

Undergraduate
Research
Conference

2002
URC



MINNESOTA STATE
UNIVERSITY
MANKATO

Welcome!

The Fourth Annual Undergraduate Research Conference recognizes and celebrates undergraduate research and creative activities at Minnesota State University, Mankato. Our faculty is committed to working side by side with students and organizing this conference has revealed both the long and productive record of undergraduate research on campus and the many benefits that occur as the result of faculty mentoring undergraduate students. Students involved in these efforts have better retention rates, excel academically, and are more competitive in the job market and graduate school admissions. This formal publication presents the abstracts of the student presentations on March 25 and 26, 2002. The conference features oral and performance based/visual arts presentations, and poster presentations from four campus colleges. Our congratulations to the students and their faculty members.

Karen A Boubel

Karen A. Boubel
Interim President
Minnesota State University, Mankato





THE UNITED NATIONS AND OPEC, STRANGE BEDFELLOWS?

Rachel Noah (Anthropology)

Paul Brown, Faculty Mentor (Anthropology)

Has the United Nations ever given out a condemnation to a member of the Organizations of the Petroleum Exporting Countries (OPEC)? Is the United Nations too quick in giving out condemnations to certain countries? Upon closer inspection of the many countries of this world, it becomes clear that there is a definite stratification when it comes to energy and resources. These resources include both renewable resources and high energy yielding resources like oil. This research investigates low resource-possessing nations and how they voted in the United Nations on energy policies. This paper will attempt to answer these questions of ethics, self-interests, and United Nations voting patterns.

PEOPLE AND ADAPTATION IN HIGH ALTITUDE

Rie Yamada (Anthropology)

Paul Brown, Faculty Mentor (Anthropology)

This research will analyze the affects of high altitude on human biological and cultural features. A comparison of the physical and cultural features of Himalayan and Andean natives shows a high degree of similarity in spite of the great distance that separates them. Also, the low atmospheric pressure causes a lower birthrate and a slower rate of growth. Studying and knowing people in other circumstances will help us to understand other people in different environments. Data for this project was collected from library sources. The research suggests environment has a strong effect on human life.

CULTURAL SIGNIFICANCE OF BODY ART

Rhonda Drescher (Anthropology)

Winifred Mitchell, Faculty Mentor (Anthropology)

For years people have been tattooing, scarring, burning, and performing other forms of body modification to permanently mark their bodies. The purpose of this project was to look at the significance that people place on body art, particularly tattooing. In this project the history and origins of tattooing and how it was brought to the United States were examined. This was done through library research. Cross-cultural research was conducted to see what tattoos mean in different cultures. To do this, four cultures from different areas around the world were examined. Local data collection was accomplished through casual, unstructured interviews. Interviews included personal narratives of the informants' tattooing experiences. They were also asked to view randomly chosen images and pick out an image that appealed to them and explain why it appealed to them. These data were then examined for common themes such as reasons for getting a tattoo, meanings, and concealment concerns behind tattoos. The themes the data were analyzed for and photographs of tattoos will be presented.

THE SEARCH FOR EXPERIENCE BROWN: A PROJECT IN GENEALOGICAL RESEARCH

Jessica Boettcher (Anthropology)

Winifred Mitchell, Faculty Mentor (Anthropology)

The purpose of this project is to find information about one family's history. The first phase of my project is focused on one individual, Experience Brown, who lived in the late 1700's. This study utilizes resources available on the Internet and the databases kept by the Church of Latter-Day Saints. Also contributing to the research is a large collection of documents belonging to this family that are in dire need of analysis and organization. The purpose of this project is to provide an overview of Experience Brown's life and create a booklet for members of the family containing pedigree sheets and stories. This will provide a great source of information for the family and will also contribute to the research of others seeking their history as a source of facts or methodology.

CULTURAL ASSIMILATION SEEN IN ISLAMIC ARCHITECTURE

Kozue Takahashi (Anthropology)

Winifred Mitchell, Faculty Mentor (Anthropology)

The purpose of my project is to explore the origin of Islamic architecture and identify major features of variation in mosques during the early stage and the late stage of their development. The hypothesis is that the establishment of Islamic architecture was largely influenced by Western culture at the earlier stage, and there are also variations in the later stage mosques that are specific to each region. After it was originally introduced, Islam spread over much of the world. Islamic architecture played an important role in the distribution of the religion. Islam discourages the use of living figure in religious context. Although early mosques were very simple, Muslims developed their unique architectural styles, such as geometric motifs. Those characteristics were acquired mostly in the earlier stage, and the examples of earlier mosques are mosques in Jerusalem and Spain. Mosques in Africa and China are different from those in Arabia, showing Islam's successful adaptation into the local region. The causes of the changes include preexisting religion and local environment. Factors most important in these changes will be identified.

UNDERSTANDING FORENSIC ANTHROPOLOGY

Summer Mitchell (Anthropology)

Paul Brown, Faculty Mentor (Anthropology)

This study attempts to convey an understanding of forensic anthropology and how it can be used to benefit homicide investigations. Often, forensic anthropological methods are a "last ditch" effort for law enforcement because all other conventional methods have been exhausted. Forensic anthropology is a multi-faceted discipline with techniques from physical anthropology, archaeology, anatomy, and law enforcement. In the laboratory analysis of evidence, forensic anthropologists are trained to determine age, sex, height, signs of trauma, and pathological uniqueness of the remains. Not all cases can be solved through conventional methods and on the same note, not all cases can be solved using forensic anthropology either. By working in conjunction with local law enforcement, forensic anthropology increases the opportunity for solving and clearing cases.

HARVESTING MINDS – HOW TV COMMERCIALS CONTROL CHILDREN: A CONTENT ANALYSIS

Ishita J. Khan (Biology)

Bikash Nandy, Faculty Mentor (Health Science)

The purpose of this research is to examine the content of TV commercials shown between cartoons and other children's programs. These commercials are directed towards children ages 1-12.

Studies show that 98 percent of American households have at least one TV set. Children watch one hour of commercials for every 5 hours that they spend watching TV, which means that they come across about 20,000 TV commercials every year.

This study will examine different products such as toys, cereals, snacks and candies etc. Conclusions, results and analysis of this research will be based on the content analysis of TV commercials from Channel 5 (ABC) each morning from 7 A.M.-11 A.M. during the month of February 2002.

COMPARISON OF EATING HABITS: STUDENTS OF SOUTH ASIA vs. AMERICAN STUDENTS

Karishma Kamath (Management Information Systems),

Waqas Jamshed (Computer Science)

Bikash Nandy, Faculty Mentor (Health Science)

A good diet is essential for overall health. Understanding the factors that make up a person's diet plays a constant vital role. In many ways, there is a direct relationship between the level of physical activity and the energy being used. The risk of diseases increases due to unhealthy diet.

To examine the eating habits of college students, a randomly selected group of 100 students from Minnesota State University, Mankato, both South Asian and American will be asked to fill out a questionnaire. This questionnaire asks students various questions about their diet intake and spending habits when it comes to food. The resulting data will be used to compare the eating habits of students of the obvious different cultural backgrounds and with the help of dieticians, create a program to help improve eating habits and prevent such a harmful lifestyle. It must be noted that due to cultural and environmental differences that "unhealthy food" in this context, is referring to food that is detrimental to students of South Asian origin. This may not necessarily hold true for people of other descent.

THE POTENTIAL OF THE BRAIN PACEMAKER

Jason Spitzer (Marketing)

Daniel Cronn-Mills, Faculty Mentor

(Speech Communication)

The September 27, 2001 edition of the Minneapolis *Star-Tribune* states that approximately 1 million Americans have Parkinson's disease, with an estimated 50,000 new cases developing each year. The number of people afflicted with this disease is more than the numbers for multiple sclerosis and muscular dystrophy combined. According to the April 8, 2000 edition of the *Wairarapa Times Age* of New Zealand, a brain pacemaker known as Activa Tremor Control Therapy is the first new Parkinson's treatment in nearly 30 years, the Brain Pacemaker may also have the promise to revolutionize the way neurological disease will be treated in the future. The purpose of this project is to look further into this revolutionizing technology by first, discovering the promise of the brain pacemaker, secondly, identify how it works, and finally, determine its social implications.

EFFECTS OF MUSIC ON SUSTAINED ATTENTION IN COLLEGE STUDENTS WHO SELF-REPORT HIGH AND LOW SYMPTOMS OF ATTENTION-DEFICIT HYPERACTIVITY DISORDER

Angie Jershe, Tina Head (Psychology)

Nancy Fenrick, Faculty Mentor (Psychology)

This study examined whether task performance requiring attention improved using music as environmental stimulation. University students who self-reported several symptoms of attention-deficit hyperactivity disorder (ADHD) were compared to students who self-reported low symptoms. Students performed computerized visual continuous performance tasks, comprehension reading and arithmetic exercises under two conditions: listening to self-selected music, and without music. Scores for the high-symptom students are expected to be higher during the music condition as compared to tasks performed in a quiet environment. Low-symptom students are predicted to be unaffected by either condition.

DEVELOPMENT OF A BIOLOGICALLY BASED CONTROL SYSTEM IN A TWO-DIMENSIONAL SIMULATION ENVIRONMENT

Adam Johnson (Physics/Psychology)

Louis Schwartzkopf, Faculty Mentor (Physics/Astronomy)

Standard control systems implement serial processing. However, a parallel processing network is better suited to a combination of path optimization and obstacle avoidance tasks, especially if obstacle motion follows a pattern. This research develops a biologically based neural network for temporal dynamic pattern recognition and optimization within a two-dimensional simulation environment. The parallel control system is then compared to a serial control system for measures of path and avoidance optimization. Initially *unknown* patterns, with stochastic aberrations, are used for obstacle motion. The neural network and serial control system are compared for measures of adaptation and pattern recognition for avoidance optimization. Measures of path optimization are also analyzed for both systems. Finally, the plausibility of extending these results to a three-dimensional environment is discussed.

USE OF A Pedometer TO IMPACT HABITUAL ACTIVITY IN SEDENTARY ADULTS

Nicole Palacios (Human Performance)

Mary Visser, Faculty Mentor (Human Performance)

The purpose of this study is to determine the effect of using a pedometer on the habitual physical activity level of sedentary adults. Tudor-Locke (1999) conducted a study in which participants demonstrated an increased level of physical activity after use of a pedometer. Two months following the study, the participants engaged in approximately 2,500 steps per day above their baseline. The hypothesis is that use of the pedometer, which quantifies the amount of activity each day, will have a positive impact on the physical activity level of the subjects. Twenty adults, ages 20-50, will participate in this study, each over a two-week period. On the first day of pedometer use the distance will be masked. On the second day, the first day's distance will be measured and then the pedometer will be returned to the subject with instructions to increase their distance by one third for the following two days. After completion, the subject will fill out a questionnaire, which will question the increase of activity during pedometer use and if they think that they can maintain their new level of activity. Two weeks following the last day of pedometer use, the subject's distance will be assessed for one more day followed by another questionnaire.

TESTING THE THREE SISTERS: CORN, BEANS, AND SQUASH – DO THEY HELP ONE ANOTHER OR HINDER?

Wendy Munson (Anthropology)

Michael Scullin, Faculty Mentor (Anthropology)

It is widely believed that the combination of corn, beans, and squash (the three sisters of Native American gardening) when grown together are mutualistically supportive. Whether this is the case has not been demonstrated through field experiments using indigenous crops and planting techniques. This research will quantify any mutualistic effects of corn and beans using various tests and measurements of the plants and soil over the growing season of 2001. Corn and beans were grown in three test plots, both together and separately to provide samples for testing. Soil nitrogen was measured to determine if the beans were releasing nitrogen into the soil that the corn could easily use. Light competition was measured to show the degree of productivity lost by shading of beans growing on corn or gain for beans climbing on cornstalks. Rhizobia bacteria, which associate with the roots of the beans and fix atmospheric nitrogen that the plant may use was tested with DNA fingerprinting to determine species that associate with these specific varieties and identify variation between treatments. Mycorrhizal fungi which infect roots of corn were grown in culture to determine its presence and if it invaded bean roots to scavenge nitrogen for the corn. Yield measurements at the end of the season were taken and analyzed for differences in production. The combination of all these data proved a more accurate estimation of what kind of relationship corn, beans, and squash develop when grown in proximity and, if they are helping each other, how that happens.

CALIBRATION OF CCD PHOTOMETRY AT ANDREAS OBSERVATORY

Jeffrey Burkett, Lucy McDermond, Andrew Monson,
Ian Radke (Astronomy)

Steve Kipp, Faculty Mentor (Physics/Astronomy)

Astronomers use telescopes with photometers to measure the brightness of stars. However, all photometers are different so astronomers have designated certain stars as standards and assigned them a standard brightness, called magnitude. Astronomers observe these standard stars and adjust their data to give the standard magnitude. By observing standard stars in the star cluster M67 and comparing data collected with the CCD photometer at Andreas Observatory with the standard magnitude of these stars, we can reduce our data for all the stars we observe to the standard system.

This research was partly supported by a Learning By Doing grant from MnSCU.





CARLSON'S TROPHIC STATE INDEX AND SOUTHERN MINNESOTA LAKES

Kristen Carlisle, Sarah Ress (Chemistry and Geography)

Bryce Hoppie, Faculty Mentor (Chemistry and Geography)

Carlson's Trophic State Index (TSI) uses phosphorous and chlorophyll-a concentrations as well as Secchi disk readings to measure the quality of Mankato-area lakes. The purpose of our research is to determine if heterogeneity exists between three distinct sites within each lake. EPA approved techniques were used to obtain Secchi disk readings and to measure the concentration of chlorophyll-a and phosphorus. Preliminary results indicate that heterogeneity exists, between phosphorus concentrations at different points on each lake. Spatial variability was also found in chlorophyll-a concentrations. Heterogeneity was not found in the Secchi disk data. Further data analysis will determine if heterogeneity exists in the TSI data for each lake. Initially, these results suggest that lakes are not well mixed. Multiple sampling sites, therefore, should be analyzed to accurately measure the trophic state of a lake.

USE OF THE FERRIC REDUCING/ ANTIOXIDANT POWER TEST (FRAP) ASSAY AS A MEASUREMENT OF ANTIOXIDANT POWER OF PLANT PHENYLPROPANOIDS

Marney Butz (Biological Sciences)

Christopher Ruhland, Faculty Mentor (Biological Sciences)

Exposure to enhanced levels of ultraviolet-B radiation (UV-B) increases production of UV-B-absorbing phenylpropanoids in some species of plants.

Phenylpropanoids are secondary metabolites and products of the Shikimate Pathway and the Krebs's Cycle. While the precise role of these compounds is not fully understood, they accumulate in the upper epidermis of plant foliage and attenuate damaging UV-B before it reaches sensitive chromophores and potentially causes oxidative damage.

The chemical structure of phenylpropanoids suggests that they may possess antioxidant capabilities; however this capability has not been directly addressed. The FRAP assay is a rapid and direct test that has been used primarily to quantify the capability and power of non-enzymatic antioxidants in human biological fluids. Here the FRAP assay will be used to determine and quantify the antioxidant power of phenylpropanoids in plant foliage.

Ultimately, it will be determined if the increased levels of phenylpropanoids in plant foliage in response to increased levels of exposure to UV-B confer an increased antioxidant capability to the plant.

PHYSICAL PROPERTIES OF SOIL AS AN INDICATOR OF RESTORATION SUCCESS

Nathan Hanke (Biological Sciences)

Brock R. McMillan, Faculty Mentor (Biological Sciences)

Grasslands of the eastern Great Plains have been described as the most endangered ecosystem in North American and possibly the world. More than 97 percent of this region has been converted to rowcrop agriculture. Because of the now-realized importance of preserving natural ecosystems and maintaining biodiversity, considerable effort has been devoted to the restoration of prairie grasslands in the region. However, there has been little effort to evaluate the effectiveness of these restoration efforts. During summer 2001, soil samples were collected from 8 sites (4 restored and 4 native) along the Platte River in south-central Nebraska. At each site, 8 samples from three locations along a hydrological gradient were taken for a total of 192 samples. Soil pH, soil moisture, bulk density, and soil texture were determined for each of the collected samples. A comparison of the results from the restored and the native sites was performed to determine the effectiveness of restoration efforts at restoring belowground structure and function of grassland ecosystems.

TYPE TOKEN RATIO: A COMPARISON OF TYPICALLY DEVELOPING CHILDREN TO CHILDREN WITH WILLIAMS SYNDROME

Jackie Christensen, Laura Brandt, Ryan Stoneburner,
Amy Schmitz (Communication Disorders)
Patricia Hargrove, Faculty Mentor
(Communication Disorders)

The purpose of this research was to compare the type token ratios (the number of different words divided by the total number of words) of children with Williams Syndrome to those of typically developing peers. Williams Syndrome has several characteristics including developmental delay; however, language skills are reported to be superior to motor and other cognitive skills.

Subjects included six typically developing children and six children with Williams Syndrome. Each of the children listened to an audiotape version of a story and retold it to his/her parent who had not been present during the playing of the audiotape. Audiotapes of the children's versions of the stories were transcribed and entered into the computerized Systematic Analysis of Language Transcripts (SALT).

SALT computed the type token ratio (the number of different words divided by the total number of words), the number of word roots, and the number of words produced by the subjects. The results indicated that there are some similarities and some differences between children with Williams Syndrome and their typically developing peers on these measures.

THE COMPARISON OF ABANDONED UTTERANCES IN CHILDREN WITH WILLIAMS SYNDROME AND TYPICALLY DEVELOPING CHILDREN

Tracy McGill, Angie Olson, Donna Eberly,
Elizabeth Gormely (Communication Disorders)

*Patricia Hargrove, Faculty Mentor
(Communication Disorders)*

Williams Syndrome impacts physical, cognitive, behavioral, and motor development. The purpose of our research was to compare the occurrence of abandon utterances of children with Williams Syndrome to those of their typically developing peers. Our subjects consisted of six children with Williams Syndrome ages 10-17 years, and six typically developing children ages 3-8 years.

Our procedure started by matching each typically developing child with a Williams Syndrome child. Matches were based on gender and language performance on the vocabulary subtest of the Kaufman Brief Intelligence Test. Each individual provided a sample of speech through the retelling of a story. The data was entered into a computerized language evaluating system known as the Systematic Analysis of Language Transcripts (SALT).

Our results concluded that there was a significant difference of $p = .032$ and determined that children with Williams Syndrome have a higher probability of abandon utterances than their typically developing peers.

THE MEAN LENGTH OF UTTERANCE IN NARRATIVES OF CHILDREN WITH WILLIAMS SYNDROME AND TYPICALLY DEVELOPING CHILDREN

Karine Murray, Vickie Benda, Sara Hanson, Becca Meger
(Communication Disorders)

Patricia Hargrove, Faculty Mentor
(Communication Disorders)

Williams Syndrome is a genetic birth defect affecting 1 in 20,000 live births. Persons with Williams Syndrome share common facial features, heart conditions, and language abilities.

Research was conducted to compare the mean length of utterance in morphemes and in words in narratives (stories) of children with Williams Syndrome and those of typically developing peers. The subjects involved in the research study were six children from each group matched according to linguistic capabilities. Two different transcribers transcribed an audio taped language sample with the differences reconciled by a third evaluator.

The data were entered into the computerized Systematic Analysis of Language Transcription known as SALT. According to the Mann-Whitney U test, results indicated no significant differences in the mean length of utterance of morphemes or words.

THE NUMBER OF MAZES IN THE RETELLING OF NARRATIVES OF CHILDREN WITH WILLIAMS SYNDROME AND TYPICALLY DEVELOPING CHILDREN

Sara Lindquist, Allyson Segar, Mary Skarohlid,
Teresa Weng (Communication Disorders)

*Patricia Hargrove, Faculty Mentor
(Communication Disorders)*

Williams Syndrome (WS) is a genetic disorder accompanied by developmental delay. Based on the literature, children with WS are very talkative but lack depth and content in their language, and may have word-finding problems. Often, when speakers have word-finding problems, they will produce false starts, repetitions, or reformulations, which will disrupt the forward flow of speech. These disruptions are referred to as mazes.

The purpose of this project was to determine if children with WS produce more mazes during the retelling of narratives than typically developing children. Samples of speech were collected from children with WS and typically developing children. Speech samples were analyzed using Systematic Analysis of Language Transcripts (SALT).

We predicted that children with WS would produce more mazes than typically developing children. The results, however, indicated that there was no significant difference in the number of mazes produced by children with WS and the number of mazes produced by typically developing children.

EFFECT OF VOLUNTARY GESTATIONAL EXERCISE ON BODY SPECIFIC GRAVITY AND KIDNEY DEVELOPMENT IN ADULT OFFSPRING

Jeffery Gilbert, Jennifer Fields, James Mullenix
(Biological Sciences)

Penny Knoblich, Faculty Mentor (Biological Sciences)

We have previously demonstrated altered body weight and systolic blood pressure (SBP) in the offspring of exercised hypertensive dams. The intent of this study was to examine kidney development and body specific gravity in these offspring with exacerbated hypertension. Twenty-four female SHR_s were randomly assigned to 1 of 3 groups: exercise during gestation (E), exercise prior to and during gestation (PE), and sedentary (S). Kidney weight (KW), nephron number (NN), and SG were determined at 27 wks. NN was determined using an acid maceration technique. SG was determined by hydrostatic weighing. The male and female E offspring possessed significantly higher SG while no significant differences were found in KW or NN. These results suggest the increased SBP observed in the offspring of exercised SHR dams is not mediated by a deficit in NN or KW, and moderate gestational exercise may generate a positive effect with respect to body composition.

Supported by the College of Graduate Studies and Research.

VOLUNTARY GESTATIONAL EXERCISE DECREASES BODY SPECIFIC GRAVITY AND INCREASES BODY LENGTH IN YOUNG RAT OFFSPRING

Jeffery Gilbert, Chris Busse, James Mullenix, Hyon Joo,
(Biological Sciences)

Penny Knoblich, Faculty Mentor, (Biological Sciences)

Kidney weight, body weight, body specific gravity, and body length were examined in five-week-old offspring of Wistar-Kyoto (WKY) dams that exercised during gestation. Nineteen female WKY's were randomly assigned to 1 of 2 groups: exercise (E), and sedentary (S). Kidney weight (KW), body weight (BW), body specific gravity (SG), and body length (BL) were measured at 5 weeks of age. SG was measured by hydrostatic weighing. A one-way ANOVA with Bonferroni indicated post hoc analyses the female E offspring had significantly lower SG ($p < 0.05$) than female S offspring. The male E offspring had significantly larger BL ($p < 0.05$) than male S offspring. There were not significant differences in BW or KW. These results demonstrate moderate gestational exercise may generate a long-term positive benefit in progeny of exercised WKY dams with respect to body density, and gestational exercise may generate increased body lengths in the progeny.

Supported by the College of Graduate Studies and Research.

BEGINNINGS AND ENDINGS

Chrissy Bendel, Elizabeth Conway, Esther Hoffmann,

Amanda Doering (English)

Timothy Midgette, Faculty Mentor (English)

Works selected for the creative presentation **Beginnings and Endings** will undergo a winnowing and refining process based upon criteria used to ascertain excellence in most artistic fields. Those criteria being:

1. Substance: The works selected will show significance – personal and/or universal.
2. Difference: The works selected will present the individual imprint of the author.
3. Completeness: The works selected will be self-contained and represent the whole of an idea, experience, emotion, etc.
4. Knowledge of craft: The works selected will represent the author's mastery of his or her chosen genre, or the author's willingness to master his or her chosen genre.

The theme-based nature of this presentation creates one additional criterion: the works selected will pertain solely to the chosen theme of **Beginnings and Endings**.

The aforementioned winnowing and refining process includes weekly workshops wherein the participants will exchange works, then evaluate and critique those works based upon the criteria above. At the end of the one-month workshop period, works of individual authors decreed, by the workshop participants and the faculty mentor, to be the works that best adhere to the criteria above will then undergo further evaluation based upon the same criteria as previous works. The end goal being twofold: to produce high-quality work that showcases the abilities of individual authors and to produce polished, theme-based, and presentable work.

COLOR, LIGHT, AND REFLECTION

Tamera Boe (Art)

James Johnson, Faculty Mentor (Art)

As individuals most of us perceive the world through our senses—we taste, we smell, we hear and we see. Because of the development of technology – from Thomas Edison’s light bulb to the recent DVD – we are bombarded with visual images. These images are so much a part of our everyday lives that we may not always take the time to appreciate what we “see” around us.

As an artist my goal is to produce a sculpture that allows the viewer to take the time to “see” and reflect. The heart of the sculpture, consists of five panels of glass 8 x 66 x 7, will engage the eye of the beholder through the use of gallery lighting, reflections created by the surroundings and color painted onto the glass.

THE SEMANTIC CHARACTERISTICS OF WORDS RECALLED IN THE RETELLING OF STORIES BY TYPICALLY DEVELOPING CHILDREN AND CHILDREN WITH WILLIAMS SYNDROME

Christen Conrad (Communication Disorders)

Patricia Hargrove, Faculty Mentor

(Communication Disorders)

Williams Syndrome is associated with mental retardation, impaired motor skills, selected behavioral disturbances, visuospatial deficits, and language skills that are superior to those expected based on the knowledge of the level of nonverbal intelligence. The objective of the study was to explore oral story retelling skills of speakers with Williams Syndrome and children who are developing language typically.

Six speakers with Williams Syndrome (WS) and six typically developing speakers served as subjects. Each child individually listened to an audiotape of the same story as their parent or guardian waited outside. Upon completion of this, the examiner invited the parent back in for the child to take their turn at retelling the story to them.

All verbalizations produced by the subjects were transcribed by students in Communication Disorders who had undergone academic and clinical training in transcribing. The transcriptions were analyzed using Systematic Analysis of Language Transcripts (SALT), using a 3-point scale. The 3-point scale served as a measuring tool to quantify how many content words were successfully recalled by each child and the nature of the errors.

The results indicate, thus far, that there are no significant differences between the two groups of children.

CREATION OF A SCALABLE PRODUCTION SERVER MODEL

Patrick St. John (Computer Information Science)

Ann Quade, Faculty Mentor

(Computer and Information Sciences)

A production class server is a high end, powerful machine that is capable of running multiple applications and requires administration, security, and backups.

This research involves the development and testing of a non-proprietary model that can be used to analyze production server requirements and project optimal server specifications for a given situation. The proposed model has several assessment parameters including the number of users expected, applications used, usage amounts, and various security requirements.

The model has two functions. First, it can be used to generate optimal parameter values given a set of specifications, and second, it can be used to optimize existing production class servers.

STUDY OF SPEECH SYNTHESIS SYSTEMS TOWARDS IMPLEMENTATION OF A MULTILINGUAL TEXT-TO-SPEECH SYSTEM

Shuvro Chakrobarty (Computer and Information Sciences)
Mahbubur Rahman Syed, Faculty Mentor
(Computer and Information Sciences)

This work researches the state-of-the-art Text-To-Speech (TTS) systems through a comprehensive study of the technological evolution of different TTS systems. We also studied several speech synthesis approaches, available tools for TTS systems with an objective to identify their applicability towards development of a Bangla TTS system. To our knowledge very little or no work has been done in this area.

This work is organized in two phases. First, a comparative survey of different TTS systems was conducted to evaluate their potential to be used for a Bangla TTS system and therefore approaching a multi-lingual TTS system. It is hypothesized that the use of existing TTS systems in other languages cannot be used for implementation of a Bangla System. Several distinguishing characteristics of Bangla sound were identified that make it necessary to build a Bangla TTS framework. In the second phase, the development of a preliminary framework is underway. Initial experiments are being conducted to test the output quality by simple concatenation of elementary speech units defined by us.

ETHICS OF DOCUMENT DESIGN: A SURVEY OF TECHNICAL COMMUNICATION STUDENTS

Joshua Weaver, Laura Diaz (English)

Roland Nord, Faculty Mentor (English)

We attempted to replicate a study conducted by Sam Dragga¹. Dragga administered a survey about ethical implications of document design to two groups of technical communicators – those working in industry and those teaching in academe. The same survey was administered to sections of technical communication students at the end of fall semester and at the beginning of spring semester. The survey² contains seven brief scenarios involving document design. Participants were asked to rate the document design decisions on a 6-point scale (ranging from *completely ethical* to *completely unethical*) and to provide brief justifications for their responses. The results of our study and the Dragga study will be discussed.

¹ Dragga, Sam. 1996. "Is This Ethical?" A survey of opinion on principles and practices of document design. *Technical Communications* 43 (3): 255-65.

² The survey is appended and available at <http://krypton.mankato.msus.edu/~nord/research/EthicsSurvey.doc>.

PROBLEMS IN THE AMERICAN MEAT PACKING INDUSTRY

Suzanne Loen (Speech Communication/ History)

Daniel Cronn-Mills, Faculty Mentor

(Speech Communication)

The Meat Packing Industry is the lowest paying industrial job. According to the Bureau of Labor Statistics, as of 1999, it is also the most dangerous job in America, with more than 40,000 workers injured on the job every year. The industry is doing little to solve this problem and is continuing to profit from the illegal action. The problems in the meat packing industry affect us all; it is the meat we buy in the supermarket, the meat we eat at fast food restaurants, and the food that is served in our university cafeterias. This research examines the efforts, or lack of efforts, of the industry to address these problems. How these issues affect consumers is discussed.



THE ELIMINATION OF TOXIC SCHOOLS

Heather Kaiser (Speech Communication)

Daniel Cronn-Mills, Faculty Mentor

(Speech Communication)

Schools are becoming toxic simply because of the sites upon which they are built. The Center for Health and Environmental Justice produced a report in March of 2001. The report stated that children are more vulnerable to toxic chemicals than adults because they are smaller and still developing. The report also stated that cancer, learning disabilities, and diseases among children are on the rise and the schools are to blame. The report cites dozens of schools throughout the U.S. are built on toxic land and more schools are currently being built on problematic sites. The CBS News.com of March 21, 2001, reports federal officials claim 2,400 new schools will be built by the year 2003. As more of these schools are being built on toxic land, we will continue to see the illnesses in children rise. The purpose of this project is to examine the growing dilemma of toxic schools by first examining the problem of toxic schools, second, determining what is causing our schools to become toxic, and finally, proposing realistic solutions to stop the contamination our schools.

ANTIBIOTIC SENSITIVITY PROFILES OF CULTURABLE FRESHWATER BACTERIA

Sara Niemeyer (Biological Sciences)

Elaine O. Hardwick, Faculty Mentor (Biological Sciences)

Bacteria were isolated and cultured from Hiniker Pond and Ox Bow Lake, recreational areas found within the city limits of Mankato, MN. Using the Kirby-Bauer Antibiotic Disk-Diffusion Method, the isolates were tested for sensitivity to six antibiotics (amoxicillin, chloramphenicol, erythromycin, penicillin, tetracycline and streptomycin). A Mueller-Hinton agar plate was covered completely with an isolate, specific antibiotic disks were placed, and plates were then incubated at room temperature for 24 - 48 hours. The degree to which bacteria were able to withstand and grow in the presence of antibiotics was measured as zones of inhibition. The recorded zones were compared to a known standard to categorize a bacterial isolate as resistant, intermediate or sensitive to each type of antibiotic. Of the 106 isolates, 31 percent were found to be resistant to at least one of the antibiotics tested, and 17 percent of these displayed multiple resistance (i.e., were resistant to at least two or more antibiotics). Most isolates were resistant to penicillin (31 percent) and streptomycin had the lowest resistance (4 percent). Freshwater phenol-degrading bacteria were also assayed for antibiotic sensitivity. For these isolates, 45 percent were resistant to at least one antibiotic and 26 percent displayed multiple antibiotic resistance.

COMPARATIVE ANALYSIS OF ANTIBIOTIC RESISTANCE IN BACTERIA ISOLATED FROM A FRESHWATER HABITAT AND A WASTEWATER TREATMENT PLANT

Corrisa Brown (Biological Sciences)

Elaine O. Hardwick, Faculty Mentor (Biological Sciences)

Antibiotic sensitivity testing of bacteria isolated and cultured from various points of the Mankato Wastewater Treatment Plant, Mankato, MN was performed in summer 2001. Bacterial isolates were differentiated and selected based on morphology and cultured until pure. The Kirby-Bauer Antibiotic Disk-Sensitivity method was used to determine sensitivity to penicillin, streptomycin, tetracycline, amoxicillin, erythromycin, and chloramphenicol. Because it is suggested in the literature that wastewater bacteria have a higher incidence of antibiotic resistance than naturally occurring bacteria, a comparison of wastewater bacterial isolate antibiotic sensitivities to those found for freshwater bacteria was performed. It was found that 73 percent of the wastewater isolates displayed resistance to at least one of the tested antibiotics with 40 percent showing multiple resistance (resistance to at least two antibiotics), whereas only 31 percent of freshwater isolates displayed resistance to at least one antibiotic and 17 percent were multiply resistant.

PCR DETECTION OF *CLOSTRIDIUM BOTULINUM* TYPE C₁ TOXIN GENE FROM SWAN LAKE AND MIDDLE LAKE SEDIMENT SAMPLES

Kimberly Van Demark (Microbiology)

Elaine O. Hardwick, Faculty Mentor (Biological Sciences)

Clostridium botulinum is an anaerobic, spore-forming bacterium known to produce neurotoxins. One particular toxin, Type C₁ causes avian botulism, a serious paralytic disease of birds that kills several million waterbirds annually. A two-year study will be performed to determine (i) if the Type C₁ toxin gene is present in Swan and Middle Lakes and (ii) if different variables (pH, temperature, salinity, oxygen concentration, water depth, and season) affect gene presence.

On a monthly basis, extraction of total DNA from sediment samples and measurement of environmental variables will occur from October 2001 - October 2003 (excluding months with ice-cover). At the present time, October and November 2001 samples have been obtained and optimization of DNA extraction and Polymerase Chain Reaction (PCR) methodologies are ongoing. The second year of the study will include additional analyses of waterfowl food resources (e.g., macroinvertebrates) for presence of the toxin gene. Presentation will include current data and procedures.

APPLICATION OF THE POLYMERASE CHAIN REACTION (PCR) TO DETECT THE PRESENCE OF PHENOL HYDROXYLASE (LMPH) GENES

Ben Hume (Chemistry)

Elaine O. Hardwick, Faculty Mentor (Biological Sciences)

Phenol, an organic hydrocarbon consisting of a benzene ring with one hydroxyl group, forms the basic structure of many naturally occurring complex carbon compounds, e.g., humic acids and petroleum products, and is also commonly used as an organic solvent in industry. Environmental bacteria may encounter natural phenol-containing compounds, especially in eutrophic systems. Isolation and culture of these bacteria may be useful in finding organisms that may be useful for bioremediation of anthropogenic phenol pollution. The multicomponent phenol hydroxylase gene, called LmPH, has often been found in naturally occurring bacteria that have been identified as phenol-degraders.

One approach that we are currently employing to identify and isolate indigenous phenol-degrading bacteria is a phenol enrichment culture. Sediments were removed from a natural eutrophic habitat (Ox Bow Lake, Mankato, MN), placed into microcosms and amended with phenol. Samples from the microcosms are plated onto medium containing phenol as the sole source of carbon and energy. Bacterial growth on these plates implies that the bacteria possess genes that enable degradation of phenol. To determine if phenol LmPH genes are present in these isolates, extraction and detection of total bacterial DNA followed by PCR amplification of LmPH genes using known primers (for LmPH) will be discussed.

OBSERVATION OF A GENDER DIFFERENCE IN THE RESPONSE OF MICE GIVEN CYCLOSPORINE TREATMENT FOR PARAQUAT TOXICITY

Michael Fralish (Biological Sciences)

Steven Mercurio, Faculty Mentor (Biological Sciences)

Paraquat, a widely used herbicide, is an oxidative and inflammatory toxicant with no current clinical antidote. The goal of this study was to determine if 1) four daily injections of the immunosuppressant cyclosporine would protect mice more profoundly against lethality from paraquat than a previous two day treatment; 2) delayed treatment would have less protective action; and 3) sex-differences in response to paraquat and/or cyclosporine would be expected. Dosing mice orally with 325 mg/kg paraquat resulted in a delayed lethal response, with significantly higher mortalities in female mice ($P < 0.05$). Intramuscular (im) injection of corn oil vehicle at 1.0 ml/kg decreased paraquat lethality, especially in females. Four daily im injections of 10 mg cyclosporine/kg were not significantly different from corn oil. Delayed injections of vehicle or cyclosporine were not protective. Comparison of these results with former experiments with cyclosporine and a physiological immunosuppressant (corticosterone) indicate that cyclosporine is more toxic than corticosterone, especially to females. It is also only highly protective in males with an immediate two day dosing treatment and becomes increasingly more toxic after two days of treatment

REMOVAL OF TRIORGANOTIN HALIDES FROM REACTION MIXTURES

Justin Stewart, Luis Yanez (Chemistry)

Brian Groh, Faculty Mentor (Chemistry)

The purpose of this project is to find an efficient, cost-effective method for the removal of triorganotin halides from reaction mixtures. This would prevent organotins from entering the waste stream thus minimizing their impact upon the environment.

Existing methods for the removal of the toxic triorganotin byproducts have many drawbacks. They are slow and ineffective, costly, hazardous, toxic, or pyrophoric. Our method is efficient, cost effective, and involves the conversion of the organotins into insoluble tin fluorides. After removal by filtration the tin fluorides can be recycled by converting them back into tin chloride, the starting material from which most organotins are made.

THE IMPLEMENTATION OF A CUSTOMIZED WEATHER DATABASE FOR USE IN MSU'S WALTER

Douglas Goodrich (Geography)

Cecil Keen, Faculty Mentor (Geography)

This study designed and developed a multi-media weather database for use in Minnesota State University's Weather Analysis Laboratory for Teaching and Educational Resources (WALTER). A variety of data types (from local observational temperatures, pressures, wind-speeds, directions etc) and data formats (radar, satellite, picture maps, and text) needed to be considered in this development. Furthermore, the times at which data become available was highly variable - from minute for local observations to 3 or 6-hourly recording sessions for satellite and model outputs. This required a highly customized approach to the programming structure for the input data. For subsequent retrieval and searching of the database, a variety of needs from climatological searches (trends, spans, etc.) to specific meteorological calls (e.g. temperature or weather at a specific time, satellite or radar imagery at a time, or tornado alert times) had to be accommodated for. Examples of the sensors, data types, and the retrieval processes will be demonstrated. It is anticipated that by the end of the semester, users will be able to access WALTER's database from the website at www.mnsu.edu/weather.

WEATHER AND POPULATIONS OF SMALL MAMMALS: A TWENTY YEAR STUDY

Jennifer Deitloff (Biological Sciences)

Brock R. McMillan, Faculty Mentor (Biological Sciences)

This study investigated the relation between weather and population dynamics of small mammals. Prior studies have shown that changes in weather can alter population size by affecting mortality and fecundity rates. A twenty-year data set was used to detect correlations between weather factors and year-to-year fluctuations in population sizes of *Peromyscus leucopus* and *Microtus pennsylvanicus*. During the study (1977 to 1997), the field site underwent succession from a grassland to a forest. Annual population size was estimated using a mark-recapture trapping method in the fall of each year. Interannual variation in population size was analyzed using winter temperature, winter snowfall amount, summer temperature, and summer rainfall amount as independent variables. The analysis of weather effects also accounted for long-term habitat change. The implications of these results for the understanding of population fluctuations of small mammals are discussed.


ABUNDANCE AND DIVERSITY OF MACROINVERTEBRATES IN SWAN LAKE AND MIDDLE LAKE

Joshua Harbitz (Biological Sciences)

John D. Krenz, Faculty Mentor (Biological Sciences)

Aquatic macroinvertebrates serve as an important source of protein for migrating and nesting waterfowl, particularly during spring and summer. Swan Lake is the largest single prairie marsh (waterfowl breeding site) in North America. The goal was to detect a correlation between macroinvertebrate abundance and vegetation habitat type and time of year. Macroinvertebrates were sampled from Swan Lake and nearby Middle Lake during four separate 7-day sampling periods from June-August 2001. Sampling consisted of placing funnel traps (108 total) in four vegetation types. In addition, sweep-net samples were taken at each trap location. Macroinvertebrates collected were preserved, sorted, and identified in the laboratory. Representatives of 17 orders were found in the samples. Comparisons of the 2001 data to data from previous years taken in the same manner may help interpret variation in waterfowl abundance.





PLANTS OF SOUTHERN MINNESOTA AND IOWA: THE IMPORTANCE OF COLLECTING AND PRESERVING SPECIMENS FOR HERBARIA

Rachel Amrine (Plant Science)

Alison Mahoney, Faculty Mentor (Biological Sciences)

The collection, identification, pressing, and mounting of plant specimens for herbaria is a vital part of Plant Science. The specimens are not only used to study the plants, but they also provide valuable records of where and when they were collected. These data may be used to track the presences, introductions, migrations or extinctions of native and exotic plant species and the effect of land management, habitat degradation, and even climate change on plant communities. This collection was made during the 2001 growing season along roadsides, on private property, and at the Big Stone National Wildlife Refuge in west-central Minnesota. The collection will be displayed during the conference.

ALTERATION OF RENAL SODIUM EXCRETION DURING DORSAL COLUMN STIMULATION

Danielle Kirkpatrick (Biochemistry)

Penny Knoblich, Faculty Mentor (Biological Sciences)

The kidney is instrumental in the regulation of blood pressure through sodium/water excretion. The current study investigates the effects of spinal stimulation at the level of the kidney on urinary sodium excretion and blood pressure. Male Spontaneously Hypertensive Rats (SHR) were divided into control and experimental groups. The rats were anesthetized with an i.p. injection of inactin or pentobarbital. The jugular vein and carotid artery were cannulated for the infusion of saline and measurement of arterial blood pressure, respectively. Laminectomy was performed to expose the spine at T8-T10. The bladder was cannulated for the collection of urine in 15-minute clearance periods. The urine was later analyzed by flame photometry for its sodium content. The experimental group received spinal stimulation for 15 minutes at 1.0 V, 50 Hz, 0.2 ms. The control group received no stimulation. Results for stimulated versus control animals will be analyzed.

EXPRESSION OF TOTAL FIBRONECTIN PROTEIN IN SPONTANEOUSLY HYPERTENSIVE RAT AORTA AND ATRIA AS A FUNCTION OF AGE, GENDER, AND EXERCISE

Megan Schatz (Chemistry)

Theresa Salerno, Faculty Mentor (Chemistry)

Fibronectin (FN) is a large glycoprotein dimer (500 kDa) that exists in either plasma or the extracellular matrix. The two monomer chains are similar (~250 kDa each) and are linked together by disulfide bonds. FN has multiple functions and is found in many different tissues and organs. Previous research has shown that there is a relationship between hypertension and age with respect to expression of FN in spontaneously hypertensive rats (SHR). This research studied the expression of total FN protein in SHR aorta and atria as a function of age, gender, and exercise. Protein was extracted from rat aorta and atria and total protein was measured. The Western blot technique was used to determine the amount of total FN present in each specific variable via chemiluminescence and densitometry. The difference in total FN protein will be discussed.

EXPRESSION OF FIBRONECTION ISOFORMS IN SPONTANEOUSLY HYPERTENSIVE RAT AORTA AND ATRIA AS A FUNCTION OF AGE, GENDER, AND EXERCISE

Justin Drake, Jeffery Gilbert (Chemistry)

Theresa Salerno, Faculty Mentor (Chemistry/Geology)

Fibronectin (FN) is a large glycoprotein dimer (500 kDa) that exists in either plasma or the extracellular matrix. FN contains different protein isoforms (A, B, and V) with various molecular sizes. This is a result of alternative splicing of the FN pre-mRNA at three positions. Previous studies have shown the expression of different amounts of some FN isoforms as a function of aging and hypertension. This research project studied the expression of different FN isoforms in spontaneously hypertensive rat (SHR) aorta and atria as a function of age, gender, and exercise. RNA was isolated from each tissue for specific amplification in the reverse transcription polymerase chain reaction (RT-PCR) procedure. The different RNA isoforms for each variable were separated on gel electrophoresis and were quantitated by densitometry after silver staining. The differences in FN isoform expression will be discussed.

IDENTIFICATION OF INTERACTING PROTEINS

Aja Bjerke (Biological Sciences)

Marilyn Hart, Faculty Mentor (Biological Sciences)

Capping protein (CP) is an actin binding protein that associates with the actin cytoskeleton and regulates its assembly. CP, found in all eucaryotic cells, is a heterodimer composed of α and β subunits. Three β subunits are found in CP (β_1 , β_2 , β_3) and these receptors exist in all vertebrate organisms. In previous work, we have shown that the β_1 and β_2 subunits have distinct functions in cardiac myocytes that cannot be carried out by the other isoform. Furthermore, our data suggests that the unique function of the β isoforms involves their interactions with an additional protein. We are using a genetic screen, a yeast two-hybrid screen, to identify proteins that interact with each β subunit.

THE EFFECT OF MATERNAL EXERCISE ON THE OFFSPRING IN A RAT BREED GENETICALLY RELATED TO SPONTANEOUSLY HYPERTENSIVE RATS (SHR), BUT HAVING NORMAL BLOOD PRESSURE.

Simone Rollins, Ronna Brands (Biological Sciences)
Penny Knoblich, Faculty Mentor (Biological Sciences)

The aim of this research is to investigate the effect of maternal exercise on offspring that have normal blood pressure (WKY), but are genetically related to the SHR. The mothers of the experimental offspring will be placed into one of three groups prior to conception. The first, the sedentary (control) group, will not participate in any exercise during the research. The second, the exercised group, will be able to voluntarily exercise during pregnancy. The third, the pre-trained group, will be allowed to use the exercise wheel in their cage before and during pregnancy. Every offspring will have their systolic blood pressure and weight measured. The blood pressure results produced from this research will be equated with the maternal regimen.

RELATIONSHIP SATISFACTION AND DEPENDENCE IN DATING COUPLES

Jovan Hernandez (Psychology)

Seiji Takaku, Faculty Mentor (Psychology)

The purpose of this study was to investigate whether or not the amount of time involved in a dating relationship would influence levels of satisfaction and dependency on the relationship to meet emotional needs and companionship needs. Three different time intervals were used in order to garner a cross-sectional account. Our hypotheses were that, first, those individuals in the first and third intervals would exhibit a higher degree of satisfaction with the relationship than those individuals in the second interval. Second, those individuals in the third interval would demonstrate a higher degree of dependence than individuals in the first and second interval.

THE EFFECT OF SPECIFIC AND GENERAL VERBAL STATEMENTS ON SELF-EFFICACY STRENGTH

Amy Posner, Gretchen Walker (Recreation, Parks and
Leisure Services)

Jim Wise, Faculty Mentor

(Recreation, Parks and Leisure Services)

The purpose of this study is to examine the effect of specific and general verbal statements on self-efficacy strength. Those who have a stronger sense of self-efficacy try new activities, expend greater effort, and persevere longer when they face difficulties. Data will be collected from 32 female college students who will bench press a self-selected weight 10 times and then receive a specific or general verbal statement. Both groups are expected to demonstrate an increase in bench press performance; however, the group that receives the specific statement will have a stronger sense of efficacy than those who heard the general statement. This knowledge is potentially important because therapeutic recreation specialists can use it to structure interventions to maximize participants' self-efficacy strength.

CONTROLLING THE SELECTIVITY OF GROUP TRANSFER FROM TETRAORGANOTINS TO SILVER (I)

Greg Burkhardt (Chemistry)

Brian Groh, Faculty Mentor (Chemistry)

We have studied the ability of silver (I) to selectively transfer one of two types of organic groups (alkyl vs. aryl) from tin to itself. When the alkyl group on tin is methyl, selectivity for transfer of aryl is sometimes quite low with transfer of methyl being the preferred process. In these cases we have been examining the effects of changing the type of alkyl component, from a relatively small methyl to a much larger butyl group, upon the selectivity and outcome of this transfer. Butyl groups seem to have some advantage affording increased selectivity, and hence yield of product, when compared with use of the methyl groups. We have also investigated the effect of temperature upon the course of this reaction.

THE EFFECTS OF A HIGH LIPID DIET ON THE PHYSIOLOGICAL FUNCTIONS OF MICE

Mansoor Khaliq, Pallavi Mynepalli (Biological Sciences)
Michael Bentley, Faculty Mentor (Biological Sciences)

Fatty foods are composed of a high amount of lipids and typically are foods that "taste good". The purpose of this study is to investigate the effects of a high lipid diet on Swiss Webster Mice. This study examined whether mice on a high fat diet gain more weight than control mice on a normal diet. One group of 10 mice was fed a high fat diet (*Labdiet 5015*, 11.4 percent fat) as compared to the other group of 10 mice on a normal diet (*Labdiet 5001*, 5.5 percent fat). The mice were weighed throughout a 310-day time period. At intervals, the mice were placed in metabolic cages to measure food and water consumption, and urine output. Mice on the high fat diet (53.8 ± 0.70 grams) were significantly heavier ($P < 0.0001$) than the normal diet mice (42.7 ± 0.54 grams). In the metabolic cages, the mice on the high fat diet ate significantly less ($P < 0.02$) than the mice on the normal diet. The food consumed per body weight for the mice fed on the high fat diet was 0.056 ± 0.01 , as compared to the mice fed on the normal diet at 0.104 ± 0.02 . There were no differences in water consumption or urine output. The results suggest the weight gain was a result of the added lipid content in the high fat diet.

Supported by the College of Graduate Studies and Research.

PURIFICATION OF ACTIN CAPPING PROTEIN α - SUBUNIT ISOFORM SPECIFIC ANTIBODIES

Ben Jilek (Biological Sciences)

Marilyn Hart, Faculty Mentor (Biological Sciences)

Actin is a protein that is vital to muscle contraction and cell motility. Actin is a polymer that possesses two very distinct ends: the pointed end and the barbed end. Capping protein (CP) binds the barbed end. Actin assembly is regulated by a variety of proteins including actin CP. CP is a heterodimer, composed of an α and β subunit. In vertebrate, the α subunit has three isoforms: $\alpha 1$, $\alpha 2$ and $\alpha 3$, and three beta isoforms: $\beta 1$, $\beta 2$ and $\beta 3$. The α and β isoforms have conserved sequences across vertebrates, suggesting conserved specific functions. Previous research has identified the localization of the β -subunit isoforms and gained information about their function. α isoform specific antibodies were purified using polyclonal antisera, which will be used to determine the cell and tissue specific locations of the α -subunit isoforms of CP.

MANIPULATION OF EMOTION: CONSTRUCTION OF HISTORY AT THE U.S. HOLOCAUST MEMORIAL MUSEUM

Elizabeth Moses (Speech Communications)

Lisa Perry, Faculty Mentor (Speech Communications)

One purpose of contemporary Jewish history is to inform society about the Holocaust. For this purpose the U.S. Holocaust Memorial Museum was founded. Daniel's Story is one of many exhibits that 16.9 million people have visited (ushmm.org). In this exhibit, museum visitors are led by Daniel's voice through events in his past. This visceral and touching exhibit lets the visitor experience what the Holocaust was like for a child.

This research project examines the Daniel's Story exhibit using the method detailed by Erika Faulk in her 1999 article, "Jewish Laws of Speech: Toward Multi-cultural Rhetoric" ([Howard Journal of Communication](#)). Faulk's article presents standards of Jewish rhetorical theory: lying, listening, parsimony, and delivery. An application of Faulk's method to the exhibit demonstrates manipulation can be a tool for education, but it raises ethical questions.

AN AMERICAN NIGHTMARE

Aaron Eckstein (English)

Mary Sue Johnston, Faculty Mentor (English)

The aim of this presentation is to educate people on the life and times of Tupac Shakur. Tupac is an example of how our society's social system fails its youth. Listeners will be informed about Tupac's life and the hardships he experienced. As an advocate for change and justice, Tupac emerged as an aggressive but sensible voice for his generation. Through his lyrics, Tupac was educating the public to the inequalities in our society's political and legal systems. Because of this, the same people he was speaking against tried to destroy his character in their successful attempt to close White ears. Our government was extremely fearful of Tupac due to the fact that he was reminding people of what they had worked for years to make White America forget.

ACCEPT: A COMMUNITY-BASED CULTURAL EXCHANGE PROGRAM FOR TOLERANCE

Joe Williams (Anthropology)

Wayne Allen, Faculty Mentor (Ethnic Studies)

The purpose of this project is to cross-foster an Anglo child and a Hispanic child. Each child will spend a summer in each other's homes, and experience a different culture in their own hometown, Madelia, Minnesota. It is hypothesized that the children who participate will develop a different perspective than that presently held in Madelia. The research methods during the early phase of this ongoing study rely on household and business surveys.

BARRIERS AND PATHWAYS TO FUTURE SERVICE-LEARNING IN HIGHER EDUCATION

Joshua Casper (Urban and Regional Studies)

Bill Bernhagen, Faculty Mentor

(Urban and Regional Studies)

Service-Learning as a teaching pedagogy provides the opportunity for students, community and faculty to come together in a coherent and formal learning process. Students serve the community while learning, faculty make connections, and the community becomes a partner in higher education. However, service-learning also can pose significant challenges in implementation, supervision, and evaluation.

This research project is based on surveys of "Instructional Faculty" at MSU and interviews of randomly selected faculty who do and do not implement service-learning, as well as surveys of greater Mankato area nonprofit organizations.

Our hypothesis was that gaps would be present in the relationship between faculty and nonprofit organizations. Time is proposed as a major barrier to implementation.

DONATING BY MOTIVATING: AN ANALYSIS ON FUNDRAISING EFFORTS FOR THE SALVATION ARMY MEN'S SHELTER.

Kristi Wibben (Urban and Regional Studies and Speech
Communications)

*Janet Cherrington, Faculty Mentor
(Urban and Regional Studies)*

This study examines the power of college students to positively sensitize their host community to the problem of homelessness. The premise of "Project Close at Hand" was to break the stereotype associated with homelessness and collect donations sufficient to save a local shelter that was in danger of closing.

EMILY DICKINSON: AMERICAN PIONEER

Judy Ochs, Brianna Weber (English)

Mary Sue Johnston, Faculty Mentor (English)

The purpose of this presentation is to examine the independent works of Ms. Emily Dickinson, a leader for women in the field of poetry. Against criticism and strong urgings to ban the idea of publishing her poetry, she continued writing in her own unique style. Though she did not become famous during her lifetime, books of her works were published following her death. Her contributions as a poet in America will be discussed.

WIRELESS DATA LOGGER

Eric Holland (Electrical Engineering)

William Hudson, Faculty Mentor

(Electrical & Computer Engineering & Technology)

The purpose of this project is to design and build a wireless data logger to be used on Minnesota State University, Mankato's Formula-SAE Racecar. The Formula-SAE (Society of Automotive Engineers) racecar requires an onboard data logger to obtain and record the performance information received from the Fuel Injection Controller. This data is needed for analyzing the engine performance of the racecar. It is advantageous to have this unit transmit the data via a wireless link to a handheld monitoring tool. Having a user interface, like a LCD screen and a keypad, would make the monitoring tool easy to use. Also making the monitoring tool communicate with a PC offers the beneficial features of saving and printing data. By having the PC connectivity, performance table updates in the Fuel Injection Controller could also be achieved. This will allow technicians to make changes to the engine performance more efficiently during the testing phases of the Formula-SAE racecar.

FUEL MANAGEMENT SYSTEM

Cliff Braunesreither (Computer Engineering Technology)

William Hudson, Faculty Mentor

(Electrical and Computer Engineering Technology)

The Formula-SAE (Society of Automotive Engineers) racecar has a carburetor for the delivery of air and fuel to the motor. This form of aspiration is not the most efficient use of resources for a performance vehicle. This project will research and design a Fuel Injector Controller (or Fuel Management System). This proposed controller allows for a very precise way of figuring out the air/fuel ratio needed to combust in each individual cycle during every engine cycle. This controller requires adaptation to the changing conditions of the environment surrounding the vehicle. The controller also calculates the most efficient use of fuel to power the vehicle. Previous carburetors only adjusted every time the vehicle came into the pits for a tune up or gas. Upon completion of this study, the vehicle will have a Fuel Management System that will not only allow for top performance but also save on the amount of fuel required to compete at the Formula-SAE National Competition level in June of 2002.

CLEAN SNOWMOBILE CHALLENGE 2002

Cory Ranweiler, Nick Bredemus (Automotive Engineering
Technology)

Bruce Jones, Faculty Mentor

(Auto & Manufacturing Engineering Technology)

Minnesota State University, Mankato (MSU) is entering the Clean Snowmobile Challenge 2002 (CSC2002) in Jackson Hole, Wyoming in March of 2002. This competition challenges engineering students to engineer an existing snowmobile for improved emissions and noise while maintaining or improving the performance characteristics. Along with the modifications, the students are expected to make a cost efficient snowmobile. MSU's snowmobile team has selected a 2001 Polaris Edge for the competition. An engine will be chosen following the testing and comparing of a direct fuel injected two-stroke cycle engine to a turbo-charged four-stroke cycle engine. The engine, which is selected, will be one that performs better in acceleration, emissions, cold start, noise, fuel economy/ range, handling/drivability, and the hill climb.

ETHANOL - DIESEL RESEARCH PROJECT

Andy Harrigan, Chad Samp, Rebecca Wells, Derick
VanDenBroeke (Automotive Engineering Technology)

Kirk Ready, Faculty Mentor

(Auto & Manufacturing Engineering Technology)

This research project involves the testing of three different Ethanol-Diesel blends with #2 Diesel fuel in a pickup truck. This will be done through testing of additives that complete the formulation of Ethanol-Diesel. The tested additives include BetzDearborn, AAE, and a bio-Diesel formulation from the South Dakota Corn Research and Promotion Council. All tests will be compared to the results using #2 Diesel with no ethanol or additives.

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Key to Information Provided:

Title of Presentation

Name of Student (Student's Major)

Name of Faculty Mentor (Mentor's Department)

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