multiple cell types and try to imitate their creation. By understanding the behavior of these cell types, we hope to find strategies to delay or reverse the effects of eye diseases such as retinitis pigmentosa and macular degeneration.

STUDY OF THE CONTRIBUTION TO VIRULENCE OF A GENE UNIQUE TO SOFT-ROT PATHOGENS

Rajitha Kota, Maria del Pilar Marquez Villavicencio (Mentor),
Plant Pathology

Pectobacterium species are enterobacterial plant pathogens that cause soft-rot diseases in many important crops including potatoes. Genome sequence analysis of multiple soft rot species, including *P. carotovorum* (Pc) have revealed genes unique to soft-rot bacteria. We will use allelic-exchange mutagenesis to delete a gene encoding a putative ATP-GTP binding protein from Pc. This gene family is found only in soft rot enterobacterial pathogens. We will investigate the contribution of this gene to bacterial virulence, survival and competition.

DNA DATA COMPRESSION

Leanne Demery, Bormin Huang (Mentor), Space Science and Engineering
DNA data compression takes long chains of DNA (ATCGAATCC etc.) that are thousands of base pairs long and uses computer codes to decrease the file size of the DNA chain. Because there are only four base pairs, the optimum compression ratio is two. Compression ratio tells us how much our file has been reduced from the original. We are trying to create a computer algorithm that will give us a compression ratio as close to two as possible. The closest anyone has gotten to a particular DNA chain is 1.98. We use computer programs such as MATLAB, which has its own language, to create functions and matrices that consist of our code.

PHYSICAL AND BIOLOGICAL INFLUENCES ON MERMITHID PARASITISM OF *BAETIS* MAYFLIES

Carolyn Robbins, Barbara Peckarsky (Mentor), Zoology

This study examines whether the parasitism of *Baetis* mayflies by the mermithid nematode *Gasteromermis* sp. in high elevation streams is affected by temperature, hydrologic conditions, and proliferation of the nuisance diatom *Didymosphenia geminata*. The following hypotheses will be addressed: The prevalence of mermithid parasitism is higher than previously recorded by Vance and Peckarsky in a comparable study from 1991–94, potentially attributable to changes in physical and biological conditions. Mermithid nematodes infect a higher proportion of *Baetis* mayflies in stream reaches at lower elevations. The prevalence of mermithid parasitism is affected by the variation in thermal and hydrologic conditions upstream versus downstream of beaver dams. There is a higher prevalence of mermithid parasitism in stream reaches with stable hydrologic conditions, such as downstream of beaver dams. High density of *D. geminata* in a stream reach is positively correlated with an increase in mermithid parasitism. Ultimately, the associations between mayflies, parasitic nematodes, nuisance algae and beavers, as well as the effects of temperature and hydrology, show the relationship between environmental changes and the fundamental process of parasitism in stream ecosystems.

SDL: A MOUSE MODEL FOR LYMPHOCYTIC LEUKEMIA

Rachael Lester, Lara Collier (Mentor), Pharmacy

Spontaneous dominant leukemia, Sdl, is a mouse model for lymphocytic leukemia. We are trying to identify the affected gene of Sdl through a recombination mapping approach. Identifying additional polymorphic markers between the parental strain on which Sdl arose and mapping strains of mice is necessary to accomplish this goal. Polymerase chain reaction and genomic sequencing are being used to analyze candidate markers. Once identified, these new markers will be used to narrow the chromosomal location where the Sdl mutation must reside. We hypothesize that discovering this mutant gene will identify a new gene involved in leukemia formation in humans and provide insight into new therapies for the disease.

FIBER-OPTIC GAS THERMOMETER FOR WIDESPREAD COMMERCIAL USE IN INTERNAL COMBUSTION ENGINES

Benjamin Conrad, Scott Sanders (Mentor), Mechanical Engineering

A fiber-optic thermometer for use in internal combustion engines was developed to utilize a fiber-optic spark plug. This system allows non-invasive, high speed (23 kHz) thermometry in a wide variety of spark-ignited engines found in engine research laboratories and in mechanics' garages. Performed under the guidance of Professor Scott Sanders and in collaboration with LaVision, GmbH the sensor is in its final round of testing.

LAND USE INFLUENCES ON CHARCOAL DEPOSITS IN NORTHERN WISCONSIN LAKES

Alexander Heeren, Sara Hotchkiss (Mentor), Botany

While the Northern Highlands Region of Vilas County, Wisconsin, has been inhabited by humans for centuries it is not known what effect human land use has had on the fire ecology of the region. Fossilized charcoal deposits that are preserved in lake sediments can provide a good record of past fire frequency. Lake sediment cores were collected from three lakes (Allequash, Crystal and Sparkling) and examined for charcoal. Charcoal data were used to recreate the fire history of the region and then examined to see if there were significant differences in fire frequency due to logging in the region.

THE INTERACTIVE EFFECTS OF CORTISOL AND PULSE RATE ON MEMORY

Alissa Benson, Heather Abercrombie (Mentor), Psychiatry

Cortisol elevations have robust effects on memory. Animal research suggests that glucocorticoids (e.g., cortisol) only facilitate memory during emotional arousal. This project examines how cortisol elevations and autonomic arousal facilitate memory in humans. Using a within subjects design, participants received a low dose of cortisol (15mg of hydrocortisone) and placebo on different days, prior to a memory encoding task. Pulse rate was measured as an index of autonomic arousal, and memory performance was tested four to six days later. We hypothesize interactive effects of cortisol and pulse rate on memory such that cortisol elevations will facilitate memory formation most for individuals showing pulse rate elevations. Examination of relationships between stress hormones, arousal, and cognition may give insight to the prevention and treatment of disorders such as post-traumatic stress disorder and depression.

OPEN SPACE DESIGN: PLANNING FOR THE FUTURE IN URBAN HONDURAS

Hogan Edelberg, Stephanie Judge, Stevie Koepp, Katherine Lewis, Darin Newman, Samuel Dennis, Jr. (Mentor), Landscape Architecture

Sensitive urban planning is an issue of growing global concern. During the Honduras service-learning trip of 2009 a UW–Madison team of students worked in partnership with the city of Siguatepeque to develop designs for a 280-acre green space. Our goal was to secure the parks boundaries and protect its natural resources, while increasing the public use of the park. Our initial work, begun in spring of 2008 in Madison, was reviewed by the Mayor and a leading architect upon our arrival. We delivered to the city drafted plans depicting location, dimensions, and character of elements designed to increase use while decreasing impact. These included a visitor center, performance space, trail and camping guidelines, passive barriers, and children's play areas. Our plans contributed to the preservation of natural resources in Siguatepeque and laid a framework for urban open space planning in Honduras.

BIOCORE PRAIRIE RESTORATION: WEED CONTROL VIA REVERSE FERTILIZATION

Deena Weiss, Janet Batzli (Mentor), Biology Core Curriculum

A major obstacle faced by the Biocore Prairie restoration on the UW–Madison campus is high soil nitrogen, encouraging the growth of nitrophilic weeds over native prairie species. We investigated a weed control technique called “reverse fertilization” to immobilize nitrogen following soil amendment with sawdust and ground corn stubble. Our results revealed changes in vegetation composition, soil nitrogen, and biomass production three years following the initial treatment. Although prairie plant frequency and biomass increased over time, no significant treatment effects were detected between sawdust and corn stubble treated plots and controls. Furthermore, significant differences in soil nitrogen were detected between treatment groups, but not over time. This research may provide valuable insight regarding the utility of this technique in prairie restorations with high soil nitrogen.

THE IMPACT OF ETHNICITY AND FAMILY STRUCTURE ON THE COPING PATTERNS OF PEER VICTIMIZED ADOLESCENTS

Liliana Palencia, Amy Bellmore (Mentor), Educational Psychology

Adolescents who suffer physical, verbal, or psychological abuse from their classmates are at risk for an array of adjustment problems including depression, anxiety, and low self-esteem. This study examines whether adolescents of certain ethnicities are more likely to cope with peer victimization through interpersonal involvement with family members. Special attention is paid to variations in family structure between the Caucasian, African-American, and Latino ethnic groups. The results of a survey distributed to 1,140 eighth graders are expected to show how ethnicity and family structure are related, as well as how these factors interact to work as peer victimization coping mechanisms. The outcomes will help evaluate why certain adolescents are more likely to use their families as a support system when faced with peer victimization.

SOUTHERN FLYING SQUIRREL (*GLAUCOMYS VOLANS*) NEST SITE SELECTION IN NOVEL FOREST MANAGEMENT SITES

Lili Prael, Tim Van Deelen (Mentor), Forest and Wildlife Ecology

At the end of the 19th century most of the hemlock-hardwood forests of northern Wisconsin were demolished for timber harvest. Since then much of the forest has grown back but no longer contains many of the unique qualities characteristic of old-growth forests. Consequently, the Wisconsin Department of Natural Resources (WDNR) has initiated a long-term research project aimed at regaining old-growth forest characteristics in northern Wisconsin. Flying squirrels (*Glaucomys spp.*) are often used as an indicator species for forest health. They are also associated with older forests in part because of their reliance on dead or decaying trees as nesting habitat. This project shows the relationship between flying squirrels and their nest site selection in these WDNR-managed old-growth forests.

THE ROLE OF PERFORMANCE PRESSURE AND CONFLICT ON HORMONAL STRESS LEVELS AND EDUCATIONAL OUTCOMES

Jacob Stern, Judith Harackiewicz (Mentor), Psychology

In this study, we investigated how sociocognitive conflict affects performance, interest, and hormonal stress depending on the presence of performance pressure during a performance task. Research suggests that sociocognitive conflict (disagreement between two or more individuals) promotes learning in a non-competitive, low stress situation, but impairs learning when the situation is more competitive and stressful. We manipulated performance pressure by informing participants they would be evaluated relative to other students, and we manipulated conflict by exposing participants to differences of opinion with another learner. To measure hormonal stress, we took saliva samples at four critical times, and analyzed the samples for the stress hormone cortisol. We predicted that students would experience more stress under performance pressure, shown by higher levels of cortisol, especially when they experience sociocognitive conflict, which would lead to lower levels of performance and interest. The results of this study may be used by educators to better understand how students respond and react to academic and social pressures in the classroom.

UNDERSTANDING FAMILY BUSINESS IN CHINA— LEEWAY TO BUILD SUSTAINABLE PARTNERSHIP

Sui Ki Debbie Cheung, Yue Jiang, Debra Houden (Mentor),
General Business

This study will examine the incorporation of Chinese culture in various aspects of family business. We will explore the influence of a dominant Chinese culture, Confucianism, on family concept, Guanxi network, and the styles of communication and operation. Upon our study, we hope to find some similarities of Chinese family enterprises with their Western counterparts, as well as their uniqueness shaped by Chinese culture. This research is conducted to provide foreign companies insights on the way family business functions in China, especially for those who are currently building an international partnership with Chinese company, or consider doing it in the near future.

THE EFFECT OF ACUTE STRESS IN CORTICOTROPIN-RELEASING FACTOR BINDING PROTEIN-DEFICIENT MICE

Matthew Hille, Stephen Gammie (Mentor), Zoology

Corticotropin-releasing factor (CRF) plays a key role in the modulation of cognitive behaviors. Endogenous levels of CRF in the central nervous system are modulated by CRF binding protein (CRFBP). Elevated levels of CRF have been shown to enhance cognitive performance via the binding protein. This present study will investigate the role of CRFBP on various measures of learning and memory processes utilizing mice deficient in the gene for CRF binding protein. Following an acute stressor spatial recognition tests and acquisition of a visual discrimination paradigm will provide a means to measure cognitive performance under stressful conditions. This study examines the specific role of CRFBP in stress mediated response during behavioral cognitive performance.

PHOTOVOICE AS A METHOD TO ADDRESS TOBACCO- USE DISPARITIES IN AN UNDERSERVED COMMUNITY

Jessica Connor, Sarah Sanchez, Joshua Shapiro, Dee Cee Xiong, Sharon Younkin (Mentor), School of Medicine and Public Health

Photovoice was used to address tobacco-use disparities on Allied Drive. Photovoice is a form of community-based participatory research designed to address social issues in high-risk communities. Participants were given cameras and instructions on how to take evocative photographs relating to the theme of tobacco use. After taking their photographs, participants discussed the themes that arose and developed action plans to create a healthier community. A community reception was held to display the photographs, stories, and action plans that resulted from the Photovoice program. Student leaders and community participants then: 1) implemented smoking cessation workshops and support groups; 2) established tobacco free areas; 3) encouraged adults not to smoke around children and to serve as positive role models in the community.

THE TRANSITION FROM THE UNITED NATIONS COMMISSION ON HUMAN RIGHTS TO THE HUMAN RIGHTS COUNCIL

Jennie Sutcliffe, Scott Straus (Mentor), Political Science

This paper explores the transition from the United Nations Commission on Human Rights to the Human Rights Council. The Commission was established on 10 December 1946 as the organ of the United Nations designed to promote and protect human rights. The work done by the Commission was monumental, specifically in the capacity of standard setting. It served as the primary body that dealt with human rights until 2006, when it was replaced by the Human Rights Council. The Council was created by General Assembly resolution 60/251 to replace the Commission, which had lost a degree of its credibility as a result of increasing politicization and an apparent inability to act in the face of gross human rights abuses. The Council retained many functions of the Commission while also implementing new mechanisms designed to address the problems faced by the Commission. This paper examines the achievements of the Commission, the causes of the demise of the Commission, and in turn the creation of the Council. Furthermore this paper discusses the differences and similarities between the Commission and the Council, and seeks to understand how the international community is responding to the new Council.

OPEN-AIR MARKETS IN THE PERIOD 1890–1920

David Nelson, Alfonso Morales (Mentor), Urban and Regional Planning

In the first part of the 20th century, open-air markets were on the decline. Changes in technology and the distribution of goods combined with social/political pressures caused open-air markets to be replaced by various types of retail operations, a trend that continued unabated until the last part of the 20th century. By examining how these markets once fulfilled the needs of the American citizen, we gain additional insight into their value to contemporary society. Questions include: What were the physical and political realities of open-air markets in America during the period 1890–1920? What role did culture play in the creation and continuance of these markets? How were the needs of period market vendors and their customers different from modern day equivalents?

GLOBAL FRAGMENTATION ANALYSIS: TRACKING THE CHANGES IN NATURAL LANDSCAPES WITH REMOTE SENSING

Brian Lee, Mutlu Ozdogan (Mentor), Forest and Wildlife Ecology

Fragmentation of natural habitat, a direct cause of biodiversity loss and ecosystem degradation, is induced by agriculture, forestry, and urbanization. To track these human activities on natural landscapes, this fragmentation analysis combined computer software on spatial analysis and high-resolution satellite images designated by a discrete global grid—series of hexagons laid over the Earth's land surface according to population density—centered on areas with rapid development. The analytical process included fragmentation measurement by comparing perimeters of different landscape types. When combined with human population, the results show that the magnitude of fragmentation is a direct function of population density. These results have wide-ranging applications from predicting the future changes in the global environment to preventing the loss of biodiversity through conservation of natural habitat.

INVESTIGATING VARIATION IN OXALATE CONTENT IN BEETS

Sam Galindo, Amy Freidig (Mentor), Horticulture

The table beet (*Beta vulgaris*) is a widely known member of the Chenopodiaceae family. Appreciated for its contribution to dietary needs and natural food dye qualities, the table beet is a versatile vegetable. Beet roots and leaves contain oxalate, a nutritional compound that may contribute to kidney stone formation. The purpose of this project is to screen for any variation in levels of oxalate amongst several beet cultivars. The beet samples undergo a series of extractions followed by enzymatic assay to determine the concentration of soluble and insoluble oxalate. We anticipate results that will show a variation of concentrations amongst the cultivars. With this information we can assess any potential for future breeding efforts to create a lower oxalate beet.

PARENT INFANT INTERACTION LAB NEWSLETTER

Leslie Lindsay, Melissa Vollbrecht, Julie Poehlmann (Mentor),
Human Development and Family Studies

A newsletter was produced to inform the participating families in the Infant-Parent Interaction Lab, run by Dr. Julie Poehlmann, about the progress of the study. Along with the current status of the study, we outlined issues relating to parenting preterm children. The study surveys the unique interactions that occur between mothers and their infants born preterm or low birthweight. This study followed 181 infant-mother dyads from birth to 36 months and is in the process of collecting six-year updates. Our lab sends out newsletters biannually, the current one being the sixth edition. The newsletters are a collaborative effort that keep the research team in touch with family participants.

REVOLUTIONARY PUBLISHING PRACTICES IN LATIN AMERICA

Miriah Barger, Sapir Sasson, Ksenija Bilbija (Mentor),
Spanish and Portuguese

This project investigates the formation of non-profit publishing houses (*cartoneras*) in Latin America; they are unique in that they use cardboard bought from street recyclers to make affordable book covers. Our project raises awareness about this literary revolution and develops a better appreciation of published literature and literacy. We are currently compiling all information pertaining to the Cartoneras into one online archive that will be available to the public. Also, we are planning a conference to unite all Cartoneras for the first time (October 2009) and will be publishing a book of Cartonera manifestos and academic articles. Our research highlights the importance of affordable, avant-garde literature and will contribute to this movement by inspiring future studies about the Cartonera publishing houses.

ESTABLISHING THE ROLE OF THE 95C5 MUTATION IN THE ATTENUATED VIRULENCE OF *TOXOPLASMA GONDII*

Peder Lund, Laura Knoll (Mentor), Medical Microbiology & Immunology

Using signature-tagged mutagenesis adapted to the protozoan parasite *Toxoplasma gondii*, we have isolated 39 mutants that demonstrate attenuated virulence in mice but normal growth in cell culture. The current study focuses on one of these mutants, designated 95C5. To verify that the mutagenesis plasmid insertion and not the signature-tag insertion is responsible for the avirulent phenotype of 95C5, we will engineer a complemented strain of 95C5 and assess its virulence in mice in an acute model of toxoplasmosis. Additionally, the gene product that is mutated in 95C5 will be localized in wild-type parasites by immunofluorescence as a preliminary characterization study. Confirming the role of this gene product in *T. gondii* pathogenesis will validate further studies on its function and regulation.

THE EFFECTS OF CORTISOL ON WORKING MEMORY AND LONG-TERM MEMORY FORMATION

Brittany Nanzig, Heather Abercrombie (Mentor), Psychiatry

Previous research suggests that heightened elevations of the stress hormone cortisol often improve long-term memory formation, but impair working memory. The goal of this study was to use one task to study the effects that cortisol had on working and long-term memory, and to determine whether these seemingly paradoxical effects of cortisol occurred concurrently. In this study, participants came in for three visits: The first two visits were memory encoding sessions; and the third was a memory testing session. Each participant served as his/her own control by receiving placebo and, during a different visit, a low dose of cortisol. It was hypothesized that when participants completed the task while receiving cortisol, versus placebo, they would show worse working memory performance but better subsequent recall performance.

GAMES AND SIMULATIONS FOR HEALTHCARE: BUILDING A LIBRARY FOR CLINICIANS AND EDUCATORS

Sam Seider, Eric Bauman (Mentor), Medicine

Technology focusing on games and simulation continues to play an increasingly integrated role in health sciences education. Many of the advances in simulation-based education assist instructors and clinicians in enhancing student and patient experiences. This project seeks to develop a library that will categorize existing information related to healthcare games and simulation. The early version of this online resource already allows students, educators, and clinicians to access, evaluate, and more easily integrate games and simulation into clinical and patient education. This resource is enhanced by users continued input and evaluation by directing and vetting new content.

DEVELOPMENT OF A CONDUCTIVITY TEST TO DETECT THE PRESENCE OF DELETERIOUS MICROFINES

Wrayanne Hersha, Jose Munoz (Mentor),
Civil and Environmental Engineering

Concrete contains aggregate which has microfines that can contain calcium and sodium; these cations lead to cracking and shrinking of set concrete years later and runoffs into the environment. In trying to find a way to stop this we were to develop a test based on conductivity measurements to distinguish when calcium or sodium are present as exchangeable cations in the 2:1 clays. We were able to develop a protocol allowing us to replace both cations with potassium and precipitate the calcium leaving the sodium alone for analysis. This test was initially performed with various salt solutions. The success on predicting the conductivity of these solutions has lead us to test natural clays. In completing this, study we can make a stronger more durable concrete by avoiding the presence of bad microfines.

THE ETHNOGRAPHIC RESEARCH PROCESS THROUGH THE ANDEAN KHIPU SYSTEM OF SCRIPT

William Marquardt, Frank Salomon (Mentor), Anthropology

I set out to further explore the ethnographic process within the anthropological realm of research in accordance with Professor Salomon's ongoing scholarship concerning the ancient Andean system of script called khipu. Through the processes of digitalizing and cataloguing of visual ethnographic materials, meeting with the main scholars with whom Professor Salomon interacts, and general absorption through available literature, I pursued pertinent information through a variety of avenues. I gained insight into the research being done on the khipu, and more significantly, an expanded repertoire of anthropological research perspectives and skills. This project was important in revealing techniques and paths by which one can become further integrated into a field or topic of ethnographic study.

EMBODIMENT OF EMOTION

Karrie Radovich, Elvira Zobel (Mentor), Psychology

Theories of embodied cognition believe that the human mind is determined by the form of the human body, and that all aspects of cognition are shaped by aspects of the body. This study will look at facial expressions and brain areas involved while participants are processing emotional and neutral words. We hypothesize that individuals show facial expressions congruent with the processed emotional knowledge, amplitude and latency differences, while performing a conceptual processing task as compared to a perceptual task on the same emotional stimuli. Each subject will be given two conditions. Subjects will press buttons based on whether or not the words displayed on a screen are related to an emotion, and whether they are in capital or lowercase letters.

UNDERSTANDING THE ROLE OF LIPOXYGENASES THROUGH CHARACTERIZATION OF LOX MUTANTS OF *A. FUMIGATUS*

Seul Ki Lee, Nancy Keller (Mentor), Medical Microbiology

Oxylipins are biologically active, oxygenated lipids produced by most eukaryotic organisms. Although the function and synthesis of oxylipins are well studied in mammals and plants, little is known about oxylipin production in fungi. Recent studies have implicated fungal oxylipins in mediating host interactions and fungal development. Oxylipin biosynthesis is catalyzed by various oxygenases, including cyclooxygenases and lipoxygenases. In this study, we examined the role of lipoxygenases in the opportunistic human pathogen *Aspergillus fumigatus*. Two lipoxygenase genes, *loxA* and *loxB*, were identified based on homology to mammalian lipoxygenases and were deleted via homologous recombination. The mutants *loxA*, *loxB*, and the double mutant *loxA/loxB* were then compared to a wild type (WT) strain in physiological assays. Radial growth rates were reduced for *loxA*, *loxB*, and *loxA/loxB* compared to WT. Oxidative stress and heat shock assays were also performed on *loxA*, *loxB* and WT strains to detect changes in survival rate under different environmental stresses. We observed a negligible difference among *loxA*, *loxB* and WT strains in their response to both oxidative stress and heat shock. Strikingly however, little secondary metabolite production was observed in the *loxA* compared to *loxB* and WT. Based on our preliminary research of *lox* mutants, we suggest that lipoxygenases may be involved in secondary metabolite production and fungal development. Further characterization of these strains is ongoing to fully elucidate the role of lipoxygenase-derived oxylipins in *Aspergillus* biology.

GENE KNOCKDOWN AND THE EFFECTS ON FILARIAL WORM RESISTANCE IN *ARMIGERES SUBALBATUS*

Erin Reddy, Bruce Christensen (Mentor), Pathobiological Sciences

The recent re-emergence of vector-borne diseases and the failure of traditional control measures necessitate the development of novel methods for control and prevention. For these measures to be effective, an understanding of mosquito-parasite interactions is required before parasite resistant genes can be introduced into wild, susceptible vectors in areas of endemic infection. Currently, little is known about the anti-filarial worm immune response in the mosquito, *Armigeres subalbatus*. The study aims to clarify key components involved in the *Armigeres subalbatus-Brugia malayi* anti-filarial worm immune response, utilizing RNA interference in conjunction with computational methods to evaluate the role and importance of select gene(s) in conferring resistance to filarial worms.

GENETIC AND EPIGENETIC PATHWAYS TO CANCER IN THE COLON OF THE PIRC RAT

Brianna Laube, William Dove (Mentor), Oncology

In the Pirc rat model for colon cancer, normal (+) function of the heterozygous (+/Pirc) Apc gatekeeper gene is eliminated by loss of heterozygosity (LOH) through somatic recombination on chromosome 18. I have investigated whether additional genetic or epigenetic events accompany tumorigenesis. LOH via somatic recombination or deletion was found on chromosome arm 1q in tumor DNA but not at other sites analyzed throughout the genome. I then investigated whether epigenetic events can affect Apc leading to tumor development. Tumors that maintained heterozygosity at Apc showed either mono-allelic or bi-allelic expression of Apc mRNA. Together, these results indicate that there may be an increase in somatic recombination in colon tumors and a previously undiscovered epigenetic pathway to tumorigenesis involving mono-allelic silencing.

DOES WIDE SPACING AROUND THE EQUAL SIGN FACILITATE EQUATION UNDERSTANDING?

Liza Meredith, Martha Alibali (Mentor), Psychology

Writing math equations is ubiquitous in math education. Past research about math notation has shown that adults and children put more space around the equal sign than they do around operation signs, suggesting that spatial processes are involved in mathematical thinking. In this study, children were exposed to equations with either equal spacing or wide spacing around the equal sign, and received a lesson about equation solving. We hypothesize that exposure to wide spacing around the equal sign may help children correctly understand the equal sign, encode the equal sign, generate correct problem-solving strategies, and put more space around the equal sign in their own written equations. If these hypotheses are supported, teachers and textbooks could mirror psychological spacing practices to facilitate conceptual understanding.

RECONSTRUCTING PALEOFIRE REGIMES IN A HAWAIIAN MONTANE CLOUD FOREST

Haeyoon Chang, Shelley Crausbay (Mentor), Botany

The goal of the research is to reconstruct the fire regime of the Hawaiian tropical montane cloud forest limit near Lake Wai'Anapanapa. The sediments collected from the lake were sliced into a half centimeter and analyzed to count the charcoal particles present in the sediment. A deposit of charcoal particles represent that there has been fire in the past. Reconstruction of the fire regime is compared to climate at that period of time in order to predict the impact of future climate change on the fire regime at the cloud forest limit.

**A NEW TROJAN TALE: THE IMPORTANCE
OF MEMORY AND LEGEND FOR THE POST BRONZE AGE
AGORA AT TROY, TURKEY**

Claire Rydell, William Aylward (Mentor), Classics

Homer first made Troy famous nearly 3,000 years ago with his epic poems the *Iliad* and the *Odyssey*. Many archaeologists, such as Heinrich Schliemann, have studied prehistoric Troy but neglected the later historical-period settlements. In fact, the Greek and Roman settlements are the focus of an ongoing archaeological project at Troy, in which I participated in summer 2008. I focused specifically on the question of daily life in the ancient Agora (city center) of Troy in Greek and Roman times. To address this question, our team catalogued the entire corpus of artifacts from the Agora and surveyed the ruins on the archaeological site. In doing so, we discovered the enduring memory of Homer's legendary Troy on later generations of settlers.

**EXAMINING SPECIATION THROUGH MORPHOMETRIC
ANALYSIS OF THREE-SPINED STICKLEBACKS**

Erik Kopperud, Idelle Cooper (Mentor), Zoology

Mechanisms of speciation can be explored by analyzing patterns of mate choice, species differences and sexual dimorphism. Three-spined stickleback (*Gasterosteus aculeatus*) species pairs, found in freshwater lakes in British Columbia, are ideal for addressing these questions because of divergence in morphology and behavior. In one lake, however, hybridization has occurred. This 'speciation in reverse' may occur if reproductive barriers break down, possibly caused by environmental changes, like those occurring after the introduction of crayfish to Enos Lake. To examine phenotypic differences, we used morphometric analyses to compare the shape of hybridizing fish in Enos Lake to intact species pairs in other lakes and the ancestral marine species. Additionally, we measured shape-assortative mate choice of Enos fish in lab trials to characterize further speciation in reverse.

**STREET ART OF A REVOLUTION:
OAXACA, MEXICO 2006-09**

Megan Pumper, Kathryn Sanchez (Mentor), Spanish and Portuguese

This research looks at the relationship between street art in Oaxaca, Mexico, and the most recent Mexican Revolution of 2006 that began there. This research has focused on the examination of a wide variety of primary and secondary sources, some in the Spanish language. Specifically, these sources included many newspaper articles, historical books, and photos of street art. Through this research it becomes clear that there is a distinct relationship between street art and the Mexican Revolution. More important, this shows that art, a universal pastime and form of expression, can persuade and influence events, events even as large and worldly as war.

DMI3 ORTHOLOGS OF PRIMITIVE PLANTS

Andrew Wiederhold, Li Huey Yeun (Mentor), Agronomy

An exclusive variety of plant-microbe symbiosis occurs when the root of a legume is infected by a form of bacteria called rhizobia. Upon infection, an external organ, the nodule, is formed on the roots of the legume. DMI3 is a gene that is required for the establishment of symbiotic relationships with both rhizobia and arbuscular mycorrhizal fungi. Putative orthologs of DMI3 are found in non-legumes and primitive plants. The study is investigating if the function of DMI3 from primitive plants is conserved in *Medicago truncatula*. *M. truncatula* dmi3 null mutant, which is unable to form nodules, will be transformed with these orthologs and observed for nodulation. Ideally, we would like to apply our findings to crops such as corn in order to significantly increase yield through nodulation.

HOW TO CREATE A BUSINESS THAT WILL OUTLAST YOU

Brandon Hubbartt, Bethany Ludwig, Debra Houden (Mentor),
General Business

One of the biggest challenges that family businesses face is succession into the next generation. Our project will explore some different approaches a family business can take to successfully outlast their current generation. Some different problems families often face are current CEOs unwilling to step down, children unwilling to take more responsibility within the company or younger generations lacking leadership. We will also dissect the importance of and barriers to succession planning. By conducting a case study on Avedis Zildjian Co., the longest running family business in America and studies on other companies who have thrived in succession planning, we will pinpoint and present some effective strategies to carry on family businesses.

EFFECT OF NON-MEDICAL INTERVENTIONS ON DIABETES MELLITUS PATIENTS

Kathryn Kaye, Ruth Perez (Mentor), Population Health

Diabetes mellitus (DM) patients often suffer from complications, especially depression, due to hyperglycemia. Self-monitoring of blood glucose (SMBG) is an essential technique to prevent these complications; yet, non-compliance is common among patients in uninsured populations. Our goal was to determine if non-medical interventions (counseling, nutrition classes, etc.) helped increase the rate of SMBG in such a population. Data was taken from the charts of patients who visited Walker's Point Community Clinic between January 1, 2006, and July 10, 2007. Patients were sorted according to interventions used and compared to a control group to whom nothing but standard medical practice had been applied. An examination of the SMBG habits revealed that both nutritional and DM education along with counseling are effective in motivating patients to SMBG.

REGIONAL NON-UNIFORMITY IN HEART WALL MOTION

Mashette Syrkin-Nikolau, Ana Schaper (Mentor), Nursing

Calcium-handling proteins play a large role in heart contraction. Five calcium-handling proteins involved in heart contraction are ryanodine receptors, phospholamban, SERCA, calsequestrin, and NCX-1 proteins. These proteins are used heterogeneously throughout the left ventricle. The goal of this research is to understand the roles of these proteins in the different areas of the ventricle. The left ventricle of a pig heart will be divided into six sections including the epicardium and endocardium regions of the base, midline and apex of the left ventricle. Using the western blot technique we will detect which calcium-handling proteins play a role in specific regions of the left ventricle. Our results will help further our knowledge of basic heart function, and may have implications for treatment of heart diseases.

PROMOTING OPTIMAL MOTIVATION WITH MULTIPLE GOALS

David Rozek, Judith Harackiewicz (Mentor), Psychology

We propose a study to investigate whether sequencing achievement goals might promote interest as well as performance. Recent achievement goal research has shown that mastery goals lead to positive outcomes such as long-term interest and deep processing in college classes, but that only performance goals predict performance on exams. In order to achieve both interest and grades, Barron and Harackiewicz (2002) assigned both goals simultaneously, but the results were mixed. We propose assigning multiple goals in succession to allow for students to focus on one goal at a time and gain the benefits of both goals in the end. The results of this research may provide insight into multiple goal techniques and suggest a way to increase interest and performance in educational contexts.

DEVELOPMENT OF NOVEL, NON-GATED CARDIAC MAGNETIC RESONANCE IMAGING TECHNIQUES

Keith Lauren, Charles Mistretta (Mentor), Medical Physics

Heart disease affects millions of Americans every year. The diagnostic capabilities of cardiologists are greatly improved with the ability to image the heart and its function. Current clinical standards of cardiac imaging either suffer from poor image quality, or expose the patient to potentially hazardous radiation. Cardiac imaging using magnetic resonance imaging (MRI) is non-invasive and produces high-quality images. ECG gating is a typical requirement of most cardiac MRI techniques but can disqualify patients with abnormal heart rhythms from undergoing an MRI examination. This research describes the development of non-ECG-gated cardiac MRI techniques. Both techniques involve a modification of the Highly Constrained Back Projection algorithm.

SWITCHGRASS TISSUE CULTURE AND TRANSFORMATION

Mary Dressler, Heidi Kaeppler (Mentor), Agronomy

This research is aimed at establishing tissue culture and genetic engineering systems for switchgrass, an important bioenergy crop. Switchgrass is a perennial grass that is native to tall grass prairies of North America. To initiate tissue cultures, switchgrass seeds were surface sterilized, grown on culture media, and housed in an incubator to promote callus growth. Approximately 250 seeds were treated and placed on culture media every two weeks. Selection was used to pick the fastest growing cell lines. Upon completion of these experiments, several fast-growing cell lines will be established and the callus used as a target for genetic engineering experiments. This research will contribute to the genetic improvement of the switchgrass crop, resulting in increased biofuel yield and/or more efficient conversion into biofuels.

IN VITRO INTERACTIONS OF PROLINE-SERINE-THREONINE PHOSPHATASE INTERACTING PROTEIN

Nicholas Burton, Anna Huttenlocher (Mentor), Medical Microbiology

Macrophages make up a critical part of the innate immune system and their migration to sites of inflammation is critical to their role in fighting infection. To accomplish this task macrophages form complex adhesive structures termed podosomes. Here we describe *in vitro* studies of the adapter protein proline-serine-threonine phosphatase interacting protein (PSTPIP) with components critical to podosome regulation. Among these are the *in vitro* interactions of PSTPIP with calpain 2, the Wiskott-Aldrich syndrome protein (WASP), and protein tyrosine phosphatase PEST (PTP-PEST). Also studied are the affects of the mutations in PSTPIP that cause PAPA syndrome. A further analysis of the role PSTPIP plays in macrophages will hopefully result in a more detailed understanding of immune cell migration and perhaps provide future targets for immunotherapies.

IDENTIFICATION OF FUNCTION UNKNOWN (FUN) GENES INVOLVED IN *SALMONELLA ENTERICA* SURVIVAL IN SOIL

Emily Slater, Jeri Barak (Mentor), Plant Pathology

Through previous studies, the Barak lab concluded that FUN genes are important for *Salmonella enterica* (*Se*) survival outside the host. Therefore, it is important to look at soil when establishing what contaminated plants. Determining if the mutant is similar to the FUN gene is the reason for our research; if the FUN gene differs we will continue research to determine why. To conduct the experiment a 96-well plate is filled with autoclaved soil and individual mutants of bacterial suspensions. After two weeks, the bacterial population is enumerated to determine if the mutants differ from the wild-type. Among 1,200 mutants, expectations are that a small number have a role in soil survival. Identification of genes needed for *Se* soil survival may provide strategies to prevent produce contamination.

RADAR ANALYSIS OF HIGH ALTITUDE MICRO-METEOROIDS

Jacob Oberman, Stanley Briczinski (Mentor), Physics

A meteoroid is the visible reflection from any non-terrestrial particle entering the Earth's atmosphere. We have used the Poker Flat Advanced Modular Incoherent Scatter Radar to detect and analyze micro meteoroids in the upper atmosphere. Some meteoroids appear to be destroyed instantaneously while others ablate (burn out) over a longer period of time. Those meteors that spontaneously vaporize may play a significant role in the composition of the upper atmosphere. We present a comparison between the observed parameters of terminal meteoroids and the general population in an attempt to determine what distinguishes terminal meteoroids from the rest of the sporadic events observed. We discuss the possible implications that the presence of terminal meteoroids has for the aeronomy of the meteor zone.

OSTEOGENESIS OF MESENCHYMAL STEM CELLS REGULATED BY EXTRACELLULAR MATRIX MOLECULES

Christopher Martin, Wan-Ju Li (Mentor), Orthopedics and Rehabilitation

Extracellular matrix (ECM) molecules interact with cells to regulate cell activities, such as proliferation and differentiation. Cell-matrix interaction is one of the key molecular mechanisms directing mesenchymal stem cell (MSC) activities in a stem cell niche. To better understand how MSCs are regulated and induced toward the osteogenic pathway, we hypothesize that different ECM molecules regulate osteogenic differentiation of MSCs with different efficacies. In this study, we will seed human MSCs in three-dimensional, collagen-fiber mimicking nanofibers coated with fibronectin, vitronectin, collagen types I and IV, and laminin. Osteogenesis will be examined by alkaline phosphatase and Alizarin Red staining. Our findings will suggest the effective ECM coating for osteogenic induction.

RECONSTRUCTING FIRES IN A HAWAIIAN MONTANE CLOUD FOREST

Kelsey Sorum, Shelley Crausbay (Mentor), Botany

Currently there is no evidence of cloud forest fires in Hawaii. However, the existence of charcoal levels in lake sediment cores suggests that fires have occurred in the past. The purpose of this study is to determine when these fires occurred and if they are linked to climate change. In order to solve this problem, I am analyzing the amount of charcoal contained in Hawaiian lake core sediment. My hypothesis is that high levels of charcoal, presumably fires, will correlate with frequent El Niño Southern Oscillation (ENSO) events. By comparing data to past climate records of the Pacific, we can show that there is a correlation between the fire regime and climate change. This data can be used to predict when future fires could occur.

CARMEN MIRANDA'S IMPACT ON 1940s AMERICAN FASHION

Melissa Coulter, Kathryn Sanchez (Mentor), Spanish and Portuguese

Carmen Miranda was an icon in the 1940s. She was internationally known for her contributions to Broadway, but she was most famously known for her style, self-confidence, and presence. The purpose of this research was to discover the impact that Carmen Miranda had on American fashion in the 1940s and to learn, psychologically, why she had such a huge impact. This was done by first researching Carmen Miranda's life and career, and then exploring the relationship between fashion and psychology. Lastly, American magazines from the 1940s such as *Vogue* were examined to see if Carmen Miranda's impact could be detected. It is evident that Carmen Miranda influenced fashion especially with her platform shoes, costume jewelry and turban head dresses.

ARE SOCIAL CATEGORIES SPECIAL?

Alexandra Byaliy, Tim Rogers (Mentor), Psychology

Previous research has demonstrated that Americans implicitly associate African American faces with weapons. It is not known whether these associations are coded within a domain-general semantic system, or within a domain-specific system for social categorization. To address this question, we will assess speed of response in object categorization tasks primed either via social or semantic category relationships, and will investigate whether these effects covary across individuals. If different systems mediate social and semantic relationships, then strength of priming for different kinds of social concepts should covary more strongly across individuals than with strength-of-priming for purely semantic relationships. The results will help to determine whether social stereotypes are formed through the same processes that support semantic categorization.

EFFECT OF HEIGHTENED CORTISOL DURING LEARNING ON FORGETTING

Cindy Burzinski, Heather Abercrombie (Mentor), Psychiatry

Elevated cortisol during learning often enhances memory formation. However, the effect of cortisol on persistence of memory through time is unknown. We hypothesize that heightened cortisol during learning, increases the “strength” of the memory and thus decreases forgetting of the material. To test this, words were presented during cortisol elevations. Memory was tested two hours later (learning session) and several days later (memory session). To measure forgetting, words recalled in the learning session that were not also recalled in the memory session will be counted. We hypothesize that elevated cortisol during learning will decrease the number of words that are forgotten. This study examines a potential mechanism involved in the persistence of memories due to stress. Thus, this basic research may inform future clinical research.

THE AMERICAN SOUTHWEST CERAMICS GUIDE PROJECT: A CASE STUDY FROM THE UW–MADISON CAMPUS

Jaclyn Kemp, Danielle Benden (Mentor), Anthropology

Southwestern American indigenous ceramics have long piqued the interest of archaeologists due, in part, to their unique designs and the mastery of the craftsmanship these vessels exhibit. The University of Wisconsin Department of Anthropology collections is home to thousands of Southwestern ceramic sherds from various sites in Arizona, New Mexico, and Colorado. The research presented here describes an ongoing project to organize the available provenience information in order to collect regional histories, create and assign typologies, and develop a useful guide for further research of these invaluable collections.

REVERSAL OF FRAGILE X PHENOTYPES BY GENETIC MANIPULATION OF APP LEVELS

Kelsey Stein, Cara Westmark (Mentor),
Pathology and Laboratory Medicine

Fragile X syndrome (FXS) is the most common form of inherited mental retardation. Research in our laboratory has demonstrated increased levels of amyloid precursor protein (APP) and beta-amyloid in FXS. One of our objectives is to reverse FXS symptoms in a mouse model by genetic manipulation of APP and beta-amyloid levels. We established cohorts of control, Fmr-1 KO, APP KO, APP heterozygote, Fmr-1 KO/APP heterozygote and Fmr-1/APP double KO mice. These mice were tested in behavioral assays and preliminary results indicate that reducing APP levels by 50 percent in the Fmr-1 KO/APP heterozygote mice reduces seizure and death rates. Thus, APP and/or beta-amyloid play a causative role in seizure induction.

ESTABLISHING AGE MODELS FOR BETTER UNDERSTANDING OF SPECIES' RESPONSES TO CLIMATE CHANGE

Jennifer Bonavia, Jack Williams (Mentor), Geography

Radiocarbon dates provide important information to paleoecologists. Age models allow researchers to determine when climatic and ecological events happened in order to better compare data from different studies. For this study, I am sieving for datable macrofossils (i.e., wood and plant fragments) from sediments of U.S. Midwestern lakes. Samples will be submitted to a radiocarbon dating lab in order to determine the radiocarbon age of the materials. Because radiocarbon production varies over time, I will calibrate these dates to calendar years before present. I will use these dates to generate age models. These will then be used to correlate the vegetation, fire, and lake productivity data previously generated for these lakes, allowing us to better understand how species have responded to climate change through time.

HARNESSING PROTEIN CONFORMATIONAL CHANGES TO MODULATE DYNAMIC SWELLING IN HYDROGEL MICROSPHERES

Songyu Ng, William Murphy (Mentor), Biomedical Engineering

Protein-based poly(ethylene glycol) (PEG) conjugates have been shown to form hydrogel discs that translate “hinge-like” protein conformational changes to macroscopic volume changes in response to specific ligands. We hypothesized that the same dynamic mechanism may be recapitulated in hydrogel microspheres processed using a water-in-oil emulsion technique. PEG-calmodulin-PEG conjugates were emulsified and photocrosslinked in situ. Image analysis revealed swollen microspheres formed with a mean diameter of 19.06 ± 8.05 μ m. In response to a calmodulin-specific ligand, the microspheres displayed a maximum volume decrease of 61.31 ± 1.10 % from their initial volumes. This technique may potentially be extended to a diverse number of proteins with well-characterized conformational changes and adapted for drug delivery, biosensing, and microactuator applications.

A TEST FOR SEXUAL IMPRINTING IN HYBRID STICKLEBACK FISH

Mallory Barnes, Janette Boughman (Mentor), Zoology

I studied mating behavior in hybrid stickleback fish to help understand how species form. In British Columbia lakes, two species of sticklebacks live together: benthics and limnetics. These species are behaviorally and ecologically isolated. However, the species hybridize when lake ecology is disturbed. In other species, individuals prefer to mate with the same species as their parents (sexual imprinting); this imprinting reduces hybridization. I conducted an experiment on benthic-limnetic hybrid females to determine if experience with a father influences mate preferences. Using hybrids controls for genetically-determined preferences, allowing me to test for imprinting. Females were raised by either a benthic or limnetic father. My results indicate that the amount of time fathers spent caring for their young influenced whether they preferred his species as adults.

EFFECTS OF COMPONENT CHANGES IN TITANIUM DIOXIDE AND ZINC OXIDE-BASED DYE-SENSITIZED SOLAR CELLS

Kyle Lara, Yukihiro Hara (Mentor), Materials Science

The need for a new type of low cost solar cell is paramount in a time when demand for affordable, renewable energy is at its greatest. Dye-sensitized solar cells technology is a nascent contender with relatively low cost but currently low efficiency comparing with Si-based solar cells. A need for manipulation of matrix upon which the cell is based (TiO₂ or ZnO) is vital for this efficiency to increase above the current levels. This research is centered upon varying the thickness of film deposition and different morphology of electrode materials. It is expected that one or more of these changes will increase efficiency. This would make for an unprecedented level of performance and offer inexpensive renewable energy.

UNDERGRADUATE BUSINESS JOB SHADOW

Travis Guelig, Shannon Elliott (Mentor), Business

Our symposium presentation is about creating a job shadow program for undergraduate students that are pursuing a business degree. Through this program students will be able to gain real world experience by spending time with business professionals in our community. This will help give them insight into potential careers as well as make lasting networking connections. The program will not only bring students and business professionals together, but it will also prepare them for the business world. Before their job shadow, students will attend a training session so they can get the most of their experience. In this session students will gain lasting skills such as proper resume formatting, business etiquette, what to expect during job shadows, as well as at interviews.

GENETICS AFFECTING BONE STRENGTH IN MICE

Kelsey Hodge, Robert Blank (Mentor), Medicine

The purpose of this research is to locate genes in mice that are responsible for determining factors that affect bone biomechanics since 50 to 70 percent of bone biomechanics are genetically determined. Quantitative trait loci (QTLs), regions of DNA contributing to a particular phenotypic trait, can be found by using microsatellites, tandem repeats of nucleotides, as markers by using unique primers that flank the microsatellite region. We used recombinant congenic strains, HcB/8 and HcB/23. Linkage analysis using R/qtl and QTL Cartographer revealed significant QTLs on chromosomes 1,2,3,4,6, and 10. The QTL on chromosome 4 affected many phenotypic biomechanic properties. The Ece1 gene has been found to be a strong candidate gene for increasing bone density as a response to mechanical strain.

MLB OPTIMAL BATTING ORDER

Jeremy Wodajo, Bormin Huang (Mentor), Space Science and Engineering

The question my study is trying to ask is: by studying and interpreting previous batting results for the New York Yankees, is there the possibility that research helps to register a batting order for the team that produces optimal results? I was interested in this research because of my love for sports and interest in baseball. My research consists of data collection of batting results of the Yankees from previous years. Once all this data is collected it will be statistically analyzed through MATLAB. I believe that the results will in some way help to formulate an optimal batting order for the Yankees. This research is beneficial to the game of baseball because the results, if proven successful, could be used by MLB teams.

NORMAL MODE ANALYSIS AND THE STUDY OF PROTEIN MOTIONS

Kimberly Schaub, Julie Mitchell (Mentor), Biochemistry

Normal mode analysis is a technique used to study the slowest motions made by macromolecules, in this case proteins. The calculation of protein motions requires large amounts of computer power for large protein systems. The motivation is to speed up this calculation using block normal mode analysis. This project will compare two methods of hierarchical clustering (complete and average linkage) which is used to divide the protein into clusters. These clusters define the blocks for the normal mode calculation. The goal of this project is to compare these two clustering methods in terms of their ability to define blocks that yield accurate normal modes.

NEWBORN SCREENING AND CYSTIC FIBROSIS

Ryan Weiss, Audrey Tluczek (Mentor), Nursing

Cystic fibrosis is a life-shortening genetic disease that can be detected via newborn screening. This research project uses grounded theory methods to gather information about how to improve newborn screening and better meet the needs of parents of infants with abnormal test results. By interviewing parents, a broader spectrum of data will be gathered that can help us improve screening and genetic counseling. In this paper, I will describe cystic fibrosis, newborn screening, this related research, my role on the project, and some of the preliminary results.

GLOBALIZATION, POVERTY AND ENVIRONMENT IN VIETNAM: GAINERS AND LOSERS

Caroline Reddy, Ian Coxhead (Mentor),
Agricultural and Applied Economics

This research aims to explore links between economic growth and environment, investigating how people are affected based on varying income and geographic location. Recently, Vietnam has experienced dramatic economic growth and declining poverty. Growth has increased total pollution (scale effect) and changed the structure of pollution due to changing industry structure (composition effect). Households gain from income growth but are involuntary consumers of pollution. What are the net effects on their welfare? To analyze this, we use household survey data, taking into account factors such as income, location and labor force participation. Upon completion, this information will help improve understanding of the net impacts of growth and will be useful both to other developing countries and for future studies of Vietnam.

WHOSE FAITH? DISTINGUISHING INTERRELIGIOUS DIALOGUES FROM PLURALISTIC THEOLOGIES

Kendric Walters, Gudrun Buhnemann (Mentor),
Languages and Cultures of Asia

In a world fraught with religiously motivated violence, ethically problematic technology, and the political marginalization of faith, some have questioned the value of maintaining present divisions between what they see as essentially parallel religious traditions. This position, commonly known as pluralistic theology, is rooted in the assumption that these problems will not disappear until religious doctrines have been abandoned in favor of an overarching “faith.” In this presentation, I will offer a critique of the arguments made by pluralistic theologians such as John Hick, while challenging the twofold assumption that each of the major religious traditions offer analogous answers to particular dimensions of human experience, and that peaceful coexistence within a pluralistic society cannot exist without doctrinal reconciliation. In doing so, I will seek to call into question the use of words such as “religion” and “faith” as general concepts with universal application.

DEFINING THE INTERACTION BETWEEN PIPKIALPHA AND STAR-PAP TO UNDERSTAND PIPKIALPHA’S ROLE IN STAR-PAP

Luke Hillman, Richard Anderson (Mentor), Pharmacology

In eukaryotic cells, mRNAs are processed by capping, polyadenylation and splicing to convert the primary transcript into its functional form. Because distinct mRNAs are produced for each gene in eukaryotes, understanding gene regulation in eukaryotes will be critical for developing therapeutic approaches for controlling aberrant expression of genes and their products. The goal of this study was to understand the mechanisms of gene regulation by Star-PAP, a recently discovered poly(A) polymerase involved in the polyadenylation step of mRNA processing. Star-PAP is distinct from the canonical poly(A) polymerases in that it may be regulated by PIPKI at its N-terminal zinc finger. N-terminal truncation mutants were developed to define the binding region of Star-PAP and PIPKI and to understand PIPKI’s role in Star-PAP activity.

THERAPEUTIC POTENTIAL OF CORE-SHELL NANOPARTICLES IN EPITHELIAL OVARIAN CANCER

Sachi Horibata, Manish Patankar (Mentor), Obstetrics and Gynecology

Ovarian cancer is the fifth leading cause of cancer related deaths among women; yet treatment options are limited. The main treatment involved in this disease is reductive surgery combined with continuous chemotherapy. But due to its lack of effectiveness, there is a need for an alternative treatment. Nanoparticles have been used as a therapy in some diseases by heating the iron core under an oscillating magnetic field, causing cell death. From this, we developed the concept of coating the iron nanoparticles with gold and conjugating the gold core-shell with a specific antibody against proteins (MUC16 and EpCAM) that are highly expressed by ovarian cancer cells. This proposal describes this innovative technique that may contribute to the treatment of epithelial ovarian cancer.

THE CARING FACTOR SURVEY USED AS A THERAPEUTIC NURSING MODALITY

Emily Nieman, Ana Schaper (Mentor), Nursing

Adult cancer patients experience a variety of challenges that can trigger feelings of anxiety. Music has been shown to reduce anxiety by affecting areas in the brain that influence imagination, intellect, memory, emotions, and moods. The purpose of this evidence-based practice pilot project is to analyze the therapeutic relationship between the patient and nurse established using music and guided by Jean Watson's theory of caring. Nurse perceptions of caring behaviors delivered and patient perceptions of caring received were assessed using the caring factor survey instruments. Overall, there was high satisfaction regarding care delivered by the nurses. One dimension of caring, support for spiritual needs, was rated lowest. The goal is to establish Jean Watson's theory of caring as a framework for comprehensive nursing care.

FACTORS ASSOCIATED WITH STUDENT INTEREST IN PUBLIC HEALTH NURSING AS A CAREER

Sarah Miner, Susan Zahner (Mentor), Nursing

To address the challenges of recruiting nurses into public health it is important to understand what influences student nurses interest in public health nursing as a career. The purpose of this research is to determine if certain types of programs and field experiences are more likely to be associated with student nurses reporting an interest in public health nursing as a career. This study invited students enrolled in baccalaureate nursing programs in Wisconsin who had completed both the didactic and field experiences in community and public health nursing to take a brief anonymous electronic survey. Analysis of data from the 158 participants demonstrated that students in public and online programs were more likely to report an interest in public health nursing as a career.

CODING NEW YORK TIMES COVERAGE OF CIVIL RIGHTS PROTEST, 1930–56

Elizabeth Neuman, Matthew Nichter (Mentor), Sociology

The goal of this project is to build a database of African-American protest events that were reported in *The New York Times* from 1930–56. The project is intended to correct methodological shortcomings in prior efforts to code the same source, which found very little protest activity before 1955–56.

THE EFFECTS OF MOTHER AND CHILD CHARACTERISTICS ON SOCIAL-EMOTIONAL AND COGNITIVE GROWTH FOSTERING

Stacey Paulos, Jeffrey Gagne (Mentor), Psychology

Recent research indicates that the parent-child relationship is more complex than originally conceptualized. The present study investigates both mother and child characteristics in the context of observed social-emotional and cognitive growth fostering in a teaching task using a large twin sample. The maternal characteristics of parent personality, family emotional environment, and mother affectivity were assessed via questionnaire. The temperament dimensions of activity level and inhibitory control were assessed at 36 months using both parent-report and observer ratings of child behavior. Interestingly, mother and child characteristics were differentially related to maternal growth fostering as a function of child gender. Interactions between mother and child characteristics in predicting maternal growth fostering will be explored. These findings will further clarify the complexities of the parent-child relationship.

MECHANISMS UNDERLYING CANNABINOID-INDUCED CHANGES IN SPINAL REFLEXES

Megan Severson, Lea Ziskind-Conhaim (Mentor), Physiology

It has been well documented that cannabinoids can alter chemical synaptic transmission, the process by which neurons communicate with each other. The general consensus is that these molecules suppress the release of GABA and glycine, which are the major inhibitory amino acids in the mammalian brain. In this study, however, cannabinoids still exhibited an inhibitory effect on the amplitude of the monosynaptic dorsal root-evoked ventral root responses with the addition of the GABA and glycine blockers Strychnine and Picrotoxin. This observation shows that exogenous CB is acting on CB1 receptors to suppress glutamate release, rather than inhibiting inhibition. In addition, the cannabinoid receptor agonist Win-55,212-2 is also shows interesting effects in the polysynaptic reflex, increasing both the amplitude and length of decay.

ON THE AIR: AMATEUR OPERATORS AND RADIO BROADCASTING IN THE UNITED STATES

Martin Bui, Phillip Kim (Mentor), Management

The focus of this project was to discover the origins of the radio industry in the form of the radio amateurs who worked with the then novel technology. The study consisted at first of determining the physics behind the transmission of radio signals using a conversion between power in watts to distance in miles. The next phase of the project would consist of researching the radio amateurs themselves, and catalogue such information as age, ethnic background, etc. Each amateur would have a certain amount of wattage assigned, giving statistics on amateurs of different areas. The results from cataloguing the information could be used for further studies.

EXPERIENCE AND FOUNDING OUTCOMES IN THE AVIATION INDUSTRY

Xiao Xu, Phillip Kim (Mentor), Management

The aviation project is to investigate the potential relationship between the experience of founding team members in the aviation industry and their intended business goals. Our method is to examine the companies' application files to the Department of Transportation. These files and documents contain information about the business plans and operating goals of companies and also the background information of the management team members. Our expected result is the positive relationship between experience and the applicants' goals. This principle could also apply to other business industries.

LARYNGEAL SENSORIMOTOR CONTROL

Swarna Mogallapu, Michael Hammer (Mentor), Surgery

The focus of this research is to compare healthy individuals with individuals who have Parkinson's disease in order to correlate laryngeal sensory function with speech, swallow, and voice function. Current activities of research involve gathering information on types of electrodes used in swallow electromyography, helping recruit subjects with newly designed flyers, and making electrodes. We expect to find sensory, speech, voice, and swallow functions to be normal in healthy individuals, while individuals with Parkinson's disease to have abnormal speech, swallow, and voice function that correlate with the degree of laryngeal sensory impairment. This research will help us gain insight into understanding how the sensory and motor aspects of speech, voice, and swallow function are affected in Parkinson's disease.

IDENTIFYING THE REGULON OF THE COPPER SENSITIVE REGULATOR CSOR IN MYCOBACTERIUM TUBERCULOSIS

Elizabeth Hoye, Adel Talaat (Mentor),
Pathobiological Sciences

Mycobacterium tuberculosis (Mtb) is a bacterium which invades and replicates within human macrophages, causing the disease tuberculosis. Understanding how Mtb regulates various molecules within the host cell is important for understanding how it can persist and cause disease. One molecule of interest is copper, which is essential for bacterial survival but toxic in excess amounts. A putative copper transporter, CtpV, has been identified in Mtb and been shown to contribute to its virulence. It has also been shown that this gene is negatively regulated by the gene CsoR. Using microarrays and LacZ expression assays, I will identify other genes under the control of CsoR. Ultimately, this could uncover new genes involved in copper regulation which may contribute to the virulence of Mtb.

IDENTIFYING LOCI ON CHROMOSOMES THAT PROMOTE SKIN CARCINOGENESIS IN B6, B6SM, AND SM INBRED MICE

Kaylene Fiala, Andrea Bilger (Mentor), Oncology

We are studying chromosomal loci that promote skin carcinogenesis in B6, B6SM, and SM mice. These mice have been bred to generate progeny with chromosomal segments inherited from each parent strain, some of which affect tumor susceptibility. By using polymerase chain reactions (PCR) to amplify chromosomal markers distinct for each strain, preparing agarose gels for electrophoresis, and using transilluminator picture-developing techniques, we are able to track the inheritance of chromosomal regions. Q-link analyses then indicate chromosomal loci that are statistically significantly linked to tumor susceptibility and, therefore, likely to promote skin carcinogenesis. Due to the genetic similarities between mice and humans, studying skin cancer in mice may give us an indication of how skin cancer susceptibility functions in the chromosomes of humans.

ENERGY HARVESTING FROM HUMAN BODY MOTION BASED ON REVERSE ELECTROWETTING ON NANO-DIELECTRICS

Devin West, Tom Krupenkin (Mentor), Mechanical Engineering

Energy harvesting from human body motion could decrease battery size and weight in mobile electronic devices as well as dependence on the electrical grid for recharging. Many strategies exist for this sort of mechanical to electrical power conversion. A strategy proposed by the Krupenkin group is to employ reverse electrowetting on dielectrics at liquid-solid interfaces to drive charge against an applied voltage and produce power. I have designed an apparatus to modulate the interface area between a dielectric and a droplet of electrolyte to investigate how much power can be generated in this manner. Using this device I have performed tests and collected data that will guide further research, including the design of a multi-drop system to generate power on the watt scale.

PECTOBACTERIUM AND THEIR EFFECT ON TOMATO PLANTS

Margaret Thelen, Jeri Barak (Mentor), Plant Pathology

All *pectobacterium* are genetically related to human pathogens. To date, no *Pectobacterium sp.* has been identified as a vascular phytopathogen for tomato. We tested 10 *pectobacterium* strains by direct vascular inoculation of the tomato stem. We identified three strains as potential vascular pathogens. Five days post inoculation, *Pectobacterium sp.* strain Ec106 showed signs of wilting. We intend to complete Koch's postulates by isolating the strain, and further prove that Ec106, is a vascular pathogen by indirect inoculation via soil soaking.

LITHIC ANALYSIS AT BUENAVISTA, BELIZE

Theresa Heindel, Jason Yaeger (Mentor), Anthropology

Over the past summer, with the help of Jason Yaeger, I excavated a lithic deposit from the Maya site of Buenavista, Belize, to help evaluate whether the site's East Plaza was a marketplace. The large amount of small flakes found leads me to believe that the deposit was produced by people putting the finishing touches on stone tools that were mostly made elsewhere. Because it was more efficient, lithic tool producers would have begun making tools close to the source of the raw material, but could bring the lighter, nearly finished tools to the marketplace for finishing. By examining the flakes I found, I hope to determine their stage of production in order to aid other research associated with the East Plaza and Late Classic Maya marketplaces in general.

LANGUAGE DEVELOPMENT IN FRAGILE X SYNDROME AND DOWN SYNDROME

Melissa Lipsitz, Leonard Abbeduto (Mentor), Educational Psychology

The main goal of the project is to find a correlation between Fragile X syndrome and Down syndrome in the nature and causes of development of language. The methods used to conduct the research are surveys, behavioral tests, observations, interviews, and genetic analysis of blood sampler. Both disabilities share similar characteristics and traits that will lead to recommendations for conducting assessment and intervention on language development. In this project, my role is to assist with library research, data entry, and learn more about the research process, and this included observing the children as they are tested. So far, there have been no concluding results but analysis of the data being collected will begin soon.

**SOCIAL MONOGAMY: PROXIMITY MAINTENANCE
AND FOOD DISTRIBUTION IN THE OWL MONKEY
(*AOTUS AZARAI AZARAI*)**

Morgan Gustison, Charles Snowdon (Mentor), Psychology

Researchers hypothesize that monogamy is either a function of territory defense based on clumped distribution of high quality foods or as a need for paternal care. I studied ranging, foraging, and intragroup interactions of four family groups of wild owl monkeys (*Aotus azarai azarai*) in Argentina to evaluate these two hypotheses. Group territories did not revolve around a single high quality food patch as expected, but fruits were found in clumps whereas leaves were randomly distributed. There was little overlap of feeding trees. The paternal care hypothesis was partially supported. Males spent more time than females maintaining the relationship with their offspring. However, offspring spent an equal amount of time near both parents, and females spent more time than males resting peripherally to their group.

**PREDICTING CONSUMER ADOPTION
OF PLUG-IN HYBRID VEHICLES**

Steven Olikara, Ashwini Bharatkumar, Jessica Guo (Mentor),
Civil and Environmental Engineering

Due to increasing concerns over the pollution and instability inherent in the use of petroleum, the plug-in hybrid electric vehicle, or PHEV, has emerged as an alternative to the conventional gasoline vehicle. By way of a multi-phase interview process, this study aims to gauge the potential for consumer adoption of PHEVs in Wisconsin. A telephone survey was developed to gather general demographic information from a sample of households in the Madison area. This was followed by a mail survey to measure the relative importance of various vehicle attributes previously determined to, or suspected to, impact consumer vehicle choice. The culmination of results from this study will enable an accurate prediction of the societal impact of PHEV adoption. This presentation in particular details the survey design process and collected results.

**RANGELAND AND ELEPHANT HABITAT
DEGRADATION DUE TO HUMAN ACTIVITIES
IN THE AMBOSELI ECOSYSTEM, KENYA**

Megan Farka, Jim Berkelman (Mentor), Forest and Wildlife Ecology

This study assessed changes in range condition in Kimana Group Ranch (located within the Loitokitok District of Kenya) through vegetation and soil assessment, household interviews, and discussions with local people. Grass species frequency, biomass, height, and inter-tuft distance were evaluated at all three sites. Household interviews helped to assess the current condition of the rangelands and changes that have occurred. The study found that degradation of the rangelands within Kimana Group Ranch has been increasing significantly. The causes of this degradation were numerous but were related to the changing lifestyles of the Maasai and localized climate change. The increase in human population, sedentarization, overgrazing, and the growth of agriculture has significantly impacted the community's livelihood, wildlife habitats, and the sustainability of natural resources.

**RETHINK WISCONSIN: RETHINKING ENVIRONMENTAL
SUSTAINABILITY PRACTICES OF THE UNIVERSITY**

Mike Amato, Annie D'Amato, Charlie Berens, Maria Davis, Maggie Galloway, Grace Latz, Jack Kloppenburg (Mentor), Rural Sociology;
Stacey Schaefer (Mentor) Psychology

ReThink Wisconsin is a student organization committed to encouraging the UW community to RE-duce, RE-use, and RE-cycle. Its strength is a unique collaboration between disparate social groupings: "greeks, greens, and jocks." Environmentally conscious students from across campus have come together and established working relationships with a range of university units. With the Athletic Department, ReThink developed the "Wear Red, Think Green" campaign which introduced recycling to Camp Randall and resulted in the diversion of more than two tons of plastic bottles from area landfills. Rethink is also working with WeConserve to reorganize recycling bins across campus and to educate students to their proper use. Rethink will also soon initiate a REfill Campaign encouraging the use of refillable beverage cups and containers. At the symposium, ReThink members will explain how their group was organized, explore the creation of cooperative endeavors with campus facilities units, and look forward at its plans to expand its activities to encompass university food purchasing, the greening of residence halls, and creation of an institutional vehicle for voicing of sustainability concerns to the university administration.

HOW DOES WORKING MEMORY RELATE TO EMOTION, ATTENTION REGULATION AND PAIN?

Nicholas Vorpahl, Stacey Schaefer (Mentor), Psychology

The COGEMO project is a study dealing with working memory in relation to emotion, attention, and pain regulation. We have run about 800 subjects in a working memory task and we hope to run a total of 1,000 subjects. We will then take the top and bottom percentiles based on their scores on the task and bring them back for two full days of testing. We will then run additional working memory tasks in relation to emotion, pain and attention regulation. We expect to find that the subjects with better working memories will be able to function better when having to deal with emotion, pain and distractions. With this study we hope to know how different forms of self-regulation relate to one another.

TRPV1 AND CBS MEDIATE MATRIX METALLOPROTEINASE EXPRESSION IN SPINAL CORD INJURY-INDUCED CHRONIC NEUROPOATHY

Lindsay Raab, Gurwattan Miranpuri (Mentor), Neurological Surgery

Disabling pain is a common occurrence following spinal cord injury (cSCI). However, the cellular and molecular events triggered by cSCI that lead to chronic pain are largely unknown. Our purpose is to demonstrate that the alterations in gene expression are responsible for the variations in pain behavior observed and to explore the molecular events responsible for the alterations in gene expression in the first place. Using rats, we induced spinal cord injuries and quantified their pain. The data indicate that a CB1-selective agonist may be novel therapeutic treatment for clinical cSCI pain. The ultimate goal of this research is to translate this information into the clinical arena in order to reduce the suffering of victims of spinal cord injury.

THE DEMOCRATIC MIND: TOCQUEVILLE AND THE TEMPORAL GROUNDS OF DEMOCRACY

Rocio Sanchez-Moyano, Richard Avramenko (Mentor), Political Science

Much work has been done in the field of democratic theory arguing that democracy sits on a framework of democratic institutions and laws. However, these institutions and laws alone will not maintain a stable democracy; they must rest on the foundations of a democratic people. What makes a people democratic, however, is not fully understood. This project explores the view of time in the consciousness of a democratic people. This view stands in direct contrast with the aristocratic view of time. Tocqueville's *Democracy in America* will help establish this relationship. Tocqueville is particularly useful for two reasons: his work on democracy appears frequently in the discussion of democratic theory; and his views as an aristocratic man viewing a democratic society unwittingly contribute to this contrast.

THREAT-RELATED COGNITIVE BIASES IN ANXIETY

Payal Soni, Wen Li (Mentor), Psychology

Olfaction is the function of smell by sensory cells in the mouth, throat and nose. Due to the closeness of the olfactory system and the limbic system in the brain, anxiety and olfaction may have a relationship. We looked to see if an individual's anxiety affects his/her ability to detect sensory information. Participants were given anxiety questionnaires. Participants then did an odor ratings task, an odor discrimination task, an odor detection task and another odor ratings task. It was hypothesized that individuals with high anxiety would do worse on the second odor discrimination task. The initial results show findings contradictory to our hypothesis; individuals with higher anxiety did better on the second odor discrimination task. This research highlights the effect anxiety may have on individuals.

**CLASSIFICATION OF CAP'N'COLLAR
IN THE DEVELOPING WING
OF *DROSOPHILA MELANOGASTER***

Nicholas Ellis, David Olson (Mentor), Zoology

By studying genes in simpler organisms, i.e. the fruit fly, we can gain a better understanding of genes required for limb development and can apply this knowledge to vertebrates. The fruit fly gene cap'n'collar (*cnc*) regulates mouthpart specification and vein/intervein fate in the wing. Our objective was to determine through what processes *cnc* affects wing development. By use of assorted genetic tools, we altered the levels of *cnc* and observed the effect on its target proteins which were labeled using antibodies. Since mutations in *cnc* are embryonic lethal, genetic mosaics were employed whereby patches of cells lacking *cnc* are generated among otherwise normal, wild-type cells (analogous to fur patterns of calico cats). This alteration has direct implications on limb/head development, egg formation, and wing veination.

**PRESERVING WISCONSIN'S HISTORY:
THE UW-MADISON ARCHAEOLOGICAL COLLECTIONS'
RE-HOUSING PROJECT**

Bethany Brander, Danielle Benden (Mentor), Anthropology

The University of Wisconsin-Madison Department of Anthropology curates prehistoric and historic collections and documents. Until recently, these artifacts and records were in poor condition, a product of the "Curation Crisis" in American archaeology. Over the last two years, the storage space and organization of these materials have improved greatly. After many hours of work, the collections—which continue to be re-boxed, documented, and cared for according to federal curation regulations—have become more accessible for teaching, research, and exhibition. Because of the vast amount of artifacts and objects curated within the UW Anthropology Department, this re-housing project is an ongoing task. Sustained maintenance of these collections is imperative to encouraging additional research and to inform about Wisconsin's dynamic cultural heritage.

MINI-BRAIN GRAPHICAL USER INTERFACE

James Thomas, Mikko Lipasti (Mentor),
Electrical and Computer Engineering

Though there seems to be no limit on computing today, there are obstacles that may prohibit the growth of computing technology in the future. There is a problem with basic computer circuitry as present technology gets faster and becomes smaller. Our research explores a new way of computing that is based on the human brain. The research team has developed a working model that is promising, but the data it generates is very difficult to access. Therefore, this project is focused on designing a graphical user interface (GUI), which will visually display the model on a computer screen. The GUI will allow the group to be able to easily view and manipulate the data generated by the model.

**DYNAMICS OF DAMAGE
TO NEURONAL LYSOSOMES DURING ISCHEMIA**

Shuhan He, Peter Lipton (Mentor), Physiology

The mechanism in which lysosomes are damaged by free radicals during neuronal ischemia is examined in rat hippocampus. There are two hypotheses. The free radicals can degrade the lysosome membrane through liquefaction; all of the intralysosomal proteins would be able to penetrate the membrane, albeit at slower rates for larger proteins. The second mechanism is that pores are created; the proteins within the lysosome that are smaller than the pores can escape while those larger than the pores would not due to the robust nature of the undamaged membrane. Acid Phosphatase (67kDa) and Galactosidase (540 kDa) has been identified as rat neuronal intralysosomal proteins that can be detected as proxies for leakage. Our initial results indicate that the damage undergoes the pore mechanism of damage.

CREATING THREE-DIMENSIONAL MODELS OF VALVULAR DISEASE

Laura Piechura, Kristyn Masters (Mentor), Biomedical Engineering

Calcification of valvular interstitial cells (VICs), the most prevalent cells of heart valves, is the leading cause of failure in both native and bioprosthetic valves. Alteration to the extracellular matrix (ECM) environment and increased expression of transforming growth factor-beta1 (TGF-1) have been associated with VIC calcification, although the mechanisms of valvular disease remain unknown. To elucidate these mechanisms, we created models of diseased valves by depleting explanted aortic valve leaflets of specific ECM components and treating them with TGF-1. ECM depletion and TGF-1 treatment both resulted in the presentation of disease markers with greatest expression observed following concomitant administration. Further characterization of these disease models may provide insight into the mechanisms underlying valvular disease, and, in this manner support clinical development of potential treatment strategies.

THE PREVENTION OF CARDIOMYOPATHY IN MICE USING MITOGEN-ACTIVATED PROTEIN KINASE INHIBITORS

Adam Mauer, Timothy Hacker (Mentor), Medicine

Treatment of familial dilated cardiomyopathy (FDC), dilated cardiomyopathy that is caused by genes, is difficult because it involves genetic predispositions for altered protein function. Mutations in LMNA proteins, proteins that protect the nucleus, cause FDC and sudden death not only in many people but also in the LMNA-N195K variant mouse model. LMNA mutations cause an up-regulation of chemical signaling (MAPK) pathways which turns on or off downstream proteins. This increased occurrence of MAPK pathways mediates FDC. We will administer MAPK inhibitors to decrease the frequency of the MAPK pathways in the mouse model. If our research is supported, administration of MAPK inhibitors to LMNA-N195K mutated mice will alleviate FDC and improve cardiac function.

YJGF AND ITS ROLE IN ISOLEUCINE BIOSYNTHESIS

Prakriti Shiwakoti, Diana Downs (Mentor), Bacteriology

yjgF is considered to be an important gene, because it is conserved in the organisms ranging from *E.coli* to human through evolution. It was discovered while studying thiamine biosynthesis, but after several studies it has also been related to other biosynthetic pathways including isoleucine. The lack of yjgF decreases the specific activity of transaminase B (IlvE) which catalyzes the last step of isoleucine biosynthesis. This was verified by determining the protein concentration and calculating the specific activity of IlvE in wild type and mutant strains. My work is to purify IlvE from yjgF background and determine the putative modification that is responsible for the difference in activity.

MEANING, METAPHYSICS AND MODALITY

Benjamin Edeker, Alan Sidelle (Mentor), Philosophy

One of the hallmarks of contemporary analytic philosophy is the work done on modality, drawing upon and testing major views in ontology, epistemology, and philosophy of language. Modality concerns the phenomena of possibility and necessity, such as if a proposition is true in every circumstance or whether an object can exist in at least one imagined situation. For example, we may think of a car we affectionately name "Speedster" as possibly having a different color, but would it continue to be the same Speedster if we made drastic changes to the engine and frame? Recent insights in language and logic have provided tools to analyze puzzles such as this, and the resulting understanding of modality has returned the favor by expanding entirely new fields of logic. My project has two components. I will first show some of the highlights within this interplay, including the significant historical steps of thinkers like Carnap, Quine, and Kripke, but then I will move to some of the unique features of conceivability and counterfactual interpretations of modality. Connecting these with the problem of epistemological access to mathematical propositions (especially as it is approached by Paul Benacerraf), I will attempt to show how these ideas can contribute to the debate between universalist and particularist theories.

**HOW PARENT EDUCATIONAL LEVEL
AND FAMILY PROCESSES RELATE
TO CHILDREN'S VOCABULARY GROWTH**

Katie Brinsko, Kayleigh Marten, Kristine Nadolski, Kayla Olson, Lisa Pappendorf, Cassandra Robertson, Dave Riley (Mentor),
Human Development and Family Studies

Preschool vocabulary size is important because it predicts later reading ability, which predicts eventual school success. Our research examines the variation in preschoolers' vocabulary growth and if it is linked to parental education levels. We will also see if family processes, such as the home reading environment and parent-child reading interactions, explain the relationship between parental education and preschoolers' pre-reading skills. Data will be collected using a parent survey and a standardized vocabulary test from a sample of 100 children aged 2.5 to 3.5 years from the Madison area. Data are currently being collected and will be ready for analysis prior to the symposium. We hypothesize that child's vocabulary growth will be positively correlated with parents' education level and family processes.

**CHANGES IN EXPRESSION OF GABAA RECEPTORS
IN THE RAT BRAINSTEM DURING THE ESTROUS CYCLE**

Kyle Stang, Mary Behan (Mentor), Comparative Biosciences

During pregnancy, female rats experience extreme fluctuations in sex hormone levels, specifically progesterone. Progesterone metabolites, which fluctuate similarly, enhance the actions of the neurotransmitter GABA, which reduces neuronal activity. It is unclear how respiratory neurons maintain homeostasis during periods of increased circulating progesterone. Preliminary data suggest that elevated levels of progesterone induce a change in GABAA receptors on respiratory neurons such that they are unaffected by progesterone metabolites. The aim of this work is to identify the receptor subunits that allow neurons to bind GABA yet remain unaffected by progesterone metabolites. We will use immunocytochemical methods to determine the temporal and spatial expression patterns of the GABAA receptor Delta subunit, which will be correlated with circulating progesterone levels.

**IDENTIFICATION OF ESTROGEN RECEPTOR TARGET
GENES REGULATED BY CARM1**

Andrea Berktold, Wei Xu (Mentor), Oncology

Doctor Wei Xu's team at the McArdle Lab for Cancer Research is working toward finding the "target" genes responsible for regulating the abnormal growth of cells in breast tissue. The cellular homeostasis of a healthy human being results in DNA with the right expression of genetic coding. Errors in this process, specifically the transcriptional process, can cause minor to fatal biological problems—such as cancer. Dr. Mariam Al-Dhaheri is studying the target gene CARM1; CARM1 is known to have critical involvement in the gene expression and regulation of ER (estrogen receptor). This target gene is therefore important because of its relation to ER. About 70 percent of breast cancer cases express ER. ER mediates its action through regulating genes involved in the cell cycle and differentiation.

**IMAGES FROM THE PAST: THE PHOTO
DOCUMENTATION AND RE-HOUSING PROJECT,
UW DEPARTMENT OF ANTHROPOLOGY**

Theresa Heindel, Danielle Benden (Mentor), Anthropology

In January 2009, the Photograph Re-housing Project began in the archives of the University of Wisconsin–Madison's Anthropology Department. Photographs, negatives, and slides provide essential information about artifacts curated within the Anthropology Collections and the people who collected them. Over the years, these had been forgotten and stored in corrosive containers. As part of an Archaeological Curation Methods course, the Photograph Re-housing Project was initiated to reorganize these materials; re-house them into acid-free binders; create a database that would not only list the locations of the items, but also display the object's provenience information and related documentation; and to digitize them. When the project is finished, pictures of specific artifacts, sites, and people will be available within the database, aiding future research of the collections.

MECHANOTRANSDUCTION AND THE REGULATION OF SKELETAL MUSCLE GROWTH

Lilly Duffy, Troy Hornberger (Mentor), Comparative Biosciences

A balanced diet and exercise regimen is a successful treatment for obesity and insulin-resistant diabetes. It's unknown if the benefits of exercise are due to increased metabolic states or increased muscle mass. If it's possible to chemically increase muscle mass, like exercise does, we could build on the success of pharmaceutical treatments. Skeletal muscle mass plays a critical role in prevention of obesity and insulin-resistant diabetes. Our lab work indicates that signaling through mTOR (mammalian target of rapamycin) is necessary for exercise-induced growth of skeletal muscle. We determined that exercise-induced activation of mTOR occurs through a PI3K/PKB-independent mechanism that appears to involve phosphatidic acid. Chemical duplication of this pathway could potentially serve as a pharmacological therapy to induce muscle growth allowing people an easier transition to a more active/healthier lifestyle.

COMPUTER SCIENCE THROUGH SCRATCH

Phoua Xiong, Andrea Arpaci-Dusseau (Mentor), Computer Sciences

A modern goal of educational research is to introduce students to computer science and show how computers work. To accomplish this, our research has fourth- and fifth-grade students at Shorewood Elementary in Madison, Wisconsin, working with an interactive computer science program called Scratch as an afterschool activity. With Scratch, as well as many other activities, students learn how computers work and how to program. Our results indicate that students have gained interest in computers. In the future, we hope to enhance young students' interest in computer science and incorporate computer programming into elementary schools' curriculum. With this accomplishment, students will begin to learn about computers as they are becoming increasingly popular. Computer programming will be a basic learning skill like mathematics, social studies, science, etc.

KISSPEPTIN EXPRESSING NEURONS IN MEDIAL BASAL HYPOTHALAMUS AND PREOPTIC AREA IN MENOPAUSAL MACAQUES

Erika Hutz, Ei Terasawa (Mentor), Pediatrics

Kisspeptin (KP) is a neuropeptide that regulates the release of gonadotropin-releasing hormone (GnRH) in the hypothalamus. This project investigates changes in KP neurons in the MBH and POA of rhesus macaques. Brain tissues from postmenopausal and eugonadal monkeys were cut at 50-micrometer thickness. Serial sections at 100-micrometer intervals were immunostained with GQ2, a KP antibody. Results show that KP somata were found in the infundibular nucleus and periventricular regions encompassing medial to the infundibular nucleus through medial to the paraventricular nucleus. The KP neurons in the MBH of postmenopausal monkeys are larger in size and greater in number than in eugonadal monkeys. These results suggest that in the menopausal state, KP expression increases because of a decrease in the negative feedback of ovarian steroid hormones.

RECESSION BRINGS CHALLENGING TIMES FOR AMERICAN BUSINESSES

Jina Mendel, Kelli Skatter, Debra Houden (Mentor),
General Business

This study investigates economic recessions and the affects it has on family businesses. This study will determine whether having a family owned business creates a competitive advantage to ride out such economic downturns, or if family businesses are the first to feel the effects and close when recessions occur. By exploring frequent concerns of economic recessions, such as confronting the lack of customers or cutting expenses, we will propose strategies to overcome these concerns. Research will be done by interviewing family and nonfamily business owners, as well as analyzing previous economic research to determine which type of business fares better in a recession. This information will benefit those who are presently involved in family, or nonfamily, owned businesses.

MULTI-LINE INVESTIGATION OF THE HYDROGEN GEOCORONA

Elise Larson, Edwin Mierkiewicz (Mentor), Physics

Studies involving the hydrogen Balmer-alpha and Balmer-beta emissions in the geocorona, or the Earth's uppermost atmosphere, are leading towards greater understanding of the characteristics, chemistry, and variability of the geocorona. These emission line studies will help to refine modeling techniques used in geocoronal analysis. In particular, the Balmer-beta emissions have not been extensively studied, and therefore could provide added insight through their relationship to the Balmer-alpha emissions. Data taken by the Wisconsin H-alpha Mapper instrument are plotted to search for relationships between Balmer-alpha and -beta, such as changes in the intensity of the emissions vs. shadow altitude. Sample plots will be presented along with descriptions of analysis techniques.

READABILITY OF HOSPICE EDUCATION MATERIALS

Michelle Brunelle, Karen Kehl (Mentor), Nursing

Low health literacy levels negatively impact health. Although health education materials are recommended to be no higher than a fifth grade reading level, patient education materials (PEMs) are often written above the reading abilities of patients. The purpose of this study was to describe the readability of 153 PEMs from hospices representing the 10 Medicare regions. Readability was measured using simple measure of gobbledygook (SMOG), Flesch-Kincaid reading level, and Flesch reading ease. Mean results confirm that PEMs are written much higher than the suggested fifth grade level. Assessment of readability is critical in providing documents that support patient understanding of their medical conditions and necessary cares. Further research is needed examining the impact of medical terminology on readability and whether medical terminology was defined.

USE OF THE ATTACHMENT STORY COMPLETION TASK WITH PRESCHOOLERS BORN PRETERM OR LOW BIRTHWEIGHT

Brynn Peterson, Julie Poehlmann (Mentor),
Human Development and Family Studies

The attachment story completion task (ASCT; Bretherton, Ridgeway, & Cassidy, 1990) was designed to assess representations of attachment relationships in preschool children. In order to bring forth children's thoughts and feelings about attachment figures, increasingly stressful story stems are presented to the child: attachment figure as authority (Spilled Juice), comforter (Hurt Knee), and protector (Monster), and separation of the child from the attachment figure as he or she leaves for a trip and reunites with the child the next day (Separation – Reunion). Although the ASCT's reliability and validity have been examined in a range of samples, previous studies have not examined its psychometric properties with children born preterm or low birthweight (PT LBW). Thus, the present study aims to examine these psychometric properties.

JASON AND MEDEA IN THE ART AND LITERATURE OF CLASSICAL ANTIQUITY

Andrea Samz-Pustol, William Aylward (Mentor), Classics

The saga of Jason and the Golden Fleece is best known from the Argonautica of the third-century B.C. epic poet Apollonius of Rhodes. No other ancient telling of the tale matches the scope or detail of the Argonautica, which purports to trace the entire journey of Jason's ship, the Argo, from Greece to the foreign shores of the Black Sea. Despite its superior account, representations of the story in ancient art, which are often drawn from literature, tend to reflect aspects of the tragedy Medea by the fifth-century B.C. playwright Euripides. My survey of depictions of this tale in ancient Greek and Roman art examines the influence of literature on art and reveals an enduring fascination with Medea for the threat of her foreign exoticism.

CONCRETE NANOTECHNOLOGY

David Bierman, Jessica Sanfilippo (Mentor),
Civil and Environmental Engineering

This year, research has been done on the effect of the application of nanoparticles to concrete, in order to improve some of its basic characteristics. The research is primarily material science engineering but also spills into chemistry, physics, circuits, as well as mechanical engineering. In short, the application of these particles involves dipping the aggregate found in concrete into a sol (a solution of nanoparticles) before mixing it into the final product. This semester, porosity tests will be run, and the concrete will also be inspected under a microscope, in order to get a good picture of what is going on. This semester's research will also include preparations for seminars and possible industrial opportunities. So far, we have found that the technology and principles we are using and developing have greatly improved the basic characteristics of concrete (reduced curing time, increased strength, etc.) and will soon change the face of our infrastructure.

SHELF LIFE STUDY OF CLEAR PROTEIN IN WATER BEVERAGES

Margaret Debrauske, Mark Etzel (Mentor), Food Science

Whey protein isolate in beverage form tends to be less turbid at lower pH levels. I examined how pH levels in the acidic range and amount of each protein affected the turbidity on the DAVISCO and Hilmar 9400 whey protein isolate after being heat treated as an aqueous solution. The turbidity of each sample was recorded each week for six weeks for the purpose of discovering if the variable (time) had any affect on the turbidity. All samples stayed at a constant turbidity for the six weeks and samples with a pH 3.7 or lower had turbidities of 50 and below. Whey protein isolate at a pH 3.7 or lower will be transparent in liquid form for an extensive period of time.

EDUCATING THROUGH COMPUTER PROGRAMMING

Pakou Vang, Phoua Xiong, Andrea Arpaci-Dusseau (Mentor),
Computer Sciences

The purpose of this research is to promote interest in computer science, to educate children using computer programming, and to develop a school curriculum that includes computer programming. This study investigates the different ways in which younger students learn. A newly developed computer program, called Scratch, was used to introduce computer programming and languages to students attending Shorewood Elementary School. We have shown that students are more eager to learn using computer software and after participating in the programming, students' interests in computer science are increased. By learning to use Scratch, children are able to build an interest in computer science, which may benefit themselves and the future of the computer science field.

DARK ENERGY AND NEUTRAL HYDROGEN WITH THE WISCONSIN SMALL TELESCOPE ARRAY FOR RADIO-WAVES

Fernando Cardoso, Kristen Jones, Sean Kalafut,
Peter Timbie (Mentor), Physics

Ninety-five percent of the Universe is in the form of unknown dark matter or dark energy. While several theories currently address how these components and baryonic matter have formed and evolved with time, we still do not know precisely the evolution of dark energy. Studying the way neutral hydrogen (HI) is distributed to a redshift of $z=2$ or 3 allows for a measurement of the equation of state of the dark energy. Galactic synchrotron radiation obscures the hydrogen signal but numerous methods have been used for removing the effects of foregrounds from current maps, including subtraction of the most contaminated regions. Using the Wisconsin Small Telescope Array for Radio-waves (W-STAR) and its long-term observation capabilities, we will search for fine features in the predicted spectrum and improve foreground removal efforts.

SUCCESSION PLANNING AND THE FAMILY BUSINESS

Brian Kaplan, Debra Houden (Mentor), General Business

Succession planning is one of the most difficult and controversial challenges confronted by family businesses. Succession planning involves the founder or CEO of a family business laying out a formal framework for naming a successor when he or she decides to retire. We plan to compare and contrast publicly traded family companies which have been able to continue into next generations, such as SC Johnson, with ones who have recently sold to non-family members, such as Anheuser-Busch. After researching and analyzing various family businesses, our group discovered that the CEOs and founders of successful family businesses were able to avoid the various conundrums associated with naming a successor by effectively communicating about the subject.

THE CREATION OF INTERNATIONAL HUMAN RIGHTS NORMS AND AGREEMENTS: CASE STUDY OF ABORTION

Gillian Stoddard Leatherberry, Scott Straus (Mentor), Political Science

This project uses norm socialization theory and the case study of abortion in international law to study (1) the origins of international human rights norms and (2) how these norms shape international agreements. The Protocol to the African Charter on the Rights of Women in Africa authorizes that states should provide medical abortion to women in certain cases, thus departing from previous international consensus statements that do not mention abortion. Why did this legislation arise on the continent of Africa where abortion is not universally accepted, and what can this process reveal about the creation of international rights agreements? Scholars have conducted little research about Article 14; I will present my research including interviews with some human rights groups and background information about the Protocol.

JUMP AROUND FOR JUMPSTART

Bill Buecksler, Robert Engel, Kaela Friedman, Grant Kraus,
Steven Skolnik, Shannon Elliott (Mentor), Business

Jump Around for Jumpstart's vision is to raise as much money as possible to help the children of Jumpstart, an under funded, non-profit organization committed to preparing low-income children to be successful in school. The program is located in Madison, and we will work with the organization to reach our goal of raising at least \$500. They will provide volunteers when we host fundraisers such as a bake sale, a penny wars competition between the different business majors, and have a raffle with various prizes. Our team is determined to give back to the community and the money raised would help provide valuable educational resources that will enable these children to be better prepared for their future education.

THE IMPACTS OF GLOBAL ATMOSPHERIC CHANGE ON THE BEHAVIOR AND PERFORMANCE OF A MAMMALIAN HERBIVORE

Robert Hansen, Christopher Habeck (Mentor), Zoology

The concentration of carbon dioxide (CO₂) and ozone (O₃) gases in the atmosphere is rising. These gases can have direct effects on leaf chemistry, subsequently altering insect behavior and performance. Almost nothing is known, however, about the impacts of atmospheric change on the behavior and performance of mammalian herbivores. To test this hypothesis, we harvested two forbs from three different atmospheric treatments: ambient, elevated CO₂, and elevated O₃. The plants were fed to weanling voles and we measured changes in body mass and plant consumption rates. Preliminary results suggest that voles on elevated CO₂ and O₃ diets grew less than voles on ambient diets. To elucidate treatment-related differences in vole growth, we are currently quantifying changes in plant nutritional quality. Plant consumption data are pending.

PROJECT SUMMER

Esther Yi, Eric Carter (Mentor), Rehabilitation Psychology
and Special Education

Project Summer is focused on developing and evaluating a set of promising intervention strategies to help students with significant disabilities or emotional/behavioral disabilities connect to work and other community activities during the summer months. There is evidence that the community is not aware of the needs or capacity of these students. The project sponsored a series of community-wide conversations to increase awareness and established community connectors and employer liaisons to help match individual students to summer job opportunities. The project involves (a) comparing outcomes for students in the research and comparison groups and (b) gathering feedback from stakeholder groups like parents, teachers, students, and employers. The intervention was particularly effective for students with severe disabilities and the team is now focusing on refining the strategies to help youth with disabilities transition successfully to life after high school.

HOW SMALL FAMILY BUSINESSES EVOLVE INTO LARGE CORPORATIONS

Andrew Simon, Debra Houden (Mentor), General Business

While most family businesses start out small, some have grown into corporations that now dominate their respective fields. However, when these family organizations grow this large, they may make changes that alter the structure of what was once a small family operation, including hiring non-family managers in leadership positions. In this study, I will look at the rise of a variety of family businesses and examine changes they made in their rise to a corporation. I will look at changes to key leadership roles in a few family businesses and expect to see that while some executive roles have been taken over by non-family members, most of the key employees in these companies are still part of the original family.

THE EFFECTS OF THE SPINY WATER FLEA (*BYTHOTREPES LONGIMANUS*) ON A NORTHERN WISCONSIN LAKE

Samantha Mueller, Jake Vander Zanden (Mentor), Zoology

The invasive spiny water flea is a large, pelagic zooplankton that has the potential to alter food webs and has been known to disrupt native zooplankton communities. Stormy Lake in Vilas County was invaded in 2007, and in this study, the effects in Stormy Lake and the potential spread of this invader are examined. Densities of *bythotrephes* were highly variable after hatching in late June, and the adults persisted through late fall. Since the spiny water flea has arrived in Stormy Lake, there has been a decrease in zooplankton biodiversity and a possible drop in water clarity. Twenty-five lakes within a 17km radius of Stormy Lake were sampled for *bythotrephes* and all were negative.

ROLE OF NON-FAMILY EMPLOYEES IN FAMILY BUSINESSES

Chris Huszar, Debra Houden (Mentor), General Business

Family businesses account for a majority of all American companies. This research addresses the issues related to why non-family employees make the decision to work for a family company. The case study includes the advantages and disadvantages of working with families, what motivates and de-motivates them, communication difficulties, as well as other issues not encountered in non-family businesses. Non-family employees will be interviewed at my family's business in northeastern Wisconsin. My research is expected to find a favorable advantage to working for a family-run company compared to non-family run businesses and larger corporate structures.

ORGANIZED CRIME IN HOLLYWOOD: GUTTING THE CORLEONE FAMILY BUSINESS

Derek Kawleski, Debra Houden (Mentor), General Business

Few people willingly acknowledge the similarities between legitimate family businesses and *The Godfather*, Francis Coppola's 1972 film about a Mob family. However, a closer look reveals that the multi-generational success acquired by the Corleone family is a direct result of exceptional family business practices. Trusted non-family advisors, well-developed family leaders, and transparent succession plans ultimately allowed the Corleones to become the most powerful family in Hollywood. The advantages and disadvantages of operating a family business are evident throughout the plot. This case study will look to expose the infrastructure of the Corleone family, revealing striking similarities between the fictional Corleones and any other successful family business.

PROBING THE CHEMISTRY IN THE ACTIVE SITE OF P4H

Khian Hong Pua, Ronald Raines (Mentor), Biochemistry

Prolyl-4-hydroxylase (P4H), a mononuclear, non-heme FeII enzyme, plays an integral role in the biosynthesis of collagen. It catalyzes the post-translational hydroxylation of proline residues that leads to the stabilization of the collagen triple helix. Mononuclear, non-heme Fe(II) enzymes are known to catalyze a wide variety of reactions. Non-heme FeII enzymes which carry out oxidative halogenation have recently been discovered. Halogenase SyrB2 and hydroxylase P4H are two very closely related enzymes, both 2-oxoglutarate and oxygen dependent, but catalyzes different types of reaction. It is thought, however, that both the halogenation and hydroxylation reactions proceed via a similar mechanism involving relatively similar residues on their active sites. We discovered that the spatial orientation of the active site residues around Fe is critical for hydroxylase activity of P4H.

CORRELATING ENVIRONMENTAL RECORDS FROM SILVER LAKE, OHIO, SEDIMENT USING LOSS-ON-IGNITION ANALYSIS

Luming Xue, Jack Williams (Mentor), Geography

This study uses loss-on-ignition (LOI) analysis to measure the relative fractions of organic carbon, carbonates, and mineral content of lake sediments from Silver Lake, OH. Samples are analyzed by measuring weight loss after burning at 100, 550, and 1000 Celsius, respectively. This data provides information on lake productivity and environmental change since the region was deglaciated, approximately 18,000 years ago. Data are then plotted and analyzed to infer periods of climate change, lake level history, and other ecological events. These data will also be used to correlate stratigraphies from other sediment cores taken from the lake for this and other previous studies. This work contributes to graduate research on vegetation responses to late-glacial environmental change, and megafaunal extinction recorded in Midwestern lake sediments.

THE IMPACT OF MATERNAL SCAFFOLDING AND CHILD NEGATIVE EMOTIONALITY ON 24-MONTH NEUROCOGNITIVE SKILLS

Anna Rissman, Janean Dilworth-Bart (Mentor),
Human Development and Family Studies

Studies suggest neurocognitive deficits underlie links between preterm birth, low birthweight, and later academic and behavioral problems. Maternal scaffolding can positively impact children's abilities. However, children requiring more assistance with soothing behaviors may be too emotionally reactive to benefit from mother's scaffolding behaviors. Understanding how emotionality impacts neurocognitive development is important for low birthweight and preterm children due to reciprocal relationships between cognition and emotion and the greater likelihood of negative emotionality in this high risk group. This analysis will examine whether child characteristics and parenting behaviors interact to impact early neurocognitive skills. Mother's scaffolding behaviors during a 16-month free-play interaction is expected to relate to 24-month working memory, impulsivity, sustained attention, and visual spatial processing only if child negative emotionality is lower.

AMERICAN FAMILY CHILDREN'S HOSPITAL BADGER BUDDY PROGRAM

Abby Forecki, Nanah Han, Chris Lee, Matthew Shapiro,
Dalton Shaughnessy, Loren Kuzuhara (Mentor), Management

The purpose of the American Family Children's Hospital Badger Buddy Program is to provide an outlet for the children at the hospital to get away from the hospital setting, to establish a connection between University of Wisconsin students and the American Family Children's Hospital, and to provide a supportive mentor for the children admitted to the American Family Children's Hospital. Surveys and interviews will be conducted with employees at the hospital and patient guardians and then analyzed to determine what activities will be most beneficial for the children. A proposal will then be generated and presented to the hospital based on our findings and will outline the project's objectives and goals.

INVESTIGATION OF MECHANISMS OF ANESTHETIC-INDUCED AMNESIA

Timothy Ford, Robert Pearce (Mentor), Anaesthesiology

Drug-induced temporary amnesia is an essential component of the anesthetic state. However, because anesthetics affect various targets and have multiple effects, the biological and cellular mechanisms that bring about a particular effect, such as amnesia, are not easy to distinguish. This investigation focused on distinguishing mechanisms that bring about amnesia. Memory was assessed in 28 mice based on the amount of time they explored a novel environment, indicating how well the mice learned their environment. Half of the mice harbor a subunit-mutation (3 subunit of GABAA receptors), which causes receptors containing that particular subunit to be insensitive to various anesthetics, including the experimental agent, 1,2 dichlorohexafluorocyclobutane (F6 or 2N). F6 impaired both genotypes' ability to learn their environment. Thus, receptors containing the 3 subunit did not appear to contribute to the amnesic effects brought about by F6.

BREAKING CEO RESISTANCE AND ENTRENCHMENT

Charles Spring, Debra Houden (Mentor), General Business

The intricacies of owning and managing a family business are a function of both positive kinship-based variables and negative, but often remediable, family-induced conflicts. One of these negative factors, which is a pertinent concern for all family businesses, is the resistance and entrenchment of CEOs with regard to succession and strategic planning. To help break this resistance, non-family advisors are brought in to mediate and mitigate tension created within the family business. I am studying the implementation by non-family advisors of family-based strategic and unifying policies to determine whether non-family advisors can successfully break CEO resistance and entrenchment. By analyzing case studies, I will be able to expound on this question and explain the invaluable importance of the non-family advisor to the family business.

IDENTIFYING CULTURALLY RELEVANT QUESTIONNAIRES AND PROCEDURES FOR HEALTH PROMOTION INTERVENTIONS

Denise Contreras, Padau Yang, Diane Lauver (Mentor), Nursing

Cardiovascular disease (CVD) is disproportionately prevalent among minority and low socioeconomic (SES) populations, including Latina women. Many interventions to reduce CVD risk have focused on high SES people and Caucasians. We are conducting a descriptive study to obtain feedback from low SES Latinas on a proposed intervention. Recruited from community centers, our sample involves women who are over 21, Spanish speakers from Latin America, with less than high school education. Participants complete study questionnaires independently and attend a group discussion. Led by a bilingual facilitator, they are asked for their understanding of questionnaires and their suggestions for the proposed intervention. Content analyses will be used to summarize feedback and will refine our intervention to be feasible, gender appropriate, and culturally acceptable.

A PRESCHOOL INTERVENTION PROGRAM TO FACILITATE SCHOOL READINESS

Nicole Allen, Sara Flugum, Julien Lee, Sarah Pitzen,
Julie Poehlmann (Mentor), Human Development and Family Studies

Jumpstart for Young Children is a national organization that focuses on improving school readiness in preschool-aged children considered at-risk for academic difficulties in kindergarten. Given Jumpstart's relationship focus, improvement in school readiness may be influenced by the nature of children's attachment representations and behavior problems, making connection with adults in the program more or less difficult. Thus, the current study examined the link between children's representations of family relationships, behavior problems, and changes in children's school readiness skills. In addition, other factors could play a role in this link, such as a child's age or gender. Thirty-eight children who participated in Jumpstart through a Midwest university program were included in the current longitudinal mixed-method study.

ACCURACY TESTING OF OPTOTRAK® 3020 CAMERA SYSTEM

Neha Hasan, Jill Schmidt (Mentor), Mechanical Engineering

Initial implant stability has been correlated with aseptic loosening, a primary reason for failure of total knee arthroplasties. Motion capture systems used to track human motion, have recently been used to monitor initial implant stability during in-vitro experiments. Yet, the accuracy of these systems for micron-level dynamic motion has not been previously evaluated. The current study assessed the accuracy of the Optotrak® 3020 camera system during dynamic motion using a calibrated stage with a dynamic controller. In addition, dynamic motion with different amplitudes and frequencies were assessed. Evaluation of the system's accuracy will provide credibility to studies which use this system to investigate implant motion.

PLASMA-AIDED NANO-ENGINEERING POLY(METHYL ACRYLATE) SURFACES

Klinsmann Gutierrez, Sorin Manolache (Mentor), Engineering Physics

Within the Center for Plasma-Aided Manufacturing, plasma has been used on the surfaces to modify their properties, such as hydrophobic, hydrophilic, and anti-scratch. In our experiments, Poly (methyl acrylate) has been applied to several mirror polished surfaces that will be treated with helium plasma. Our goal is to modify the thin layer of Poly (methyl acrylate) within the nano-scale in order to modify its properties. The plasma will break the carbon backbone of the polymer and modify the crosslink between polymer chains, thereby affecting their physical properties and generating nano-topography. By the end of the research, we hope to accomplish a better understanding of polymers at the nano-scale and how they interact differently on the surface.

MOTIVATIONAL FACTORS IN RECRUITMENT OF WOMEN FOR A RANDOMIZED CONTROL TRIAL

Stephanie Rabe, Ana Schaper (Mentor), Nursing

Recruitment of younger women for research studies investigating interventions to support wellness is challenging. The loss of participants over the course of study is a significant threat to the validity of the results. In a pilot study to evaluate the effectiveness of two interventions to prevent urinary incontinence during and after pregnancy, only 40 women were recruited. Women who completed the study were asked to submit a questionnaire that was used to identify factors that motivated them to enroll in the study and engage in self-care activities. The majority of women indicated only one motivating factor which focused on wellness of self or others. Utilizing motivational factors identified at recruitment, such as self-care, may be effective in recruiting and retaining younger women in research trials.

**MATERNAL AND HOME CORRELATES
OF NEUROCOGNITIVE PERFORMANCE
AND SCHOOL READINESS**

Ashton Lloyd, Chantelle Tally, Janean Dilworth-Bart (Mentor),
Human Development and Family Studies

High quality home environments are vital to promoting school readiness. Home environments may impact readiness through their influences on neurocognitive skills such as executive functions or affective decision making. Numerous factors impact home environment quality including maternal well-being and support. This study identifies home and maternal characteristics that promote preschoolers' neurocognitive skills. Study participants included 20 children ages 54–66 months and their mothers living in a small midwestern city. We hypothesize that higher home environment quality and maternal well-being will be related to higher executive function scores and school readiness. The information can help create family- and home-based interventions that promote school readiness.

**EVIDENCE-BASED RECOMMENDATIONS
FOR AN EDUCATIONAL INTERVENTION
TO IMPROVE OUTCOMES IN LONG-TERM CARE**

Elizabeth Apollo, Barbara Bowers (Mentor), Nursing

Despite considerable efforts to improve practices in long-term care, substandard care remains an issue in many facilities. Approaches to improve care have been focused on identifying educational needs of front-line staff and providing information in classroom settings. Research on work process change indicates that practice improvements require integration of adult education principles as well as a supportive work environment to be successful. Evidence gathered in a human-service setting has shown that training managers and supervisors in general supervisory interaction skills had positive effects on staff and clients. This intervention, presented with interactive learning techniques, requires minimal training to implement and potential for improved patient outcomes. Further research is needed to test the efficiency of this intervention in a long-term care setting.

**CULTURE AND MANAGEMENT: A STUDY OF HMONG
FAMILY BUSINESSES IN WISCONSIN**

Yee Vue, Pa Nhia Thao, Debra Houden (Mentor), General Business

The greatest obstacle preventing Hmong family businesses from thriving in Wisconsin—and possibly succeeding to the next generation—is lack of knowledge on effective management strategies. Culturally, set structures of rules and policies, as well as best practices to balance the demands of business and family are rarely employed in Hmong family businesses. This research attempts to determine the unique problems and challenges that stem from the lack of management strategies in most Hmong family businesses and will demonstrate the importance of having family meetings, strategic planning, and a board of advisors to help sustain the family business. Current research stresses the importance of these management strategies and indicates that about 90 percent of businesses without them either fail or are sold by the third generation.

**DIFFERENCES IN SKIN AND ENVIRONMENTAL
MRSA COLONIZATION BETWEEN RESIDENTS
OF A VA NURSING HOME**

Anna Kaufman, Christopher Crnich (Mentor), Medicine

Nursing home (NH) residents are commonly colonized with methicillin-resistant *staphylococcus aureus* (MRSA). Residents of Veterans Health Administration (VHA) nursing homes are screened for MRSA colonization and screen-positive individuals are stratified into high- (H-MRSA) and low-risk (L-MRSA) transmission groups based on criteria yet to be validated scientifically. The objective of this pilot study is to measure differences in skin and environmental MRSA contamination between H-MRSA and L-MRSA residents in the Tomah nursing home. Participating subjects will undergo cultures of their skin and surrounding environment. The proposed research will generate important preliminary data on MRSA transmission in the nursing home and will serve as a foundation for future studies that will explicitly examine how nursing home residents acquire and transmit MRSA. This research will be critical for developing future preventative interventions.

THE INFLUENCE OF ELECTRIC FIELD EXPOSURE AND INTENSITY ON ELECTRICALLY MEDIATED GENE AND DRUG DELIVERY

Kaytlyn Beres, Adam Hahn, Samantha Kamin,
John Booske (Mentor), Electrical and Computer Engineering

In the presence of an electric field, cell membranes will develop structural defects, or pores, allowing for the delivery of various behavior-modifying molecules to cells: for instance genes and drugs. Despite the widespread use of electrical gene and drug delivery, much remains unknown regarding how the duration of electric field exposure and the scale at which it is administered influences the delivery of genes and drugs to cells. We will present data obtained using fluorescence microscopy comparing electrically mediated delivery of a fluorescent marker to human leukemia cells using macroscopic-scale electric field exposure times of 1, 20, and 40 microseconds. Additionally, we will compare this data to that obtained when exposing cells to molecular-scale electric fields emanating from charged molecules at various concentrations.

HOW MATERNAL SCHOOL EXPERIENCES INFLUENCE THE WAY MOTHERS PREPARE THEIR PRESCHOOLERS FOR SCHOOL

Lauren Heilbrunn, Lily Hlavacek, Ashton Lloyd, Megan Wyman,
Janean Dilworth-Bart (Mentor), Human Development and Family Studies

Parents' own school memories are reactivated as they begin to prepare their children for school, and parents themselves go through a transition during this period that needs to be acknowledged. It is important to identify issues related to parents' experiences with school, and how that influences children's learning before school entry, in order to best support the transition process. The current research entailed trained interviewers asking mothers to revisit both academic and social memories of their school days, and consider whether their experiences were positive, negative or mixed. Mothers also reflected on how their own experiences influence how they think about preparing their children for school. Implications from these findings may guide practitioners and educational centers in reframing negative attitudes towards school and assisting families with the school readiness process.

BULLYING DIFFERENCES BETWEEN MALES AND FEMALES

Terrance Sims, Amy Bellmore (Mentor), Educational Psychology

This study will examine gender differences in bullying and its effects on the self-esteem of male and female victims. Based on a survey of urban middle school students, I expect the results to show that males will tend to be more physically aggressive in their forms of bullying (pushing, hitting, and kicking), while females will use more emotion-based tactics (spreading rumors). I believe the bullying will be more harmful to the self-esteem of the female adolescents than the male adolescents.

RENDERING UNTO CAESAR: THE CATHOLIC CHURCH CONFRONTS GERMAN NATIONAL SOCIALISM

James Reuter, Rudy Koshar (Mentor), History

During the rise of the Nazi Party during the 1920s and early '30s, the Catholic Church and its hierarchy did the best they could to try and distance themselves from the party, by urging its followers to remain loyal to Catholic institutions and by banning Nazi formations from Catholic events. However, Nazi electoral victories in 1932 forced the church to at least try and get along with the legitimate government in an attempt to ensure its own survival. Despite signing a Concordat to protect the independence of Catholic institutions and organizations, though, Hitler and the Reich embarked on a crusade to end all forms of Catholic autonomy within Germany, in an effort to win the hearts and minds of loyal Catholics.

THE IMPACT OF SCRATCH ON ELEMENTARY SCHOOL CHILDREN'S UNDERSTANDING OF COMPUTER PROGRAMMING

Erin Gonzalez, Andrea Arpac-Dusseau (Mentor), Computer Sciences

The purpose of this research is to promote interest in computer science, to educate children using computer programming, and to develop a school curriculum that includes computer programming. This study investigates the different ways in which younger students learn. A newly developed computer program, called Scratch, was used to introduce computer programming and languages to students attending Shorewood Elementary School. We have shown that students are more eager to learn using computer software, and after participating in the club their interest in computer science is increased. By learning to use Scratch children are able to build an interest in computer science which may benefit themselves and the future of the computer science field.

FAMILY FEUDS: A LOOK INTO DISAGREEMENTS AMONG FAMILY BUSINESS OWNERS AND THEIR RESOLUTIONS

George Passaro, Paul Riemer, Eric Upchurch,
Debra Houden (Mentor), General Business

Family businesses can be infamous for infighting between owners. These crucial differences in decision making often leads to the destruction of valuable relationships, which, in turn, affects the business itself. Through case studies, interviews, and literature review we intend to investigate past and present issues between family business owners to evaluate their particular solutions to keep the business not only solvent, but prepared to advance to the next generation. We will present findings that help other family business owners approach these respective business problems with new confidence.

CREATING AND MAINTAINING POSITIVE PERSONAL AND PROFESSIONAL RELATIONSHIPS IN A FAMILY BUSINESS

Mallory Madden, Debra Houden (Mentor), General Business

This study will address the dynamics of the relationship between non-family and family member employees in a family business through the utilization of personal interviews and a case study of The Star Prairie Trout Farm. I will address frequently occurring personal and professional problems within these relationships and their hypothesized solutions. The inclusion of non-family employees in a family business provides fresh perspectives, expands the business into the community, and is vital to business growth. However, it is predicted that unless the relationships among non-family and family employees remain amicable, the positive effects of including non-family employees may be reversed. Moreover, because relationships within a family are complex before factoring in a business, this study hopes to provide insight into utilizing the family business to strengthen family bonds.

SUCCESSION PLANNING AND THE FAMILY BUSINESS

Charli Hantman, Brandon Steiner, Debra Houden (Mentor),
General Business

Succession planning is one of the most difficult and controversial challenges confronted by family businesses. Succession planning involves the founder or CEO of a family business laying out a formal framework for naming a successor when he or she decides to retire. We will compare and contrast publicly traded family companies which have been able to continue into next generations, such as SC Johnson, with ones who have recently sold to non-family members, such as Anheuser-Busch. After researching and analyzing various family businesses, we will discover that the CEOs and founders of successful family businesses were able to avoid the various conundrums associated with naming a successor by effectively communicating about the subject to those involved.

**PARENT PARTNER AND ETHNIC MINORITY STATUS
IN RELATION TO YOUTH FRIENDSHIP
AND ACADEMIC SUCCESS**

Maichou Lor, Susan Riesch (Mentor), Nursing

This study examined 5th grade parent-child dyads to determine if a parent's partner status and ethnic minority status are associated with youth friendships and academic success. Dyads were a sub-sample from the Mission Possible: Parents and Kids Who Listen study conducted at the Waisman Center. All data were collected by in-home interview and were analyzed using t and chi-square tests. Results showed that there was no difference in the number of friendships among children whose parents were partnered or not, and that ethnic minority children reported significantly more close friends than non-ethnic minority children. Children whose parents were non-partnered and ethnic minorities were more likely to get poor grades. Based on these results, factors other than social isolation to explain poor academic success need to be examined.

**EFFECT OF METHYLPHENIDATE ON ANTI-SACCADE
PERFORMANCE IN THE RHESUS MACAQUE**

Kimberly Lancaster, Luis Populin (Mentor), Department of Anatomy/
Neuroscience Training Program

Methylphenidate (MPH) is a popular prescription for the treatment of Attention Deficit Hyperactivity Disorder (ADHD). Central symptoms of ADHD include distractibility, impulsivity, and the inability to appropriately allocate attention. The disorder is thought to stem from prefrontal cortex (PFC) dysfunction exacerbated by a catecholamine imbalance. Despite its clinical efficacy and wide spread use, the actual effects of MPH on the neuronal networks of the PFC remain unknown. The Specific Aim of this proposal is to study the effects of MPH on the performance of a PFC-dependent behavior: the anti-saccade task. Cardinal symptoms of the ADHD challenge successful completion of the anti-saccade task. The experiments will be performed in awake behaving rhesus monkeys allowing results to be directly comparable to human studies utilizing the same experimental task. It is hypothesized that low doses of MPH will improve performance through the facilitation of better PFC function. It is also hypothesized that higher doses of MPH will impair performance.

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