Proceedings of the Ninth Annual University of Wisconsin-Eau Claire Student Research Day

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Arts and Humanities

Art

Sara Black
Faculty Advisor/Collaborator: **Michael Christopherson**
The Figure in Sculpture and the Mythology of Genius

Through the use of the "Molding and Casting" process with large figurative sculpture, Mike Christopherson and I will be creating a life-size figure in space to comment on the "Mythology of Genius" in Modern Painting. The approach that I am taking to this commentary is that of a Postmodern critique in reaction to the generations of artists who fulfilled the dramatic myth of the "Modern Painter," the genius. This life-size self-portrait displays the traditional stereotype of the "genius" through clothing, stance, and expression, yet the monument-type image will resemble a ridiculously large "trophy." I will be writing up and documenting the "Molding and Casting" process in detail, for future instructional use in the Sculpture Department of the UWEC Art Department.

David Jensen
Faculty Advisor/Collaborator: **Scott Robertson**
New Formulas: Painting and Postmodernism

The stated objective of this research grant will be to explore new avenues of contemporary painting as well as research historical works of the early avante garde. In Modernism, definitions held schools of painting together. The definitions were exclusive. Modernism is involved in how an object is made, how it is perceived, and what defines art. It focuses on the formal properties of art. In contrast, formalist issues in Post-Modern art take a secondary role to other concerns, such as why an art object is made, how it is experienced, and what the object means beyond its formal composition. Post-Modernism focuses on the relationship between representation and content. In Post-Modernism categories are never clearly drawn; a multitude of purposes and categories exist side by side. David Jensen wishes to explore these new approaches to painting to include both contemporary the*e social context that his work fits into as well as exploring themes such as globalization. These are issues that David has already begun to explore in his previous work. This grant will provide financial support for materials such as new paint mediums so David can continue his creative inquiry into Post-Moderism.

Mary La Venture
Faculty Advisor/Collaborator: **Deirdre Monk**
Transitions

Our objectives are to portray the evolutionary cycle of life and death, freshness and decay, through the use of metaphor and symbolism using photography as the medium. Through both color and black and white photography we are planning an exhibition on the nature of life transitions, including the metamorphosis of birth, growth, maturity, and death. We will research the nature of symbolism and metaphor to help us fulfill our goal. The project is significant in its ability to both speak to the frailty of the physical world, and the ability of photography to interpret those states of inevitable transition. Our hope is that these images will encourage those who see the exhibit to consider the intricate nature of the ever-evolving ecosystem in which we exist. We hope to develop a stronger sense of the author, audience, and subject relationships. Developing an ability to deal with this subject matter in metaphysical and symbolic ways offer the opportunity for author and audience to correspond and contemplate the nature of physical and metaphysical transition.

Holly Leitner
Faculty Advisor/Collaborator: **Deirdre Monk**
The Four Noble Truths

"The Four Noble Truths" is a photography project depicting the four noble truths of Buddhism which are that all life is suffering, craving, letting go, and finding the path to enlightenment. I believe that these aspects can be found in all parts of life, whether it is religious or not. The photographs are being printed on large pieces of canvas (3'x 5') in a collage format. The collage aspect represents the Buddhist teaching of integration and interdependence of all things. I chose to print on canvas because of its association with clothing, one of life's necessities, as is art and spiritual beliefs for many.

Kristine MacCallum
Faculty Advisor/Collaborator: **Michael Christopherson**
Approaches To Mold-Making And Casting

Artists explored various methodologies and technologies available to sculptors for the purpose of mold-making and casting. The project intent was to uncover art-making options which enable the creation of multiples and more complex imagery in sculpture. To accomplish this, traditional approaches to mold-making were employed in new ways, and new developments to mold-making and casting were examined, including use of urethane compounds for mold-making and plastic resins for casting. Also, experimentation pursued various uses of such casting materials as concrete, wax, plaster, glass, paper, and perishable materials such as ice and chocolate, each of these in non-traditional combinations. To gain an information base, a literature search was conducted to research techniques, materials, and issues pertaining to contemporary mold-making and casting. Experts in the academic, industrial, and art arenas were interviewed to learn more about state-of-the-art and experimental methods in use. Dissemination of information gained from these investigations was shared with other sculpture students through demonstrations and one-to-one mentoring. Also, a procedural manual was developed to include step-by-step instructions, safety considerations, troubleshooting recommendations, examples of mold-making in sculpture, and a bibliography. This manual is intended as a special guide for artists and provides instructions beyond the manufacturers' guidelines.

Troy Williams
Faculty Advisor/Collaborator: **Mike Weber**
Construction of a Japanese Anagama Kiln

Currently I am a sixth semester independent study student of ceramics, studying under Mike Weber. A large part of my independent study is kiln research and construction. In the summer of 1998 Mike me to the ancient method of wood firing. The natural build-up of ash and the flame itself produces results that can not be mimicked by any other firing technique. The Summer Research Experience for Undergraduates Grant allowed me to broaden my knowledge into the ancient art of wood fire. Enabling me to explore ceramics into an unprecedented level.

Foreign Languages

Wayne Hansen
Faculty Advisor/Collaborator: **Johannes Strohschänk**
Analysis of German Periodicals Published in the Midwest Between 1894 and 1910

My task was to analyze German-American agricultural newspapers published in Milwaukee, Wisconsin, and Lincoln, Nebraska, in the late 19th century. I was to try to collect useful information about the German immigrants that came to Wisconsin at this time period, such as:

German region of origin
Reasons for emigration
Descriptions of their passage to the United States
§ Reasons for selecting a particular state (for instance Wisconsin)
Their land acquisition and land use
  Agricultural practices
Cultural life in their new country

I was able to find much useful information pertaining to these topics. The results of this project will supplement a much larger project that my supervising professor Dr. Johannes Strohschänk and his research partner William Thiel are working on. An article containing the information received through this research will be published in a scholarly journal within the next year or two.

Music and Theatre Arts

Katherine Cance
Faculty Advisor/Collaborator: **Terry Allen**
Theatrical Techniques in American Cinema

Project research for Theatrical Techniques in American Cinema has involved studying the five elements of stage direction as seen in ten genres or categories of films. The focus of the study has been examining composition, picturization, movement, rhythm, and stage business in three films within the ten categories in order to experience each film as an artistic text that can be brought into the realm of stage direction. By looking at moods of compositions, storytelling of pictures, values of movements, dynamics of rhythms, and completing details of stage business in films, a stage director can appreciate the concepts and techniques of film direction and understand how it works to clarify expression not only through the film medium but as applied to stage direction as well. The objective of this project is to analyze the medium of film under the elements of stage direction with the goal of increasing the director's artistic boundaries by including film as a venue for directorial ideas. The physical representation of research is short papers on each of the categories identifying key examples of each of the five elements.

Philosophy and Religious Studies

Jennifer Hale
Faculty Advisor/Collaborator: **Lori Rowlett**
Popular Culture Representations of Afro-Caribbean Traditions

This project includes an evaluation, in brief, of the representations of Afro-Caribbean traditions in popular media through a video montage of television and movie programs that include false and destructive Voodoo imagery. The main focus will be a discussion of research gathered in New Orleans during the summer of 2000 concerning the history of commercialism and profit as a genius point for modern misunderstanding and myth of Afro-Caribbean traditions in the United States.

Matthew Meyer
Faculty Advisor/Collaborator: **James Brummer**
Nietzsche's Slave Morality: The 'Other' and Ressentiment

Friedrich Nietzsche was perhaps the most talked about philosopher of the twentieth century. He has been described as everything from a prophet and a genius, to a Nazi and an anti-Semite. It is the latter description that is the focus of this project. Nietzsche, though poetic and aesthetically pleasing in his work, was most definitely unsystematic in his philosophy. On the one hand, this

makes his work refreshing and interesting to read; but, on the other hand, it makes his work difficult and easily misconstrued or misunderstood. Even some of the main points of his philosophy, such as the master and slave morality, are splintered throughout his work, and are never to be seen in the whole. Since the theory of slave morality is such an essential and telling part of his philosophy that will be the second component of this project. The purpose of this study is thus: (a) to explicate and expand on what Nietzsche meant by slave morality and (b) through this explication and expansion to illustrate decisively that Nietzsche was an anti-anti-Semite. What I attempt to do here is to show that anti-Semites are part of the same slave morality in which he categorizes Jews; therefore, Nietzsche is fundamentally an anti-anti-Semite. In order to do this, I shall use two characteristics of slave morality which apply to the priests and anti-Semites: namely, the way in which they treat the 'other,' and the resentment they felt towards the 'other'.

Greg Schneider
Faculty Advisor/Collaborator: **James Brummer**
Descartes: Theodic and the Ethics of Belief

This paper is an analysis of Descartes's Fourth Meditation. In this intermediate meditation, Descartes explores conceptual error, and he uses theodicy arguments to examine where the responsibility for error lies and how to remove it. This latter idea is formulated in an ethic of belief that predates the famous Clifford/James debate on what we should and should not believe. Consequently, I argue that Descartes's conception of human error is not as convincing as it may first appear. God, in my opinion, is not utterly removed from blame where error is concerned, because, at bottom, God remains the cause for the disparity between the will and the understanding. As at least partial cause for human error, God's nature must be seen as imperfect, which is contradictory to all conceptions of an omniperfect being. I then explore the effects of this claim, and, ultimately, show that Descartes's conception of God (and also man) may possibly be inverted. Finally, I discuss the ethic of belief that Descartes forms, and examine if that ethic is applicable and practical. Finding that the ethic is too limiting, I conclude that Descartes's rule is impractical and unattainable, and, therefore, must be reformulated.

Larry Troyer
Faculty Advisor/Collaborator: **Lori Rowlett**
Snake Symbolism in Voodoo

Snakes are a part of Voodoo mythology wherever it is found, but only in New Orleans are they integral to the ceremonies. According to Voodoo tradition, the creators of the universe at the beginning of time were a pair of snakes, Damballah (the male) and Aida Wedo (the female). From them came the World Egg, out of which came all of creation. Scholars of Afro-Caribbean religions (Voodoo, Santeria, Obeah, Condomble and others) have long been aware that while most of the African elements in these religions come from the Yoruba of Nigeria, some come instead from neighboring people, such as the Ibo and the Fon. The snake tradition comes originally from the Fon people of Western Africa, and differs from some of the other West African creation stories, which typically feature anthropomorphic deities as creators. How and why is it used? Is the use of snakes in ceremonies a recent innovation, because it appeals visually to modern practitioners? These are some of the questions addressed in our research.

Nichole Weinfurtner
Faculty Advisor/Collaborator: **Martin Webb**
Religious Practice: The Radical Witness of Daniel and Philip Berrigan

Daniel Berrigan is a Catholic Jesuit priest with a prison record. He and his brother Philip Berrigan have spent the larger part of their lives concerned about justice. During the Vietnam era, both brothers were involved in protests that had them imprisoned. Their primary method of protest was civil disobedience, or non-violently breaking an unjust law in order to change that law. The

Berrigans cite the Christian Gospels as their moral justification and as their call to action. However, millions of other Christians hear the same Gospels and do not feel they are called to perform acts of civil disobedience in the name of their faith. If the Berrigans' "radical" actions such as raiding draft boards are in fact following the Gospels, this may mean that millions of other people who call themselves Christians may not be following Christ to the fullest. The purpose of this study was to ask Catholic-Christians, as well as people outside of that community, their opinions on these questions. The author contends that the ideology and the actions supporting the ideology of Daniel and Philip Berrigan incite differing reactions from Catholics in Central Wisconsin, bringing into question who is actually following the Gospels.

Behavioral and Social Sciences

Counseling Services/Health Services/Psychology

Josh Kennedy and **Travis Olson**
Faculty Advisor/Collaborator: **P.J. Kennedy, Sarah Harvieux,** and **Allen Keniston**
Secular Trends in Core Alcohol Use

1. Compare data from 1998-99 Core baseline data with 2000-01 Core baseline data regarding alcohol and drug use.
2. Pooled UWEC results will be used to expand the Social Norms Campaign.
3. The comparative data will be used to expand Social Norms Campaign from the 1998-99 Data.
4. The research question will answer the question to how trends have changed in alcohol use and compare them nationally.
5. Analysis will also aid in identifying high risk populations and focusing on prevention efforts.

Kait Wainscott and **Becky Moe**
Faculty Advisor/Collaborator: **Sarah Harvieux, P.J. Kennedy,** and **Allen Keniston**
A Pilot Study of the Incident Rates and Correlates of Tobacco Use on the University of Wisconsin-Eau Claire Campus

The researchers will (1) administer the College Tobacco Inventory (CTI), a pilot study, to a sample of convenience composed of university students in entry level psychology classes. Secondly the researchers will (2) collect baseline data that provides an incidence rate of tobacco use. Next (3) the identification of correlational high-risk groups will occur. Lastly the researchers will (4) utilize the collected data to design a tobacco prevention program and implement a social norms campaign.

Economics

Elina Camane and **Tua Lor**
Faculty Advisor/Collaborator: **Wayne Carroll**
Status of the Hmong Population and Other Asian Minorities in 1990

The aim of the research is to bring together an extensive collection of demographic and economic data on the Hmong population in the U.S. and to make these data easily available to a wider audience. The data presented here are drawn from the most detailed 1990 U.S. Census sources. They provide a comprehensive picture of the economic and social status of the Hmong community in 1990 in Wisconsin, Minnesota, and California, which together included 89% of the nation's Hmong population. The data also include comparisons between the Hmong and other

Asian ethnic groups along a number of dimensions. The project is an ongoing effort, so the scope and depth of the research will grow over time. The 1990 data presented will serve as a benchmark for comparison with detail data from the 2000 U.S Census, which the Census Bureau expects to release starting in late 2002.

Feng Deng
Faculty Advisor/Collaborator: **Maria DaCosta** and **Wayne Carroll**
China's Accession to the World Trade Organization and Its Economic Impact

China's economic growth has opened it to the outside world. It has begun to join a variety of international organizations. Following its involvement in international organizations such as the International Monetary Fund (IMF) and the World Bank, China has been pursuing its membership in the World Trade Organization since the 1980s. Joining the WTO is an internal requirement if China is to deepen her reform and open policy in order to establish a socialist market economy type structure. It is also an external requirement for China to strengthen her important status in promoting a healthy world economy and building a more friendly and peaceful international environment. China's accession to the WTO brings both opportunities and challenges. It will require rapid internal reform and adjustment to lower external barriers, as well as greater commitments to the WTO members. China's agriculture will be one of the domestic sectors most greatly affected by the country's joining the WTO. The purpose of this research project is three-fold: 1) to describe in detail the shortcomings of China's agriculture; 2) to analyze the impact of China's accession to the WTO on its agriculture; 3) to provide some policy recommendations on how China's agriculture can respond to this challenge.

David Fuller
Faculty Advisor/Collaborator: **David Schaffer**
Occupation Segregation and Wage Discrimination by Gender in the U.S.

Women in the U.S. labor force have faced two separate types of discrimination. First of all, various types of barriers to entry and/or advancement have tracked the vast majority of women into just three occupations: elementary school teachers, nurses, and secretaries. All three of these occupations pay unusually low wages, given the degree of education and training involved. This type of gender discrimination is referred to as "occupational segregation." Second, many of the women who have managed to enter occupations in which a large majority of workers are men, have been paid lower wages than comparable men doing comparable work. This type of gender discrimination is referred to as "wage discrimination." While wage discrimination has been heavily investigated by economists, occupational segregation has received much less attention. Even fewer studies have attempted to look at both issues simultaneously. We use a detailed data set on the U.S. labor force to examine patterns of both gender wage discrimination and gender occupational segregation in the U.S. over the last 30 years. We use a variety of graphical and statistical methods to analyze this data, paying particular attention to the relation between the two types of discrimination.

Justin Hentges
Faculty Advisor/Collaborator: **Kristen Monaco**
Fatigue Among Over-the-Road Drivers

Using data from the 1997 and 1998 Survey of Drivers conducted by the University of Michigan Trucking Industry Program, we aim to identify the factors that influence hours of sleep and sleeping and dozing at the wheel. We find that pay rate, age and self-employment are all positively related to hours of sleep. Those variables which are negatively related to sleep include driving more miles, the ratio of non-driving to driving time and violating HOS regulations. Pay method, experience, HOS violations, driving more miles and hours of sleep are all significant predictors of dozing or falling asleep at the wheel.

Jessica Johnson
Faculty Advisor/Collaborator: **Kristen Monaco**
Health Plan Selection

What are the factors that affect the demand for health care among individuals? They are both economic and non-economic as well as quantitative and qualitative. Not surprising from an economic perspective, price paid by the consumer plays a major role in the demand for health care and the type of health plan selected. Though the demand for health care itself is quite inelastic, there is still a clear relationship between price and the type of health plan selected. Income is also significant. When assessing the more detailed problem of how workers choose between different types of health plans offered by their employers the measurement of price becomes more complicated, typically being comprised of copayments, deductibles, and premiums. Also significant in choice of the health plan are non-economic factors such as tastes and preferences, health depreciation, health stock, and quality of care. Tastes and preferences include factors that affect how people perceive the importance of health care. Examples include, race, gender, ethnicity, marital status, and qualitative measures of an individual's view of health care. As women are more likely to consume health services than men they also tend to be more likely to enroll in HMOs than fee-for-service plans.

Aimee LaBlonde
Faculty Advisor/Collaborator: **Kristen Monaco** and **Rose-Marie Avin**
Natural Disaster and Economic Growth

Through analysis of Hurricane Mitch and Hurricane Georges and their effects on the economies, solutions and recommendations will be given for future actions and then related to the most recent earthquake in Latin America that hit El Salvador. This issue is important because Latin American countries have seen a chain of natural disasters. The objective of the analysis is to use unique past experiences to understand the most beneficial actions that can be taken towards disasters in the future actions. The resulting damage from these storms has been considerable, and unfortunately, the countries' responses have focused on the short-run rather than the long-run. There has been a negative impact on economies and the lives of residents that we will consider in the analysis in order to understand what action should be taken in the future. We can also note how to increase the capability of dealing with natural disasters in the future. In general, countries should concentrate on the long-run. Finally, we shall consider how our conclusions and recommendations could take effect in El Salvador, where there was one of the most recent disasters in Latin America.

Cristiana Oliveira and **Branda Rochwerger**
Faculty Advisor/Collaborator: **Rose-Marie Avin**
Modernization and Women in Brazil: Their Changing Roles in the Economy, in the Family, and in Society

Since World War 11, Brazil has experienced a rapid transformation in its socioeconomic system. Its economy, dominated by a few export crops during the 1930s, became more diversified and industrialized. This project examines the impact of rapid industrial growth and modernization on the economic status of women in Brazil. Branda Rochwerger, Cristiana Oliveira, and I will evaluate a number of measures that are regarded as useful indicators of women's economic status: their labor force participation rate, the degree of occupational segregation, the male-female earnings ratio, their level of educational attainment, the fertility rate, the allocation of housework, their role in government, and their adjustments to the economic crisis of the 1990s. We recognize that our analysis will be complex given the diversity of the Brazilian population. It is important to acknowledge differences in women in terms of race, class, and ethnicity. For example, the impact of modernization may be different for indigenous women and Afro-Brazilian women, or for middle-class, Euro-Brazilian women.

Christopher Peterson
Faculty Advisor/Collaborator: **Kristen Monaco**
International Income Taxation of Electronic Commerce: Classification of Income Issues

In the past decade, electronic commerce has radically changed the world economy. One of its implications is its impact on taxation, especially multijuridictional taxation. This project explores the worldwide income taxation issues raised by the growth of electronic commerce, particularly the issues of permanent establishment, foreign tax credit, and characterization of income. Using real-world situations, electronic commerce transactions are analyzed to their economic and tax effects. The response by countries to this issue will greatly affect the future growth of electronic commerce in the world economy.

Nathan Schmies
Faculty Advisor/Collaborator: **David Schaffer**
Job Market Displacement of Men by Women in the U.S. - 1971-2000

Over the last 30 years, there has been a substantial increase in the labor force participation rate of women in the U.S. economy. Previous economic analysis of this phenomenon has focused on the effect this has had on women - both in and out of the labor force. However, there is relatively little analysis of the effect this has had upon men in the labor force. Recent research has suggested an on-going labor market process in which women with high levels of both education and cognitive skills have moved into professional-level jobs, displacing men with high levels of education, but relatively low levels of cognitive skills. This displacement in professional-level jobs then leads to a cascade of further job displacement as these men move into jobs previously filled by those with lower levels of education. At the end of the process, men with low levels of education find it more difficult than ever to find work. We analyze Current Population Survey from several years and find support for this hypothesis. We also examine some of the market forces driving employers to change their hiring patterns, including lower pay for women and replacing full-time workers with part-time ones.

Geography

Patrick Hahn, Kyran Hamill, Marnie Lundgren, Scott Nelson, and **Tobi Rutten**
Faculty Advisor/Collaborator: **Brady Foust** and **Lisa Theo**
Analysis and Modeling of Urban Growth in Las Vegas Using Intersection Density

Las Vegas was the fastest growing city in the nation during the past decade. The purpose of this study is to evaluate the use of street intersection density change between 1990 and 1999 to visualize suburban sprawl in Las Vegas. Street intersection coordinates will be derived from the Bureau of Census TIGER Files for the study years. A quarter mile grid will be generated in ArcView GIS and the number of intersections in each cell counted for each study year. The resultant map will be compared to census estimates of growth within the study area. Because growth follows the expansion of the street network, we anticipate that our method will be a better predictor of growth than other methods. Visualizing growth can be an important planning tool. Knowing where and when to provide community resources helps a growing city to more efficiently use its revenue and plan for the future.

Peter Jacobson
Faculty Advisor/Collaborator: **Ingolf Vogeler**
Chippewa Valley Agricultural Study: 1850-1997

The purpose of this project is to examine the agricultural trends of the Chippewa Valley in northwestern Wisconsin. The Chippewa Valley is defined as the eighteen counties in the Chippewa River flowage; Ashland, Barron, Bayfield, Buffalo, Chippewa, Clark, Dunn, Eau Claire,

Iron, Pepin, Pierce, Rusk, Sawyer, St. Croix, Taylor, Vilas, and Washburn counties. The data were collected from the USDA census from 1850 to 1997. The underlying theme of this study is to present the data in an easy to follow manner for patrons of the Chippewa Valley Museum for their display: “Country Places.” Data were displayed spatially using Atlas GIS and statistically with Microsoft Excel. The agricultural data were split up into pre-1945 and post-1945. Pre-1945 data outlines the development of small economically viable farms in the region and post-1945 data focuses on the decline of small farms and the pressures of agribusiness on the region. Data categories include the number of farms, acres of farmland, value of implements and machinery, value of land and buildings, farm expenses, farm ownership, and harvested cropland.

Alex Jones, Nathan Suhr, Zachary Pennycook, Cody Thiede, Sarah Mindel, and **Rudolph Kluz**
Faculty Advisor/Collaborator: **Brady Foust** and **Lisa Theo**
Determining the Correlation between Housing Value and Elevation in Las Vegas, NV

The purpose of this project is to calculate the correlation between elevation and housing values in Las Vegas, NV. Our hypothesis is that as elevation increases, so does housing value. Higher income groups tend to favor higher elevations for the view, freedom from air pollution, privacy, and more interesting building sites. Elevation data will be derived from United States Geological Survey (USGS) digital elevation model (DEM) data. Housing values at the block group level will be obtained from 1990 census data and projections for 1999. Every block group will be assigned sample points. The coefficient of correlation between elevation and housing value will be calculated from this data, and the residuals from this data will be graphed and mapped. The primary purpose of fieldwork, done March 10-17, 2001, is to visually evaluate anomalous areas.

Rudolph Kluz, Sarah Mindel, and **Cody Thiede**
Faculty Advisor/Collaborator: **Sean Hartnett and Ingolf Vogeler**
The Correlation of Political Signs and Votes in the November 2000 Election

The ability to map the political signs for the Presidential, Senate, United States Representative, and the State Assembly was made possible by using the Differential Global Positioning System (DGPS), the Trimble Pro XR receivers, that mapped the location of each lawn sign with sub-meter precision. This system gives latitude and longitude coordinates to points, lines, and regions by using a series of satellites dispersed in a spatial orbit. Four students completed the survey positioning the DGPS over each political sign recorded. DGPS data was imported into ArcView GIS where the sign of each candidate was mapped. The purpose of this project is to show the correlation between the political signs and votes by political ward, and to see how these wards might vote based on these signs. The prediction made before starting the project was that the signs would give a positive correlation to the vote count. In other words, whoever would get the most votes should indeed have the most signs.

Christopher Koehnen, Evan Marshall, Peter Jacobson, Corinne Orzech, and **Casie Ollendick**
Faculty Advisor/Collaborator: **Brady Foust** and **Lisa Theo**
Alluvial Fan Hazard Mapping in Las Vegas, Nevada

Las Vegas, Nevada is the fastest growing city in the United States. The resulting urban sprawl from this growth has lead to the building of structures on or near alluvial fans and their flood plains. Alluvial fans are cone shaped deposits of sediment in desert environments that often stay dry for many years, however, with a single flash flood loose material can be reworked resulting in damage or destruction to the nearby structures. The purpose of our research is to locate hazardous areas and determine the value of structures that may potentially be affected. USGS digital orthophoto quads and 1990 U.S. Census housing data will be used as our primary research aids to asses future implications. We found that many structures are built on alluvial fans and are prone to severe damage if a flash flood were to occur. Better city planning strategies

or more stringent zoning laws may need to be implicated to avoid a potentially dangerous and costly situation.

Evan Marshall
Faculty Advisor/Collaborator: **Brady Foust**
Using GIS to Map Change in Land Cover/Use in the Illinois River Alton Pool

This poster outlines the basis for comparing historic (1902-1904) land cover and land use patterns to more recent (1989) patterns on a segment of the Illinois River. The study is divided into four parts: data acquisition, data input, data manipulation, and data display. The study area covers approximately 80 miles between the La Grange Pool and the town of Grafton along the Illinois River in west central Illinois. Digital data from the USGS were used for 1989. Data for land cover and land use for 1902-1904 consisted of hand-drawn land use maps that were manually traced and scanned. Scanned images were converted to grid images and electronically traced using ArcTools to create fifteen Arc/Info coverages. Attributes were assigned and all coverages converted to a standard UTM projection. The final step joined individual coverages into a single coverage. The final outcome is a map displaying land use patterns for both years.

Sarah Wayne
Faculty Advisor/Collaborator: **Lisa Theo**
Prophecy: Environment

I intend on making the connection between the world's current environmental issues and biblical prophecy. I will demonstrate how environmental politics have been used in the past and continue to be used today as a vehicle in achieving a "one world government." Along with the single world government prophesized in the Bible, I will make mention of several other related revelations, such as a unified world currency, the seizure of private land, communism, and the rise of the Anti-Christ. The part played by such historical giants as John D. Rockefeller, Carl Marx, J.P. Morgan and Associates, Chase Manhattan Bank, Joseph Stalin, and Abraham Lincoln, as well as influential people and organizations of today, particularly the Clinton/Gore administration and the United Nations will be examined. There is ample evidence to support the realization of the biblical prophecies mentioned and to demonstrate how today's so-called environmental problems play an important role.

Nikki Wruck, Alex Dvoracek, Andy Grosvold, and **Brent Hove**
Faculty Advisor/Collaborator: **Brady Foust** and **Lisa Theo**
Restricted and Non-Restricted Gaming Licenses in Las Vegas: The Strip and Beyond

The purpose of this project is to map and analyze the distribution of gaming license in the Las Vegas metropolitan area. Both restricted (15 or fewer slots) and non-restricted (15 or more slots and table games) will be analyzed. Locations will be mapped by address geo-coding from the crystal report file supplied by the Nevada State Gaming Commission. The hypothesis is that establishments with a non-restricted license will have greater square footage than those establishments with a restricted license. In Las Vegas, NV, we will locate select establishments to verify addresses. For visual reference, we will photo document several establishments that fall into the restricted and non-restricted license categories.

History

Corinne Orzech, Timothy Kinney, and **Joshua Lahner**
Faculty Advisor/Collaborator: **James Oberly**
The Elders Remember: A GPS Study of Stockbridge-Munsee Historical Land Use

In July 2000, a group of UWEC geographers and historians, along with Stockbridge-Munsee tribe elders visited land areas in Shawano County that the Stockbridge-Munsee tribe has used for survival from 1900-1930. These important sites were recorded in order to reveal what lands the tribe has used in the past. The data was collected and entered into a Trimble Pro XR Global Positioning System(GPS) device. Pathfinder and ArcView software were used to organize and present the GPS data. These images were then overlayed on top of a topographical map of the study area. Adobe Illustrator software was then used to enhance the image on the map and to express clearly where the Stockbridge-Munsees made use of lands. The resulting map displays that the Stockbridge-Munsee tribe have used resources continuously despite losing ownership of land parcels on their reservation.

Political Science

Nathan Franklin
Faculty Advisor/Collaborator: **Rodd Freitag**
Money Rules: the 2000 Election for the Wisconsin Legislature

Previous studies of state legislative elections reveal a number of consistent and significant findings: incumbents have a large advantage over challengers in raising and spending campaign funds, PACs in particular are much more likely to give to incumbents and only to the rare challenger perceived as having a strong chance to be elected, campaign spending in competitive legislative races are, on average, at least twice as high than in all contested races, and challengers who defeat incumbents spend much more than the average challenger in state legislative races. Our analysis of the campaign finance data reported by each Assembly and Senate candidate to the Wisconsin Board of Elections tests whether and measures to what degree these findings hold for the 2000 elections for the Wisconsin legislature.

James Johnson and **Melissa Gehring**
Faculty Advisor/Collaborator: **Geoff Peterson**
Bets and Ballots: The Impact of Legalized Gambling on American Indian Politics

While much has been made in the media about the increased tribal revenues since the advent of legalized reservation gambling, little work has been done examining the impact of these revenues on the political activities of the tribal units. We examined the impact of increased gambling revenues on voter turnout. Using data from the Current Population Survey, we looked at voter turnout levels among American Indians both before and after the introduction of casino gambling to determine the political impact of these economic changes. We compared the turnout in counties with a high percentage of American Indians to other counties in the state while controlling for a wide variety of demographic variables and controlling for the introduction of casino gambling.

Glory Koloen and **Lindsey Duerst**
Faculty Advisor/Collaborator: **Geoff Peterson**
It May Be Funny, But Is It True? The Political Content of Late-Night Talk Show Monologues

Research indicates the number of people who turn to late-night talk shows for political news is increasing. A study by the Pew Research Center for Politics found 47% of Americans between the ages of 18 and 29 gathered significant political information from late-night talk shows. Our goal was to examine the political content of late-night talk show monologues and quantify the amount and types of political information presented in them. Cursory examination of any late-night talk show reveals a significant amount of political content. The hosts make jokes at the expense of officials and candidates alike. They cover policy and character issues on a regular basis, and they do not appear to hesitate to attack any available targets. It is this material that we examined in detail. To evaluate the content of late-night monologues, we taped all episodes of

the major late-night shows aired from October 1 through November 20. The material was coded based on the nature of the joke (positive or negative) the target, accuracy, and the topic (policy vs. character). We also coded material that does not have a specific individual as the target, but could impact the viewer (such as jokes about the Electoral College).

Angela Zabrowski
Faculty Advisor/Collaborator: **Steven Majstorovic**
The Quasi-Ethnic Dimensions of Sexual Minorities: A Comparative Analysis

The objective of this project is a comparative examination of the important parallels between the politicization of ethnic and sexual minority identity. This parallel is important when the issue of constitutional and legal rights for sexual minorities are now part of the contemporary socio-political discourse. Most theories of Liberal-Democracy have conceived constitutional rights within the context of individual rights because history has shown that an obsessive focus on group rights can lead to civil war and ethnic cleansing. However, Liberal-Democracies have been somewhat successful in addressing the issues of ethnic minority oppression through the use of constitutional guarantees that balance individual rights with the necessary addition of some group recognition and protection. By establishing the quasi-ethnic nature of sexual minority identity, this project will make it evident that group recognition and protection must be extended to Gay and Lesbian citizens. This research effort will combine a theoretical presentation of how ethnic and sexual minority identity can be usefully compared in the context of politicization and self-identification with a comparative case study analysis of sexual minority politics in South Africa, the Netherlands, the Philippines, and the United States. This comparative methodology will essentially be qualitative, although descriptive statistics will be included.

Psychology

Stacy Anderson and **Elisha Ann Poppitz**
Faculty Advisor/Collaborator: **William Douglas Woody**
Are Males or Females More Vengeful? Perpetrators, Victims, and Sex-Role Identification

Revenge is a pervasive social problem that has received only little attention from social psychologists. Specifically, the effects of gender on various aspects of revenge remain largely unknown, and the present research addressed possible influences of gender on vengeance. Participants read 18 scenarios, each of which depicted a male or a female committing an act that could elicit revenge, and participants indicated whether they would seek revenge in that situation. Two counterbalanced versions of the scenarios were used; both versions depicted nine male perpetrators and nine female perpetrators. The gender of the perpetrator of each scenario was counterbalanced between versions so that each scenario was presented with a male perpetrator to half of the participants and with a female perpetrator to half of the participants. After responding to the scenarios, participants completed a demographics questionnaire, the Vengeance Scale, and the Personal Attributes Questionnaire (PAQ). Data analysis is in progress. Expected results include (a) males will be more vengeful than females and (b) participants will be more vengeful toward same-gender perpetrators. Data from the PAQ will be used to investigate potential relationships among gender, traditional sex-role identification, and attitudes toward revenge.

Hannah Boughton, Travis Olson, and **Heidi Thalacker**
Faculty Advisor/Collaborator: **Allen Keniston**
Study Abroad: Personal Developmental Correlates

This study supports previous research stating that foreign study and travel can promote a much greater change in attitude in a far shorter time than can a regular program of campus study. UWEC students were given surveys before and after completing a semester abroad (Spring

2000). A control group of UWEC students remaining on campus was also surveyed. The surveys examine three areas important to personal development: (1) self-efficacy, or an individual's ability to deal with challenging situations that may arise; (2) ego identity, or how one views oneself; and (3) ego development, or changes in one's self-concept over time.

Heather Carden, Rebecca Kelm, and **Davin Mikkonen**
Faculty Advisor/Collaborator: **William Douglas Woody**
Motivations for Revenge: Individual Biases and Gender Biases

The motivations of the perpetrator of an offensive act may impact the victim's decisions of whether to seek revenge, but little is known about characteristics of offenses that may justify vengeance. The present research compared offenses committed against an individual due to personal bias with offenses committed against an individual due to gender bias. Participants read 16 scenarios, each of which depicted a perpetrator committing an act that could elicit revenge, and participants indicated whether the victim in each scenario was justified in seeking revenge. Four counterbalanced versions of the scenarios were used; all versions depicted eight acts motivated by personal bias and eight acts motivated by gender bias, and all versions depicted eight acts directed against a man and eight acts directed against a woman. Participants completed the Vengeance Scale and the Personal Attributes Questionnaire (PAQ). Data analysis is in progress. Expected results include (a) participants are expected to perceive revenge as more justified if acts are committed against an individual due to gender bias instead of due to personal bias and (b) a participant will perceive vengeance as more justified when the bias is against the participant's gender. Data from the PAQ will be used to investigate potential relationships among gender, traditional sex-role identification, and attitudes toward revenge.

Jamie Dake, Bethany Raiff, and **Jennifer Gross**
Faculty Advisor/Collaborator: **Gregory Madden**
Unit Prices Composed of Fixed-Ratio and Variable-Ratio Schedules of Reinforcement

The economic concept of unit price holds that, all else being equal, the amount of labor supplied by a worker and the amount of a commodity consumed with the worker's wages is determined by the prevailing price of the commodity. Price may be defined as a cost/benefit ratio. Several animal studies have supported this economic theory. The purpose of this study is to test the prediction that the manner in which rewards (i.e. the commodity consumed) are scheduled does not affect labor supplied and consumption as long as the overall price of the reward is unchanged. For example, if the cost of one unit of a reward (benefit = 1) is one hour of labor (cost = 1), then we should see no change in consumption or labor supplied if the reward was given after an average of one hour of work because the overall costs and benefits have not changed. The animal research literature in psychology, however, suggests that the schedule by which rewards are delivered may matter. For example, many researchers have demonstrated that animals and humans will work at much higher rates if rewards are delivered unpredictably rather than after a fixed amount of work. In our study, four pigeons will work for food rewards at a range of unit prices. At each unit price, the animal will complete a series of sessions in which the rewards are obtained after a fixed amount of work and another series in which rewards are obtained after a variable amount of work, while the average amount of work required per reward remains constant. Comparing total labor supplied and total consumption across these two conditions will reveal whether these reward schedules matter.

Lauri Doepke
Faculty Advisor/Collaborator: **Allen Keniston**
Working Memory Capacity: An Analysis of High and Low Span Readers with Respect to Semantic Processing

In this study, a lexical decision task was used to determine whether high and low spans differed in the amount of time it took to access typical (daisy) versus atypical (geranium) members of a

category (flowers). Following the ideas that working memory (or short term store) is a limited capacity system and that individuals differ in the amount of activation available to the system, this research was designed to examine the differences between high capacity individuals (high spans) and low capacity individuals (low spans) with respect to their speed of semantic processing; typical versus atypical. It is hypothesized that: (1) high and low spans will access typical members of a category at a similar rate, however, (2) high spans will access atypical members faster than low spans. Research in this area may provide a base understanding for individual differences in more complex reading processes, such as activation of different types of inferences.

Erin Guell and **Megan Giles**
Faculty Advisor/Collaborator: **Blaine Peden**
Happiness in High School Dating Relationships

This project examines the correlation between happiness levels in high school students and their dating status/qualities. We propose to extend our previous research, by comparing happiness levels of dating and non-dating students at Eau Claire area high schools. Also, we intend to examine factors in their current partnerships that contribute to satisfaction within a relationship. We choose to use high school students because high schools usually have fewer students than universities and because of this high school students tend to be more aware of others' personal lives, including dating status (i.e. gossip). College relationships tend to be serious and closely related to marital relationships whereas high school relationships focus is more on social aspects of dating; it serves as a source of recreation and inclusion. As a result, high school relationships seem to be a more interesting alternative for study.

Aimee Hogan and **Kathryn Leisz**
Faculty Advisor/Collaborator: **Blaine Peden**
High School Student's Attitudes Toward Public Displays of Affection

Affection is an essential part of life, which is displayed throughout the world. Public displays of affection include such acts as holding hands, kissing, and groping. This study surveyed high school student's opinions regarding public displays of affection. The students rated how they felt about different acts of public displays of affection in either a school setting or a public setting. The students also rated how they felt other students perceived these acts, as well as how teachers and adults perceived them. Public displays of affection are becoming more and more prevalent in our nations high schools. Some schools have declared acts of affection grounds for suspension. This research will benefit teachers and administrators to understand students attitudes on public displays of affection.

Krista Krueger and **Jennifer Gross**
Faculty Advisor/Collaborator: **Gregory Madden**
Human Foraging and the Ideal Free Distribution

The ideal free distribution model assumes that the amount of participants allocated to a group is equivalent to the amount of available resources. Many studies have looked at this phenomenon in animal species, however the current study looks at human participants and their distribution between two patches of point resources. Thirty-six college students from the University of Wisconsin-Eau Claire were participants in the current study. Two resource areas were designated by red or blue colors in a classroom, and participants chose their destination freely. Participants chose the point area based on varying amounts of point reinforcement. Findings support the ideal free distribution model, suggesting group dynamic influences choice.

Jeffrey Miller
Faculty Advisor/Collaborator: **Blaine Peden**
Complexity and Range of Modulation as Factors in Tempo Perception

A previous experiment determined that background music positively affects math test-taking only when the tempo is accelerating. In this experiment, thirty-three participants volunteered to take both a simple and a complex math test. One group took the tests while listening to music set at its default tempo across two minutes. Another group took the tests while listening to music with the tempo increased by 25 percent. A third group took the tests while listening to music with the tempo increased by 50 percent. Completion rates declined for both simple and complex math tests as the tempo changed from no increase to a 25 percent increase to a 50 percent increase. Faster tempos may decrease task completion rates due to increased strain on processing regardless of task complexity.

Mycie Moua
Faculty Advisor/Collaborator: **Gregory Madden**
Effects of Reinforcer Delay and Response Topography on Pigeon's Impulsivity

Impulsivity in nonhumans (usually pigeons) has been an important area of research for the last 25 years. Impulsivity, in these experiments, is defined as choosing a smaller amount of food delivered now and forgoing a larger amount of food delivered after a brief delay. A potential problem for this area research is that impulsivity in pigeons may be different from impulsivity in humans. Specifically, pigeons may be involuntarily responding for the smaller-sooner reward. The mechanism explaining this involuntary behavior is classical conditioning. Just as Pavlov's dog did not voluntarily choose to salivate at the sound of a bell, pigeons may not be choosing to behave impulsively, but classical conditioning elicits this response. If pigeon impulsivity is an involuntary response, then this species may be inappropriate for studying the determinants of human impulsivity. To evaluate this possibility, four pigeons will choose between smaller-sooner and larger-later food rewards in two conditions. In one condition, pigeons will make their choices by pecking keys (a response empirically known to be affected by classical conditioning); key pecking is the response used in all prior impulsivity research with pigeons. In a second condition, pigeons will respond by pressing a lever with their foot (prior research has shown that this response cannot be classically conditioned). Degree of impulsive behavior will be compared across these conditions.

Bethany Raiff and **Andrea Gantz**
Faculty Advisor/Collaborator: **Gregory Madden**
Human Discounting of Delayed Monetary Rewards: Real vs. Hypothetical Rewards

In the human temporal discounting literature, real and hypothetical rewards have been extensively used. Two experiments were conducted to determine if there is a difference in discounting rates in real versus hypothetical reward situations. Experiment 1 was a between-subjects design, which consisted of subjects making choices about delayed monetary rewards. Individuals made choices between a variable amount of money delivered now or $10 delivered after some delay. Higher rates of discounting were observed in the hypothetical group. This unexpected finding suggested that subjects in the real rewards group made choice that would maximize their ability to earn a larger monetary reward now (a strategy that would yield more apparent self-control). Therefore, in Experiment 2 we are using a silent auction procedure that controls for this strategy (see Kirby, 1997). Initial findings suggest there is no systematic difference between the degree to which participants discount the value of real and hypothetical rewards. A discussion of follow-up experiments that are required will be presented.

Bethany Raiff and **Desiree Nohner**
Faculty Advisor/Collaborator: **Gregory Madden**
Human Matching in Positive Versus Negative Reinforcement

Studies have shown that subtle instructions may be responsible for human choice behavior that appears to conform to an animal model of choice behavior known as the matching law (Horne & Lowe, 1993). The purpose of this study was to replicate the Horne and Lowe findings and to

determine if humans conform to the matching law in a negative reinforcement context. Three college students participated in this single-subject design experiment. Students worked at a computer to either earn (positive reinforcement) or avoid losing (negative reinforcement) money during daily sessions. In each session, students were free to respond on one of two response alternatives and could switch between alternatives at any time. Money deliveries (or subtractions) were arranged according to intermittent schedules, such that these events were unpredictable. In 5 different conditions, the relative rate at which reinforcers were available on each response alternative varied. Each condition remained in effect for at least 10 1.5 hour sessions and until behavior was judged stable. Human behavior was found to quantitatively better conform to the matching law in the negative reinforcement phase.

Amanda Retzak and **Elizabeth Alvarez**
Faculty Advisor/Collaborator: **Gregory Madden**
Classical Conditioning Effects on Delay Discounting in Pigeons

Impulsivity is an important category of human behavior which includes societally important behaviors such as drug abuse, gambling, over-eating, and risky choices responsible for the spread of HIV. Investigating the determinants of impulsivity in nonhumans (usually pigeons) has been an important area of research for the last 25 years. Impulsivity, in these experiments, is defined as choosing a smaller amount of food delivered now and forgoing a larger amount of food delivered after a brief delay. A potential problem for this line of research is that impulsivity in pigeons may be different from than in humans. Specifically, pigeons may be reflexively (i.e., involuntarily) behaving impulsively while human impulsivity is a voluntary response. The mechanism explaining this involuntary behavior is classical conditioning. To test this possibility, we will use a psychophysical technique to quantify the rate at which pigeons discount the value of delayed rewards across two conditions. In one condition, pigeons will respond by pecking keys (a response known to be influenced by classical conditioning); key pecking is the response used in all prior impulsivity research with pigeons. In a second condition, pigeons will respond by pressing a lever with their foot (a response that cannot be classically conditioned). The psychophysical procedure involves adjusting the duration of the delay to the larger food reward until the subject is indifferent between the two rewards. The adjusted delay value may then be used to derive individual subjects' discounting rates. Discounting rates will be compared across the key-pecking and treadle-pressing phases.

Jaclyn Rudebeck
Faculty Advisor/Collaborator: **William Douglas Woody**
Juveniles Tried as Adults: Age and Fairness

States use a variety of guidelines to try juveniles who are accused of serious crimes such as murder. Juveniles as young as 13 and as old as 17 may be tried by a jury and sentenced as adults. Jury members are required by law to separate the age of the defendant from decisions of culpability and punishment. Two hundred jury-eligible students at the University of Wisconsin - Eau Claire read standard jury instructions and a transcript of a criminal case depicting a defendant who may or may not be guilty of second degree intentional homicide. The defendant was portrayed as 13, 15, 17, or 21 years of age, or no information was given for the defendant; the age of the defendant should have no legal impact on jurors' decisions of guilt or sentencing recommendations. Jurors reported whether they believed the defendant to be guilty or not guilty, their confidence in their decision, and, if they found the defendant guilty, their recommended sentence. Jurors were improperly influenced by the defendant's age. The discussion focuses on jurors' biases regarding child defendants tried as adults and how knowledge of such a bias can aid the legal community in the search for ameliorative measures.

Sheila Schmitz and **Elizabeth Alvarez**
Faculty Advisor/Collaborator: **Marie Crothers**
The Relationship Between Fear of AIDS and Sexual Behavior Among College Students

The purpose of this project is to investigate the relationship between college students' fear of AIDS and their sexual behaviors. Seventy-five participants will be recruited from the UWEC student body via announcements in psychology classes. All participants will be between 18 and 25 years of age. Participants will be asked to complete three brief questionnaires: 1) a demographic form 2) the Fear of AIDS Scale, and 3) either the Sexual Behavior Questionnaire or the Virginity Scale (depending on sexual activity status). It is hypothesized that students who express relatively higher levels of fear about AIDS will report more cautious sexual behavior patterns than students who express lower levels of AIDS fear. Participation will require approximately 30 minutes. Multiple linear regression techniques will be employed to analyze the resulting data set.

Julie Slowiak and **Alicia Bear**
Faculty Advisor/Collaborator: **Blaine Peden**
Litter Butts: A Look at the Relationship Among Smokers' Gender, Social Environment & Cigarette Disposal

Cigarette butt litter is a problem in our society as a whole and, more specifically, on college campuses. A naturalistic observation of 75 smokers, 28 males and 47 females, evaluated the associations among gender, social environment, and way of cigarette disposal. Prior research had analyzed these variables separately or in association with other related variables. Two observers coded observations of gender, whether the participant was alone or in a group, and how they disposed of their cigarette butts outside of an academic building or outside of a campus dormitory. Chi-square analysis indicated statistically significant relationships between gender and way of deposit, and also between gender and social environment at one location. There was no association between social environment and way of deposit. These results supported the hypotheses that males would neglect the use of receptacles more than females, and secondly, that females smoked in groups more than males. The latter result may infer that smoking is more of a social affair for females. Included are implications of how to keep the University of Wisconsin - Eau Claire Wisconsin's most beautiful campus.

Jill Wahlstrom and **Kathryn Hamilton**
Faculty Advisor/Collaborator: **Blaine Peden**
Rates of Flirtation by Opposite-Sex Couples in a High and Low Activity Bar: Replication and Extension

We became interested in the study of flirtation in Psychology 271: Methods of Research and performed two research studies on the topic. Our previous studies have shown that the rate of flirtation and the activity of the bar are positively correlated. Based on these two studies, we have replicated and extended these findings to perform the present research to strengthen our results. In this study, the activity of the bar is defined by the number of patrons attending the bar and the capacity of the bar. A flirtation is defined as a nonverbal action used to convey interest in the other person and to make him or her look more attractive to the potential partner. Our first hypothesis is that the rate of flirtation in a heterosexual couple and the activity of a bar (high or low) are positively correlated. Our second hypothesis is that females will have a higher rate of flirtation in either bar setting when compared to males. This study will consist of unobtrusive observations of approximately 80 heterosexual couples (40 at each bar) over two weekends. We will analyze the data using Pearson's r to determine interrater agreement and t-test to determine if a correlation exists.

Psychology/Allied Health Professions

Jeffrey Miller
Faculty Advisor/Collaborator: **Lee Anna Rasar** and **Marie Crothers**
Effects of Tempo on Typing Tests Measurements of Speed and Accuracy

A repeated measures experiment assessed typing speed and accuracy under conditions of either increasing or decreasing tempo. After a practice round, 49 participants repeated a typing test across three rounds. During each round, participants heard a different movement of a Haydn piano sonata ordered from either the slowest to fastest movement or the fastest to slowest movement. To control for practice and memory effects, one group was exposed to no music and all groups were provided a practice round. Typing speed was significantly higher when not listening to music than when listening to music increasing in tempo from slow to fast. Although post-test survey responses revealed that all participants enjoyed the stimuli, background music with increasing tempo may distract from productivity.

Psychology/Counseling Services

Pamela Miller and **Stephanie Wood**
Faculty Advisor/Collaborator: **Marie Crothers** and **Katherine Schneider**
Evaluation of a Mentoring Program for Psychologists with Disabilities

Mentoring has been shown to increase the participation of marginalized groups such as women and minorities in various professions. Less than .5% of American Psychological Association members report having a disability, compared with 14% of Americans in general. Under the aegis of the Disability Issues in Psychology a pilot mentoring program was designed, advertised and implemented. Psychologists with disabilities were matched with graduate students in similar fields of psychology and with similar disabilities. After six months of participating in the mentoring program, the 28 mentors and the 28 mentees were asked to complete an anonymous questionnaire to evaluate their satisfaction with the match and the perceived benefits of the mentoring relationship. Questionnaires were also sent to the 19 unmatched volunteer mentors, eliciting information about their willingness to participate in, and their ideas for future directions for, this mentoring effort. Results will be analyzed using both quantitative and qualitative methods. Discussion will focus both on the mentors' and the mentees' perceptions of the mentoring relationship. The information from the questionnaires will also be used to suggest directions the Committee on Disability Issues in Psychology might consider for future mentoring projects.

Sociology and Anthropology

Nao Yamasaki
Faculty Advisor/Collaborator: **Helaine Minkus**
The Social Networks of International Students

The research project studied the social support networks constructed by international students at UWEC and the relations that international students have with American students. A questionnaire was sent to all international students and interviews were conducted with international students and American friends and roommates. The research also investigated the efforts that the university makes to facilitate interaction between international and American students. The poster session will report the questionnaire data on such issues as the nature of international student relationships with roommates and host family, how satisfied they are with the social relations they have with American students and with their social and educational experiences at UWEC.

Business and Professional Studies

Adult Health Nursing

Linda Huelsbeck
Faculty Advisor/Collaborator: **Rita Sperstad** and **Joan Stehle Werner**
Wisdom of the Spirit: The Lived Experience of Spirituality by Women and Practitioners within the Context of Birth.

Professional nursing care attends to the whole person- body, mind, and spirit. Increasingly, nursing is recognizing the need to gain further understanding of and more effectively attend to the spiritual dimension of care. The focus of this project is to describe spirituality as a lived experience by women, lay practitioners, and professional nursing practitioners within the context of birth. Data will be gathered through a mailed presurvey tool, two separate focus group sessions, and a follow-up mailed survey tool. The first focus group will consist of lay practitioners and professional nursing practitioners. The second group will consist of women who have experienced birth in a hospital or home setting. Participants will be invited to share a birth story that reflects spirituality. Then participants will be invited to use a creative journaling technique to further analyze and explain spirituality within the lived experience of birth. Transcripts of the focus groups and journal discussions will be documented from taped recording of the groups. Qualitative analysis of the focus group sessions will be shared in results. Suggestions for application to nursing practice and further research will be made.

Leah Luedtke, Heather Tinder, Jennifer Nie, Jennifer Prijic, Heidi Nelson, and **Heather Nelson**
Faculty Advisor/Collaborator: **Rita Sperstad**
Assessment of Cultural Care: Meaning to Faculty & Students with Mexicans during the Perinatal Experience

This faculty/student research collaboration project is a learning activity included in a nursing clinical experience with an impoverished diverse culture. The project is descriptive research that will use both quantitative and qualitative methods. Students and faculty will initially meet to discuss nursing theory and concepts related to cultural care, cultural competency, specific Hispanic cultural traditions, and health factors related to Mexican immigration. During the week of spring break, students and faculty will participate in an “immersion” clinical experience at Holy Family Services in Weslaco, Texas, which is ten miles from the border of Mexico. Holy Family is a free standing birthcenter managed by certified nurse midwives and staffed by registered nurses, a social worker and volunteers. The staff at Holy Family lives on the grounds of the facilities in a communal living environment. Holy Family Services provides comprehensive perinatal care to impoverished Mexican women and families. The quantitative method for data collection will include the administration of a pre/post clinical culture survey. The qualitative method for data collection will include a personal journal, followed by group reflection seminars. Analysis of both quantitative and qualitative data will be compiled and reported to describe the meaning of this cultural care experience.

Shelly Quinn
Faculty Advisor/Collaborator: **Debra Jansen**
Influence of Perceived Barriers on Participation in Restorative Activities by Community-Dwelling Elders

As people get older, their capacity to direct attention (CDA) appears to decline. This capacity is important because it allows people to concentrate and manage the daily routines of life. Based on the Kaplan and Kaplan Framework of Directed Attentional Fatigue and Restoration, exposure to

mentally restorative activities (e.g., observing nature and walking in the park) is theoretically associated with improved CDA and feelings of greater mental energy, peacefulness, and refreshment. As part of a larger study, 30 (28 women, 2 men) community-dwelling elders (ages 65-92 years; M = 75 years) were interviewed regarding the types of restorative activities in which they engaged. Additional data was gathered regarding barriers. The purpose of this study was to determine the types of barriers older people perceive as interfering with their ability to participate in restorative activities. A content analysis of themes produced 12 categories of barriers: health limitations, lack of time, transportation difficulties, age, lack of a companion, financial constraints, weather, safety, distance from family, lack of space, limited opportunities, and additional constraints. Information regarding barriers may be helpful in developing feasible means of incorporating restorative-type activities into the lives of older people in need of restoration.

Darci Underwood
Faculty Advisor/Collaborator: **Rosemary Jadack**
Personal Social Networks and Patterns of Disclosure Among HIV+ Persons with a History of Injection Drug Use

Researchers have shown that the support of significant others within an individual's social network is a key component in adjustment to chronic disease. Lasting stigma against those with HIV make disclosure difficult for many, leading to isolation, depression, and ineffective coping. The purpose of this project is to describe HIV disclosure among HIV positive persons, and compare characteristics of disclosure, social networks, clinical depression, and coping. This project is a secondary analysis of data that examines the social network characteristics of HIV+ persons with a history of injection drug use. Personal social networks, types of support provided by members of the networks, patterns of disclosure, depression, and coping were assessed in 175 HIV+ persons living in an inner-city area of a major east coast metropolitan area. Respondents reported an average of 5.9 persons in their network; the mean density of the networks was .73. Overall, 73 (41.7%) reported significant depressive symptomotolgy; people with higher depression scores had significantly less dense networks. Further, respondents disclosed to an average of 3.7 people. There were different patterns of depression depending on who was told first. Respondents who disclosed to parents first had significantly lower depression and adaptive coping scores. Results provide important information about the facts that contribute to HIV adjustment.

Adult Health Nursing/Nursing Systems

Julie McCormick, Jennifer Nie, Susan Paulus-Smith, and **Celeste Jackson**
Faculty Advisor/Collaborator: **Joan Stehle Werner** and **M. Cecilia Wendler**
Human Responses Influenced by Caring

This project's purpose is to synthesize knowledge about human responses influenced by nurse caring through review and appraisal of the research literature in nursing. Methods include integrative research review for studies that are empirical in nature, and meta-synthesis for studies employing interpretive methodologies. Studies appearing in the literature for the last decade, from 1990 through 1999, are being appraised. Caring is defined for this project specifically enough to guide the literature search. Preliminary work suggests that the human response patterns of well-being, anxiety, suffering, and dying respond to caring. This project will clarify these and other human responses that have been shown through research to be affected by caring. This project has also been accepted for presentation at the International Association for Human Caring's International Conference in Stirling, Scotland, in June 2001.

Allied Health Professions

Lee Albrecht
Faculty Advisor/Collaborator: **Robert Nelson**
Cost Efficient Water Pump: Design, Development, and Implementation in Costa Rica

Water quality problems still exist throughout the world especially in developing countries. The inaccessibility of correct implements, such as water pumps, to access water is the main reason for water contamination in economically depressed areas. Without water pumps, wells are left unsealed for anything such as surface water, fecal matter, and domestic animals to contaminate a potable well. A low-cost non-electric water pump made from PVC was designed, developed, and implemented in the Guanacaste and Caribbean regions in Costa Rica. The pump was tested in Costa Rica with regards to effectiveness, practicality, and durability in a typical village. With the low-cost pumps being installed successfully, six wells are now sealed and surface contaminants can no longer harm the quality of the water. Also, people aren't cross contaminating their well since they stopped using a bucket to obtain their water. With future funding, the pump will be implemented in other developing countries in Central America.

Molly Bjorngjeld, Katie Solberg, and **Latina Pyawasay**
Faculty Advisor/Collaborator: **Lee Anna Rasar**
Assessment of Needs of Women Inmates Upon Discharge from Jail and Available Resources to Meet these Needs in the Eau Claire Community

We are presently volunteering at the Eau Claire County Jail with female inmates. We are designing an assessment tool to use to assist the women in preparing for their futures after release from jail. Specific areas of need will be identified and a resource guidebook will be developed for use with the women. The guidebook will contain descriptions of community and personal resources available to the women to target their areas of need. An implementation program will be developed to use the guidebooks prior to release and will be carried out by us with the women.

Communication Disorders

Jennifer Carlson, Magda Dimitrijevic, Eryn McClutchey, Keely Pease, Katrina Pilgrim, and **Tina Pirkl**
Faculty Advisor/Collaborator: **Lisa LaSalle**
"Best Practices" for Treating Preschoolers Who Stutter

The "indirect" approach to treating preschoolers who stutter involves gradually increasing the length and complexity of fluent utterances while modeling slow and simple utterances. The "direct" approach is based on response contingent stimulation in which fluency is frequently praised and stuttering is occasionally corrected. Both approaches appear generally effective, but the relative effectiveness is currently unclear. Furthermore, prior research suggests that combining the two approaches and adding temperament management strategies might represent "best practices" for treating preschoolers who stutter. Three- to five-year-old boys who stutter participated in an alternating treatment design that compared four types of treatment sessions to baseline sessions occurring on a 50-minute weekly or semi-weekly randomized schedule. For three boys, direct v. indirect v. best practice sessions were compared. For a fourth boy, best practice sessions were compared to indirect-direct combined sessions without the use of temperament management strategies. Graphical displays of percent syllables stuttered per session type and qualitative findings show support for the increased efficacy of "best practices" sessions. Results also suggest future directions for treatment efficacy research with this clinical population.

Communication and Journalism

Andrea Foseid, Katie Schoepf, and **Tiffany Talcott**
Faculty Advisor/Collaborator: **W. Robert Sampson**
Analysis of Internal Communication & Culture within a Mass Media Organization

Our research question is "How does the quality of internal communication effect organizational culture?" Data for this study will be gathered through non-random interviews of approximately ten newsworkers within a small midwestern market. At least one interview will occur within each job position. Information gathered from the interviews will be used to fine tune the Organizational Culture Profile that will then be distributed to all thirty-five newsworkers within the organization. Analysis of the data will occur through observations and comparison with findings and opinions stated in the relevant literature.

Kendra Hansen, Jill Spaak, and **Jeremy Whiteman**
Faculty Advisor/Collaborator: **W. Robert Sampson**
Communication Effectiveness in a Midwestern Dinner Theater

This study explores the effectiveness of several communication forms, in a popular mid-western dinner/theater restaurant. Researchers collaborated with restaurant management to decide specific areas of communication strengths and weaknesses. Focusing on the specified areas, researchers administered a revised version of the International Communication Association (ICA) Communication Audit, conducted informational interviews with 15 randomly selected employees, and completed non-obtrusive observations during normal business hours. The three forms of data were analyzed and compared with each other and to current communication standards within the industry, for the determination of communication effectiveness. Results were presented to the dinner/theater restaurant in written and oral form, for their consideration.

Timothy Larson, Elizabeth Moon, and **Christopher Tukiendorf**
Faculty Advisor/Collaborator: **W. Robert Sampson**
Organizational Communications Audit of Eau Claire Leader-Telegram

This project researches the communications process of the Eau Claire Leader-Telegram using interviews, surverys, observations, and focus group. The criteria of measure will be communications, culture, and organization of the newspaper company. We will work within the Sales and Advertising departments by interviewing, surveying, observing thirty to fifty employees of the organization. After the qualitative and quantitative research, the group will facilitate focus groups for the benefit of the organization. The results will be significant to the Human Resources Department in developing training and development to future employees, and providing valuable experience to each group member. This research project is required in the capstone of the organizational communications major, under the supervision of Dr. W. Robert Sampson.

Rachel Thomas, Tamela Heider, and **Margie Tarnowski**
Faculty Advisor/Collaborator: **W. Robert Sampson**
Communication Analysis of a Fitness Center

The communication analysis of Highland Fitness Center will identify the organization's strengths, weaknesses, and future needs in regard to its communication methods and processes. We will analyze the communication process through interviews, observations, and surveys. Approximately 30 employees, including all levels of the organization will be involved in the study. The results will be presented to the organization's management along with recommendations for future consideration.

Joleen Thompson, Kristen Sellman-Sanchez, and **Nissa Dahle**
Faculty Advisor/Collaborator: **W. Robert Sampson**
Communication Audit of Radio Company

This research project will include a quantitative survey , interviews, and observation. These three methods will allow us to take a “snapshot” of the communication in the client organization. Our intent is to use this snapshot of communication to provide suggestions to the client company.

Family Health Nursing

Allison Schultz and **May Zoua Yang**
Faculty Advisor/Collaborator: **Susan Diemert Moch**
New Knowledge into Practice through Discussion Groups

An innovative strategy for getting new knowledge into practice is through discussion groups. The discussion groups offer an interesting and effective means for incorporating research into practice. Through this poster, the strategy for conducting the groups, the historical development of previous groups, the evaluation of a current interdisciplinary group session will be shared. Health professionals meet in small groups to discuss research articles. Each member contracts to read one article before each discussion session, to attend three of the four sessions and to provide honest feedback about the article. The groups are led by an advanced practice nurse and often involve communication with the author/researcher of one of the articles. Thus far, eight discussion group series have been held and evaluated. One of the groups involved a discussion of health promotion strategies with a group of advanced practice nurses employed in several different clinics in a rural area. The group evaluations for the interdisciplinary group of health professionals on culturally competent health care with the Hmong will be presented. Evaluation of the current group series includes a process evaluation of each session through audio recording as well as a pre and post written evaluation by group members. The group evaluation data is summarized for this poster presentation.

May Zoua Yang and **Allison Schultz**
Faculty Advisor/Collaborator: **Susan Diemert Moch**
Evaluating Hmong Client Perceptions Of Western Health Care

Identifying ways for evaluating two health projects involving Hmong clients is the focus of this endeavor. Feedback from the Hmong participants was essential. Due to verbal tradition and the tendency for Hmong participants to answer positively when questioned, direct feedback and critique was difficult to obtain through the evaluation means most often used in western healthcare. The first project, Health Promotion through Radio and Television consisted of nursing students working with Hmong community leaders to plan and conduct health education programs on radio and television. The second project, Collaborative Research Discussion Groups on Hmong Culture, involved health care professionals learning about Hmong culture through discussion groups. The methodology for this project was conducting a literature review and several interviews with persons knowledgeable about Hmong culture. Themes identified though the literature and the interviews include understanding the importance of verbal tradition and personal interviews, involving community members in program design and evaluation, considering age, gender, culture, and status of the interviewer, and employing people of the same ethnic background in delivering the health education programs. Specific strategies and implications for practice for each project are also shared though this poster.

Foundations of Education

Kang Bao Her, Xiongmee Lor, and **Nou Thor**
Faculty Advisor/Collaborator: **Katherine Rhoades**
Educating EDGEWALKERS: Exploring the Boundaries of Hiculturalism with Hmong Teachers

This qualitative study of 25 Hmong American preservice and classroom teachers who are participating in ProjectTEACH, a federally funded program designed to support and educate bilingual/bicultural educators on 3 University of Wisconsin System campuses, analyzes the processes involved in becoming a bilingual/bicultural educator. The data analysis, when completed, will identify patterns of similarity and themes of variability among the research participants as it seeks to explore the meanings of cultural representation and transition in educational contexts in an increasingly diverse multiethnic society.

Rebecca Immich
Faculty Advisor/Collaborator: **Barbara Erdman** and **Carol Koroghlanian**
Changing Technology Education in Teacher Education Program

For the past twenty years, teacher education programs have included technology courses in their curriculum, believing that increasing the level of pre-service teacher technology skills would translate into increased technology integration in the K-12 classroom. Despite this effort, relatively little technology integration has actually occurred. While a number of research studies have examined how technology is integrated in the K-12 classroom and how pre-service teacher technology education affects technology integration in the classroom after graduation, few studies have examined the actual technology skill needs of pre-service teachers in terms of the available K-12 school technology. This research will be used to determine the current technology skills of pre-service teachers in comparison to the skills of their cooperating teachers and the technology available in their cooperating schools. It will also determine the type and amount of technology integration occurring in the pre-service teacher field experience classrooms. The researchers will also obtain perspectives from school media personnel in terms of teacher and student technology needs. The results of the research will be used to propose changes to pre-service teacher technology education to maximize the potential for integrating technology into K-12 classrooms after graduation.

Management and Marketing

Betsy Gardner
Faculty Advisor/Collaborator: **Rama Yelkur**
The Foreign Corrupt Practices Act (FCPA): Its Effectiveness and Impact on the Global Competitiveness of U.S. Firms

In the mid-1970s, investigations by the Securities and Exchange Commission (SEC) revealed that over 400 U.S. companies admitted to making illegal payments in excess of $300 million to foreign governments. The result was a law enacted by Congress in 1977 entitled the Foreign Corrupt Practices Act (FCPA) that was established to prevent bribery of foreign officials as well as to restore public confidence in the integrity of the American business system. This study includes a critical evaluation of the effectiveness of this anti-bribery legislation in preventing bribery by U.S. firms operating in overseas markets. It also includes an examination of the effect of the FCPA on the operations of U.S. firms abroad, in order to assess if the FCPA has affected the competitive position of American firms.

Jennifer Handrick
Faculty Advisor/Collaborator: **Robert Erffmeyer**
An Examination of Ethics Training Programs for Entry-Level Collegiate Hires

This study examined the ethics training delivered to entry-level college hires. A great deal of literature comments on the value of ethics, but little provides insight as to how companies deal with the topic with new hires. College recruiters who had visited the University of Wisconsin - Eau Claire campus within the previous 12 months were contacted via email and asked to respond to an on-line survey. A variety of content areas were explored including the amount of training received, who delivered it, the manner in which it was delivered and company characteristics. Respondents were asked if they believed the training was effective and what proof they had that it was or was not and to rate the level of ethics seen in their industry. Additionally, they were asked their perception of what areas within their company was most likely to encounter ethical dilemmas. An analysis was conducted based on job placement. Suggestions for future training programs were discussed.

Nursing Systems

Sara Loertscher and **Sean Grorich**
Faculty Advisor/Collaborator: **M. Cecilia Wendler**
Testing Unidimensional Measures of State Anxiety in Healthy University Students Taking an Important Examination

Numeric rating scales (NRS) have been used in research and clinical nursing to help quantify unpleasant sensations such as pain when frequent, repeated assessments are needed. The validity and reliability of NRSs for pain assessment is well established. However, their usefulness in quantifying unpleasant experiences, such as state anxiety, has not yet been established. The purpose of this study is to determine the relationship, if any, between the State Anxiety Inventory (Spielberger, 1983) and five potential proxy instruments in healthy students facing an important examination. Results will be used in future research with patients undergoing anxiety-provoking procedures in acute care.

Jennifer Platt and **Karolyn Tamke**
Faculty Advisor/Collaborator: **Lois Taft** and **Mary Ellen Stolder**
Oral History Project with Nursing Home Residents

This project's purpose is to initiate a program of research to develop, implement, and evaluate an oral history project with nursing home residents. This project will focus on collecting stories from men and women living in nursing home settings about personal experiences during World War II. This research program involves participation in a project sponsored by the National Endowment for the Humanities called "My History is America's History." Participants will have the option to have their stories archived on the Website, www. myhistory.org. This preliminary project includes reviewing the literature, submitting an IRB application, and conducting pilot interviews. This project adds to nursing's body of knowledge about the potential benefits of reminiscence on mental health in old age and is part of an ongoing effort to identify interventions that reduce depression and enhance ego integrity in older adults in nursing home

Social Work

Chrisna Kirichkow and **Becky Borchardt**
Faculty Advisor/Collaborator: **Don Mowry** and **Steve Tallant**
Evaluation of the Chippewa Valley Free Health Clinic

This study is an evaluation of the Chippewa Valley Free Health Clinic in Eau Claire, Wisconsin. The clinic opened in 1997 to provide primary health care for people in the Chippewa Valley area who lacked insurance, are under insured, or lack the financial resources to pay for private care. Each clinic patient, prior to treatment, completed an intake survey. The collected data represents a population profile of all clinic users. This profile includes variables such as gender, age, county of residence, income, race, employment status, presenting medical complaint, and prior health care usage. Each clinic patient also identified potential barriers to obtaining heath care. An open ended question was asked during intake to obtain this information. Both Eau Claire and nationally, the free health clinic movement is dedicated to a philosophy that primary health care is a right, not a privilege.

Inger Nelson and **Adriana Monti**
Faculty Advisor/Collaborator: **Gloria Fennell**
Adoption Follow Up Study

This is a research study designed to gain insight into how children perceive and have experienced the adoption process. Information from this qualitative analysis could be used in the professional field to help determine the adequacy of pre and post adoptive services for children and their families. It is anticipated that this preliminary study will assist in determining if additional study is needed. Children are the subjects of this study in order to get their personal perspective and to gain appreciation for the adoption process as they have experienced it. It is important that the current family has formally adopted the child for at least two years prior to the study in order to provide for adjustment into his/her environment. The study will be conducted in a structured interview format with the one of the researchers and the child. The format entails ten open-ended questions designed to facilitate discussion about the child's experience. The potential exists to begin a process that will result in adopted children having an important voice in recognizing the ways in which current adoption procedures are effective and ways in which they might be improved.

Social Work/Music and Theatre Arts/Nursing

Herman Schultz
Faculty Advisor/Collaborator: **Leonard Gibbs, Terry Allen,** and **Joan Stehle Werner**
Three Interactive Measures of Critical Thinking for the Helping Professions

Our students enter many helping professions, where they will make judgments and decisions in their life-affecting work. To be worthy of this trust, they must learn to reason well. This project includes three realistic interactive CD-ROM measures that demonstrate evidence-based practice and also test ability to reason critically and scientifically in health care, courtroom, and educational settings. These measures, all with satisfactory inter-rater reliability, represent three faculty/student collaborative efforts over a four-year period. These programs will be published by Brooks/Cole Thompson Learning. Forty-five people from different departments, universities, majors, and professional disciplines, many as volunteers, all contributed their efforts to this project.

Natural and Physical Sciences

Biology

Matthew Allen and **Ryan Franckowiak**
Faculty Advisor/Collaborator: **David Lonzarich**
Distribution, Movement, and Behavior of Coho Salmon, Oncorhynchus Kisutch, during The Summer Rearing Period in the Onion River, a Lake Superior Tributary

In their native range of western North America, coho salmon (Oncorhynchus kisutch) are exposed to a variety of population controls during their freshwater residency. The first summer is particularly stressful, as low stream flows create conditions that intensify biotic interactions, limit distribution and select for aggressive and sedentary behaviors. Testing the premise that flow conditions can shape the ecology of juvenile salmon, we examined how periodic summer flooding in a tributary stream of Lake Superior, Wisconsin affected the distribution, movement and social structure of a population established in the drainage in the 1970s. Snorkeling approximately 1 kilometer of the stream at ten-day intervals for 50 days in summer 2000, we found that salmon occupied a wide range of habitats; that they moved a great deal; and that they were as likely to occur in schools as they were in social hierarchies. We suspect that the variable summer flows in this stream may alter the nature of intraspecific interactions by limiting the ability of salmon to establish social hierarchies. These results raise the possibility that coho salmon might be adapting to the environmental challenges of streams in this region.

Valerie Boyarski
Faculty Advisor/Collaborator: **Paula Kleintjes** and **Michael Weil**
Population Estimates And Habitat Selection Of Flat-Tail Horned Lizards, Phrynosoma Mcallii, In The Coachella Valley Preserve, CA

A number of studies suggest that habitat loss, fragmentation, or degradation leads to population declines of flat-tail horned lizards, Phrynosoma mcallii. In my study, two populations of P. mcallii inhabiting the Coachella Valley Preserve (CVP), CA were examined during July and August 2000. The purpose of my study was to 1) estimate population size of P. mcallii along two transects within the preserve, 2) correlate sand compaction with substrate preference, and 3) correlate population size of P. mcallii with abundances of harvester ants. Data were collected by tracking and capturing P. mcallii along two line-transects. Following capture, each individual was marked, weighed, measured, and sexed. Both ambient temperatures and Universal Transverse Mercater (UTM) coordinates were recorded for the locations where each lizard was sighted. Sand compaction values and ant abundances were also determined at various points along the two transects. Numbers and sizes of individuals varied between males and females. Using satellite imagery, it was determined that lizards preferred one type of substrate along transect 1 but not along transect 2. There may be potential for locating other populations of P. mcallii within the CVP using satellite imagery if habitat preferences can be used as indicators of lizard presence.

J. D. Buss
Faculty Advisor/Collaborator: **W.A. Taylor**
Distribution of Silicon in the Megaspore Walls of Selaginella

The presence of hydrous amorphous silicon dioxide (opaline silica) in the walls of various types of plant cells has long been recognized. It occurs consistently in association with the surface of large spores (megaspores) of the plant group Lycophyta - particularly the genera Selaginella and Isoetes. Previous analyses of the distribution of opaline silicon on the megaspores of Isoetes revealed that it was involved in producing most, but not all, of the topographic relief of the megaspore ornamentation. Furthermore, following treatment of the spores in hydrofluoric acid (which dissolves opaline silica), some sort of possibly organic matrix remained attached to the spore surfaces. Applying these same techniques to megaspores of Selaginella will allow comparisons to be drawn on the relative distribution and involvement of opaline silica in the wall and on the surface of these lycophyte megaspores. Fossil megaspores occur from the Devonian to the Holocene Periods. Their utility as evolutionary and stratigraphic markers is affected by the variability of their surface morphology. Assessing the causes and ranges of variability in modern megaspores can aid in maximizing the utility of the fossils.

Christina Dahlke
Faculty Advisor/Collaborator: **Jon Scales**
Determination of Diploidy in Xenopus Tropicalis by Southern Blot Analysis of Specific Loci

Xenopus lavis is a traditional tool to study embryogenesis and signaling receptors for development. Not only is the “African clawed frog” easily maintained in the laboratory, it is a source of gene information due to the tetraploid genome and large size of the embryo. X. lavis is a logical model system for developing the foundation of developmental biology. However, the polyploid genome may contain genes that are not functional, thus making complex reaction cascades difficult to study. Therefore, a new model system is required to work efficiently and accurately for genetic studies. Xenopus tropicalis is thought to have a diploid genome and would simplify genetic studies with more life cycles and fewer chromosomes. The two model systems are also compatible so that strategies and genetic markers can be used for both systems. Eventually, X. tropicalis can be a valuable tool for assessing genetic approaches for embryonic development. Determination of diploidy and providing genomic resources for X. tropicalis begins the development of a new model system for genetic analysis.

Kristofer Hall and **Gina Liebsch**
Faculty Advisor/Collaborator: **Daniel Conklin**
Effects of Methylamine in Isolated Human Blood Vessels

Methylamine (MA), a primary amine, is hypothesized to be an endogenous substrate for the vascular-rich enzyme, semicarbazide-sensitive amine oxidase (SSAO). MA is broken down by SSAO into formaldehyde, hydrogen peroxide, and ammonia. Because all three MA metabolites are toxicants and because SSAO activity is relatively concentrated in blood vessels, it is hypothesized that MA is a vascular toxicant. We tested this hypothesis by exposing isolated human blood vessels (internal mammary artery, IMA; radial artery, RA; and saphenous vein, SV), collected from consenting patients undergoing coronary artery bypass grafts, to MA (1-1,000 μM). MA (1 mM) produced two dramatic effects: 1) MA reduced subsequent norepinephrine-induced contractions (NE; 10 μM), and 2) MA relaxed NE-precontracted blood vessels. The MA relaxation was most dramatic in the IMA (~40% reduction in NE-induced tension). We tested whether the MA relaxation in IMA was dependent on SSAO activity by IMA pretreatment with semicarbazide (1 mM, 10 min), the inhibitor for which SSAO was named. Semicarbazide significantly inhibited the MA-induced relaxation. We conclude that MA is a substrate for human blood vessel SSAO and that a MA metabolite(s) significantly reduces blood vessel contractility, although the mechanism is unknown.

David Heitmann
Faculty Advisor/Collaborator: **Christy Carello**
The Effects of Arm Swing Motion on the Human Gait

There has been a flourish of studies done on the lower limbs of humans to try and determine the mechanics behind the cost of locomotion. However, little work has been done on how arm movement affects the cost of locomotion. The objective of this experiment is to determine how restricted arm movements affects the overall cost of locomotion. Subjects will first run as normal and then with their arms restricted to their side. They will run at different speeds and surface grades. The time that the foot is in contact with the ground will be used to estimate the cost of locomotion. Previous experiments have shown that decreased foot contact time results in increased cost. I hypothesize that having the arms restricted during locomotion on an incline will result in a decrease of foot contact time, and thus an increase in cost. I also hypothesize that having the arms restricted during locomotion on a decline will result in a increase in foot contact time, resulting in a decrease in the cost of locomotion.

Alyson Hudock
Faculty Advisor/Collaborator: **Christy Carello**
Quail Hind Limb Morphology

What morphological differences exist in small and large quail that affect differences in energy cost of locomotion? Energy costs are minimized by the capacity to store energy elastically. On the

other hand, increased muscle force results in increased cost. We want to discover if these two factors are affected by the morphology of a muscle-tendon unit. We expect to find that small quail will have shorter muscles that have a greater cross -sectional area. This would make them favorable to generate more force. In larger quail, we expect to find longer muscles that have a smaller cross-sectional area. This would make them more favorable to store elastic energy. Data will be collected using button quail (40g) and mountain quail (200g). We will describe methods for measuring muscle and tendon properties in both species to calculate maximum muscle force and maximum energy storage capacity.

Alex Kluiber and **Heidi Heizer**
Faculty Advisor/Collaborator: **Christy Carello**
Do Button Quail Offset the Cost of Running Uphill when They Run Downhill?

The energy cost of locomotion can be determined through measurements of oxygen consumption. Running uphill results in an increase in cost. However, there have only been a few studies on the cost of locomotion during downhill running. We will run Button Quail on a motorized treadmill positioned on a 10° decline, level surface and 10° incline. We will measure oxygen consumption of the quail on a treadmill to determine the cost of locomotion. We hypothesize that the saving of downhill running will not completely offset the cost for uphill running because of the necessity to brake while running downhill. We have designed methods for determining the energy cost of locomotion for quail running on variable grades. These methods include using an oxygen analyzer connected to an analog to digital converter. This is linked to a personal computer where the results are recorded for later analysis. This poster will describe the results of calibrated equipment and experimental design.

Ron Malecki
Faculty Advisor/Collaborator: **David Lonzarich**
Degradation of Habitat in Warmwater Streams of Chippewa County, Wisconsin

Of the many thousands of miles of small streams in Wisconsin, the majority are classified as warmwater. Despite this fact, most stream research and management in this state has focused on the improvement of coldwater trout streams. In this study, we will continue a survey, initiated in spring 2000, to assess the quantity and quality of habitat in several warmwater streams of Chippewa County, Wisconsin. Habitat evaluations are being completed using the criteria established by the Wisconsin Department of Natural Resources. These results will then be related to land-use patterns for the different watersheds, as viewed from aerial photographs. The findings of the survey will be combined with the results of ongoing studies of warmwater stream quality and riparian zone usage in Northwest and Central Wisconsin.

Jennifer Meisel and **Nicole Trushenski**
Faculty Advisor/Collaborator: **Evan Weiher**
Multivariate Analysis of Floodplain Oak Savanna Community Composition

Floodplain oak savanna communities are a threatened vegetation type (e.g., Quercus macrocarpa - Andropogon gerardii communities are listed as G1) but little is known about their understory vegetation. With help of the DNR, we located several areas of floodplain oak savanna along the Chippewa River in western Wisconsin. The sites vary from 10% to 80% tree canopy cover (Quercus macropcarpa and Q. ellipsoidalis). 168 quadrats (0.25 m2) from 10 sites sampled a range of fire frequencies, soil qualities, tree canopies, elevations, and distances from the river. We used indirect gradient analysis with both DCA to determine how vegetation is affected by environment. Disturbance by fire, soil moisture, light availability, tree canopy, and soil quality were all significantly correlated with ordination scores. In a nutshell, Andropogon gerardii dominated a core community type, and the communities graded into (1) Schizachyrium - Koeleria sand barrens (if very sandy) (2) Sorghastrum - Solidago mesic prairie (if low soil P) (3) Solidago /

Carex / Spartina / Cornus savanna complex (if richer soil & frequently burned), and (4) Solidago gigantea / Carex / Teucrium savanna (if richer soil & greater canopy).

Eric Mickelson
Faculty Advisor/Collaborator: **Terry Balding**
Analysis of Site Fidelity and Species Density of Lower Chippewa River Backwater Turtles

Turtles of the lower Chippewa River near Durand, Wisconsin were studied to determine population estimates and site fidelity within a backwater habitat. Mark and recapture techniques at four netting stations placed 100 yards apart within the study site were used to keep counts of the number of each turtle species encountered, as well as to track movements in those turtles that were recaptured. Species of turtles encountered included Painted (Chrysemys picta), Spiny Softshell (Trionyx spinifera), Snapping (Chelydra serpentina), Common Map (Graptemys geographica), and Blanding's (Emydoidea blandingi). Painted turtles represented 88.5 percent of all turtles captured. Because of the relatively low numbers of all other species caught, site fidelity was considered for only the painted turtles. Of those painted turtles that were recaptured, most (95 %) traveled less than 200 yards from their original capture station. It is worth mentioning that these turtles represent only 11 percent of the Painted Turtles caught during the study.

Hilary Preis and **Aaron Broege**
Faculty Advisor/Collaborator: **Jon Scales**
Characterization of EphB3 Regulatory Sequences

During embryonic development, cells use surface receptors to guide their way around the organism. One such receptor, EphB3, a member of the Eph-class receptor tyrosine kinases (RTKs), is of particular interest to us. Previous experiments (Winning, et.al, Dev Bio 179:309 (1996); Scales, unpublished data) have determined that some Eph RTKs function in cell-cell adhesion complexes. The specific function of EphB3, however, remains unknown. To determine the function of EphB3, we have isolated the entire gene as a set of small, unordered, overlapping sequences. By last summer (2000), we generated a low resolution restriction map, allowing us to arrange the fragments. Our task has now become one of sequencing the most promising genomic DNA fragments in order to identify the transcriptional control regions upstream of the gene itself. Once they are identified we will be able to generate expression constructs to test the regulatory sequences. The final step in the process will be to produce transgenic frogs that will express mutated forms of the gene, allowing us to investigate EphB3's biological function.

Alan Roloff
Faculty Advisor/Collaborator: **Jon Scales**
Cadherin's Intracellular Domain Mediates Xepha4 Signaling to Regulate Cell Adhesion During Development

Receptor tyrosine kinases (RTK's) play definitive roles in cell division, cell motility, and differentiation during embryonic development. One of the largest families of RTKs is the Eph receptor family. These RTKs play important roles in nervous system development. One specific Eph receptor XephA4 (previously known as Pagliaccio) has been shown to down-regulate cell adhesion between blastomeres when ectopically expressed via mRNA injection into Xenopus laevis embryos. The localized regions of dissociation are referred to as craters. During early Xenopus development, the primary cell adhesion system is the cadherin-based adherens junctions which are a complex of cadherin and catenins connected to the actin cytoskeleton. The observed dissociation suggests that XephA4 activation disrupts the function of cadherin-based adherens junctions. Dissociation can be rescued/prevented by co-expression of cadherin mRNA together with XephA4. This result suggests that cadherin and XephA4 may interact, directly or indirectly, in a common signaling pathway. We have tested C-terminal truncations of the cadherin protein in attempts to localize those regions of cadherin potentially involved in an interaction with XephA4. Interestingly, co-expression of cadherin lacking the extracellular domain, DECcad,

rescues dissociation. Similarly, cadherin lacking half of the C-terminus, DECcadD83 is also capable of rescuing dissociation. We have continued to generate additional truncations of the C-terminal domain to delineate the region of cadherin which mediates the signaling of XephA4 to induce dissociation.

Tara Scheunemann
Faculty Advisor/Collaborator: **Christy Carello**
The Effect of Surface Grades on the Stride Parameters of Button Quail

Button Quail (Coturnix chinensis) are ground foragers and therefore spend a predominant amount of time walking and running. Stride parameters and joint kinematics are useful tools for evaluating how surface substrates affect the cost of locomotion because they reveal the relative time and range of motion devoted to various stages of each step. Four parameters were analyzed in this study: stance phase, swing phase, cycle period and duty factor. The entire step, from the moment of the first foot contact with the ground to the return of the foot to the ground after the swing phase, is defined as the cycle period. Stance phase is defined as the amount of time that the foot is in contact with the ground. We used a high speed digital camera to film Button Quail running on a motorized treadmill on a level surface, two inclines (10o and 20 o) and a decline (10 o). We found that both stance phase and cycle period decreased from decline to level, but increased from level to incline. We also found that the swing phase increased during incline running, thus allowing more time to generate force for the remainder of the cycle period.

Jill Sporrong
Faculty Advisor/Collaborator: **Paula Kleintjes**
Restoration of Karner Blue Butterfly Habitat in the Eau Claire River Basin

The success of wild lupine (Lupinus perennis) seeding is being measured in the Eau Claire River basin. Lupine is the larval host plant of the federally endangered Karner blue butterfly. In fall 1997, a dry sand prairie seed mixture was planted for a habitat mitigation project, which included 10% wild lupine. By August 2000, lupine was established at this site (with a mean of 0.026 lupine/m2) along with a population of Karners. In 2000, the Eau Claire County Natural Resources Conservation Service began including lupine seed in all Conservation Reserve Program (CRP) native prairie plant mixes. We evaluated whether CRP sites were appropriate (e.g., soil, light, vegetation, butterfly range) for lupine establishment and if so, how did they compare with the successfully seeded habitat mitigation project? Out of 32 sites, half existed within the Karners documented range, three contained stands of lupine, and one supported a population of Karners. In spring 2000, sites were planted with a mix of native grasses and forbs, and lupine was planted in fall (25-40 seeds/m2). The successful germination of lupine/m2 will be determined in spring 2001 by transect counts (n=3) in each of 15 sites and compared with first year results for the seeded dry sand.

Heidi Wallman
Faculty Advisor/Collaborator: **Joseph Rohrer**
Temperature and Hypoxia Tolerance of Selected Fishes from a Hyperthermal Tidepool in the Dry Tortugas

During hot summer months, fishes living in shallow tidally influenced rockpools on northwest Loggerhead Key in the Dry Tortugas National Park, experience marked diel temperature shifts. We sampled pools in July 2000 and documented thermal characteristics, ichthyofauna diversity, and quantified high-temperature and low-oxygen tolerance of three pool fishes. Mid-moming rockpool temperatures increased from 30.0 to 35.80C by late afternoon. Unlike typical extreme habitats of this type, which usually contain one or two tolerant species, Loggerhead Key rockpools were populated by at least seven tropical fishes. Also, rockpools were inhabited by reef species usually found in deeper, cooler tropical waters. High temperature tolerances for three species, cocoa damselfish Pomacentrus variabilis, French grant Haemulonflavolineatum, and

white mullet Mugil curema, were not significantly different and ranged from 35.7 to 37.3'C. Hypoxia tolerances of French grunt (1.8 mg/L) and white mullet (2.1 mg/L) were also not significantly different; however, cocoa damselfish was significantly more tolerant of hypoxic conditions (1.36 mg/L) than the other two species. French grunt and cocoa darnselfish augmented their oxygen tolerance strategy through aquatic surface respiration when dissolved oxygen levels reached 2.00 mg/L, whereas, white mullet did not. Various physiological adaptations allow Loggerhead Key fishes to exploit resources in hyperthermal habitats.

Chemistry

Emily Bauer
Faculty Advisor/Collaborator: **Scott Hartsel**
The Effect of Serum Albumin on Amphotericin B Formulations

It has been demonstrated that mild heat treatment of Fungizone (Amphotericin B: deoxycholate formulation) leads to a super-aggregated form ("Hot-Zone") that demonstrates reduced toxicity in vitro and in vivo in a manner reminiscent of new liposomal Amphotericin B preparations. Our previous whole serum distribution studies have shown that both Fungizone and Hot-Zone are predominantly present in the lipoprotein deficient portion of serum (mostly albumin) with some small difference in lipoprotein distribution. Thus, we have investigated the effect of human serum albumin (HSA) on the stability and in vitro channel forming ability of these two preparations against model fungal and mammalian membrane vesicles. Kinetic and CD spectra show that Fungizone is rapidly converted from its aggregated form to a bound monomer in the presence of HSA, while Hot-Zone demonstrates greater stability by persisting as a stable inactive aggregate. Our stopped-flow fluorescence measurements of ion currents show that HSA attenuates the membrane-activity of both preparations. However, the efficacy of Hot-Zone against model fungal membranes is comparable to that of Fungizone (especially at low concentrations) while the activity against model mammalian membranes is still reduced. These data provides a rationale for the similar efficacy and lower toxicity of Hot-Zone.

Clinton Fenner, Theresa Hopp, Kristopher Lange, Keetra Plegge, and **Nathan Wells**
Faculty Advisor/Collaborator: **James Phillips**
Substituent and Solvent Effects in the O-H Vibrational Spectra of Alchohols and Acids

We have measured integrated intensities for O-H stretching vibrational bands, both fundamentals and overtones, for a wide variety of vapor phase alcohol and acid species. In turn, we have identified several trends among the band strengths that parallel the inductive character of the substituent. Specifically, fundamental intensities increase with substituent electronegativity, as does intensity fall-off, or the proportional decrease in overtone band strength relative to the fundamental. We have also attempted to model the data, and while the agreement is only fair, the model parameters also vary with the substituent, and offer some rationale for the trends. Ultimately, we suspect that the trends arise from systematic variations in charge distribution among the compounds studied. Just recently, we have attempted to solidify this rationale through a series of molecular orbital calculations. We have also begun an examination of solvent effects on these data, in an attempt to identify analogous trends arising from intermolecular (i.e. solvent-solute) interactions. These should be distinct from the susbtituent effects, which are strictly intra-molecular in nature.

Teresa Jentzsch and **Jessica O'Konek**
Faculty Advisor/Collaborator: **Jack Pladziewicz**
The Relationship Between Molecular Shape and Rate of Electron Transfer

Electron transfer reactions are among the simplest chemical changes that occur, yet they control or participate in some of the most important chemical changes in industrial processes, the

environment and living organisms. Our project investigates the relationship between how the rates of these reactions are controlled by the structural changes that molecules undergo during the electron transfer process. This poster will summarize the results of our studies and show how electron transfer rates depend on the molecular structure (shape) of the reactant and product molecules.

Chris Lemke, Rebecca Fenske, and **Anthony Ratkovich**
Faculty Advisor/Collaborator: **Marcus McEllistrem**
Etching of Gallium Nitride by Molecular Bromine

Gallium nitride is a semiconductor of increasing utility. It is currently used in light-emitting diodes (LEDs) and has also been used to make diode lasers (for use in laser printers and compact disc players). Although the LEDs are now commercially available, the diode lasers require significant improvements before they are commercially viable. We have undertaken a study into the etching of the gallium nitride surface using bromine in an attempt to better understand the surface reactions that lead to etching. Our results indicate that bromine can facilitate the removal of gallium from the surface, and that nitrogen desorbs as N2. Interestingly, although the the atomic structure for etched and unetched surfaces are significantly different, the atomic scale (and even nanoscale) structure for these two surfaces is very nearly the same. Our work will describe how some methods indicate that the surface is ordered while others indicate disorder. How bromine influences etching and surface structure will also be presented and discussed.

Wesley Manske, Chris Lemke, Jami Radl, and **Anthony Ratkovich**
Faculty Advisor/Collaborator: **Marcus McEllistrem**
Chemistry of the Gallium Nitride Surface

Gallium nitride continues to be a material of interest to the optoelectronics industry. Specifically, deep green and blue light-emitting diodes and diode lasers can be made from nitride semiconductors. These colors are not obtainable using established semiconductors. We are interested in better understanding fundamental surface reactions on the gallium nitride surface that relate to material growth and etching. We have therefore begun an investigation into methods for preparing clean, well-ordered nitride semiconductor surfaces. We describe the results from two different approaches: using a capping material that we later desorb prior to surface chemistry studies, and etching the surface with bromine. Our initial investigations have focussed on the chemistry of hydrogen on gallium nitride since it is involved in several aspects of surface reactions related to material growth. The dependence of hydrogen desorption on surface preparation will be discussed, and how surface composition influences hydrogen chemistry.

Anthony Ratkovich, Phillip Canon, Lara Harris, and **Matt Popowski**
Faculty Advisor/Collaborator: **Marcus McEllistrem**
LabView Program for Control of a Mass Spectrometer

A quadrupole mass spectrometer is used in our research into surface reactions. We use this instrument to perform two different experiments: measuring the composition of gases to which the sample is exposed, and determining the identity of molecules that desorb from (that is, come off of) the surface as the sample is heated. The first experiment is called residual gas analysis and the second is called temperature programmed desorption. The goal of this project is to interface the mass spectrometer's control electronics to a computer, so that the computer can be used to control the mass spectrometer, collect the data and store it. We used a Macintosh computer, and the programming language LabView to perform this task. We have therefore written a control program in LabView for performing all of the needed measurements as well as handling the data. Some of the advantages of controlling the mass spectrometer and some of the remaining challenges that we face will be presented.

Rebecca Siemer and **Michael Weiss**
Faculty Advisor/Collaborator: **Marcia Miller-Rodeberg**
Kinetic And Redox Potential Studies Of Fe(Iii) Proteins From Bacterial Sources

Studies of have shown that the redox potential of an enzyme is a sensitive indicator of subtle changes at the active site by which catalysis is regulated. Our work will focus on redox potential studies of two different classes of Fe (III) proteins, the dihydroxybenzoate dioxygenase, protocatachuate 3,4-dioxygenase (3,4-PCD) and the heme enzyme, catalase. 3,4-PCD is considered the archetypal Fe(III) dioxygenase, and has been the focus of numerous crystallographic, kinetic, and spectroscopic studies. The enzyme catalyzes a key step in the microbial degradation of aromatic compounds- cleavage of the aromatic ring. Our goal is to determine the redox potential of 3,4-PCD as native enzyme and complexed with various substrates and inhibitors. 3,4-PCD has been isolated from P. aeruginosa using standard purification techniques. Active, purified enzyme has been obtained and is currently being characterized. We are also currently isolating and characterizing two heme enzymes, which catalyze the disportionation of hydrogen peroxide, from two different bacterial sources. Based on kinetic analysis, the P. aeruginosa heme enzyme is likely to be a catalase. The redox potentials of the catalases will also be determined. Initial results from the purification and characterization of these enzymes will be presented.

Jason Van Zanten
Faculty Advisor/Collaborator: **Stephen Drucker**
Cavity-Ringdown Laser Spectroscopy

The overall goal of the research program is to understand the structural and dynamical properties of photoexcited molecules. Knowledge of these properties is important for predicting the course of photochemical reactions, such as those initiated in the atmosphere by sunlight. Laboratory studies are accomplished by recording laser absorption spectra of gaseous molecular samples. The laser spectroscopy facility was constructed and equipped from 1999-2000. During the summer of 2000, a light detection system known as the Cavity-Ringdown (CRD) technique was installed. Molecular absorption is signalled by an increase in the rate at which light intensity decreases in an optical cavity. This technique almost completely eliminates “noise” in recorded spectra that is due to random fluctuation in the intensity of the laser beam. The complete CRD system includes high-reflectivity mirrors bounding the optical cavity, a photodetector, and a digital oscilloscope. The entire detection system was computer interfaced using the LabVIEW (R) programming environment. The performance of the CRD system was optimized by recording the spectrum of a doubly forbidden oxygen transition.

Computer Science

Matthew Dorn
Faculty Advisor/Collaborator: **Daniel Stevenson**
A Computational Process for Determining Object-Shadow Correlation

Computer vision includes the study of reconstructing lost 3D information using 2D cues. Psychological studies have shown that shadows are an important 2D cue which humans use to determine an object’s 3D position. Previous research in computer vision has also shown that the use of object-shadow correlation provides a reasonably straight-forward method for computing an object’s 3D position from a 2D image. However, this requires the a priori knowledge of which shadow belongs to which object, and this remains a significant problem in computer vision. The goal of this project is to develop a system to examine 2D image sequences and accurately correlate the objects in the scene with their shadows.

Jared Heuschele
Faculty Advisor/Collaborator: **Andrew Phillips**
Flexible Topologies and Interfaces for a Distributed Computation Framework

This paper describes a “framework” for distributed computation that is problem, communication topology, and interface independent. Our goal is to create a framework that allows a user to easily implement a solution to a problem adaptable to distributed computation on a Beowulf cluster using MPI as the communication mechanism. Our guiding concern is to allow the user to implement a parallel algorithm while remaining unaware of the communication methodology of the underlying system. While we have achieved this particular goal in previous research using a framework implementation of a variation of the traditional “master-slave” distributed computing model, the result was a solution applicable to a limited class of problems.

James Russell
Faculty Advisor/Collaborator: **Daniel Stevenson**
Improving Image Layer Classification

The web consists of many layered images. Automatically reconstructing the layers that an image consists of is a difficult task. One of the steps involved in this process is layer classification. This project focuses on improving a simple layer classifier, both in terms of the robustness of the image statistics gathered as well as the accuracy of the actual classification procedure.

Geography

Alison Bush, Sarah Mindel, and **Lisa Schretenthaler**
Faculty Advisor/Collaborator: **Sean Hartnett**
DGPS Survey of White Pines in Putnam Park, Eau Claire, WI

Putnam Park contains some of the few remaining majestic white pines (Pinus strobes) in the area. This project involved the completion of a detailed Differential Global Positioning System (DGPS) survey of the white pines in the park. The data was collected using a Trimble Pro XR DGPS unit that records latitude, longitude and elevation positions with sub-meter accuracy. Additional data collected included health, age, diameter, and estimated height along with the digital image of the tree. All the data will be combined on an ArcView GIS database and plotted onto the digital orthophoto quadrangle (DOQ) and onto a digital elevation model (DEM) of Putnam Park. This data will be presented in a series of detailed maps and an interactive web page where users can point and click on map objects retrieving information on the individual trees.

Ryan DeChaine
Faculty Advisor/Collaborator: **Harry Jol** and **Garry Running**
Ground Penetrating Radar Investigations at the Lowton Archaeological Site, SC.MB

A ground penetrating radar (GPR) survey was conducted at the Lowton site in southwestern Manitoba to locate intact subsurface archeological features. The goal of the research is to re-construct Pre Columbian cultural and environmental contexts to more effectively interpret the archeological record of the region. The site, selected for study through its reputation among local collectors as artifact rich, was sectioned off into a grid consisting of 35 lines, separated by 0.5 m. Each line was 30 m in length with data points collected every 0.10 m with a pulseEKKO 100 GPR system (200MHz antennae). A variety of anomalies (domes, pits, and voids) were interpreted from the GPR reflection patterns. When the anomalous reflection patterns were ground truthed by archeological excavation, concentrations of large clasts, rodent burrows, pits containing ceramics and bone fragments, and auger hole tests were discovered. Several of the disturbances were non-cultural (clasts, holes, rodent burrows, inconclusive pits), while others were associated with

disturbances interpreted as cultural features (charcoal, bones, ceramics). All anomalous GPR reflection patterns inspected by excavation were associated with unique subsurface features. This evidence strongly supports the use of GPR in the archeological recovery of artifacts.

Alex Jones
Faculty Advisor/Collaborator: **Sean Hartnett**
Photo Mapping -Badger Ammunitions Plant: The Analysis of Objects Using Air Photo Interpretation and Placement of Political Boundaries

The purpose of this project is to research the land area of The Badger Army Ammunition Plant, a 7354-acre complex located in central Wisconsin. Air photos obtained from the Sauk County Cartographers office, were digitally combined and manipulated for the study area. The air photos were then used to interpret features currently located at this site. These features were mapped and labeled to give a better understanding of the area. Platt maps were also be used to look at land property before the plant was built in 1941 and to compare that to the land property today. By studying what is at the site may add a new view of the complex. To further aid in its future plans the decommissioned plant can then use the map for planning and assessment.

Christopher Koehnen, Timothy Kinney, Corinne Orzech, Joshua Lahner, and **Bradford Minich**
Faculty Advisor/Collaborator: **Sean Hartnett**
GPS Mapping Techniques Offluvial Characteristics on the Chippewa River

During September 2000 a one-mile stretch of the Chippewa River in Eau Claire, Wisconsin was mapped using Global Positioning System (GPS) technology. Traditionally, fluvial systems are mapped using a cross section survey technique, which limits river channel detail and structural understanding. The intent of our research was to create a detailed Digital Elevation Model (DEM) and a Contour Interval Model of a stretch of the river in an attempt to illustrate a more comprehensive picture of the river channel structure. Two different strategies of GPS data collection were employed to compare mapping techniques. Pathfinder and ArcView software were used to organize and present the GPS data in a two dimensional form while Arcview Spatial Analyst was employed to produce the final DEM. The resulting maps and model of the river channel demonstrate a new, efficient, and accurate approach to fluvial mapping, potentially replacing the traditional methods of channel structure studies.

Joshua Lahner, Kimberly Long, and **Casie Ollendick**
Faculty Advisor/Collaborator: **Garry Running**
Geomorphology of the Pembina Spillway, South Central Manitoba

This poster's purpose is to present results of research conducted to determine dimensions, morphology, and development history of the Pembina Spillway in Lang's Valley, adjacent to the Tiger Hills end moraine. The Pembina Spillway lies between Glacial Lake Hind and Glacial Lake Agassiz. Like other glacial meltwater spillways in the northern Great Plains, the Pembina Spillway exhibits a deep, steeply incised inner trench bounded, in places, by an outer channel. However, outer channel dimensions and boundaries are poorly understood. Whether this spillway formed by one or more episodes of incision, or occupies a pre-existing drainageway is still debated. GIS-based maps of the spillway and adjacent landforms of Tiger Hills were constructed from interpretations of paired aerial photographs. Glacioalluvial origin of a streamlined hill (erosional remnant) and at least two sets of terraces (components typical of outer channels) were confirmed by field investigations. The following conclusions can be made: 1) The inner channel is ~2700 meters wide and ~225 meters deep; the spillway is ~5500 meters wide including the outer spillway. 2) Erosional remnant is an outer spillway feature formed before inner channel was incised by initial flow. 3) Presence of terraces in/near Lang's Valley indicates more than one incision.

Kimberly Long, Jennifer Meisel, Joshua Lahner, and **Casie Ollendick**
Faculty Advisor/Collaborator: **Garry Running**
Paleovegetation Reconstruction of the Elkwater Lake Basin Locality, Cypress Hills, Southeastern Alberta

The Elkwater Lake basin study area (Cypress Hills, southeastern Alberta) is one of 4 Canadian prairie localities currently under study by SCAPE researchers (Study of Cultural Adaptations within the Prairie Ecozone). Reconstructing post-glacial vegetation is one of the goals of the SCAPE project. The Elkwater Lake basin study area is important for analyzing the pollen record preserved in sediments recovered from Elkwater Lake. The purpose of this poster is to design an analysis to assist in interpreting the pollen record recovered from Elkwater Lake. Aerial photography and existing digital data were used to create a GIS-based vegetation map of the study area. A pollen shed model was constructed in ArcView ModelBuilder, based on proximity to drainage, size, vegetation and wind, to identify areas within the basin that are best represented by pollen spectra preserved in Elkwater Lake. The results of the pollen shed model identify areas within the basin that are under, over or correctly represented by the pollen record in Elkwater Lake. Preliminary results indicate that vegetation communities within the contributing basin that are large and/or near a drainage are over-represented in the Elkwater Lake pollen record. Reconstructions of paleovegetation based on pollen analysis must account for this error.

Chris Morton
Faculty Advisor/Collaborator: **Harry Jol**
Geo-Archaeological Database and Search Engine for the Historical Cave of Letters, Israel

A solid and maintainable research database was developed to provide digital storage for all artifacts and finds discovered during the July 2000 John F. Merrill Expedition to the Cave Of Letters, Israel. The Microsoft Access database was also designed to provide a secure web-based querying system allowing data access for all researchers involved in the expedition. The web based search engine (500 K in size) was researched and implemented using the Java programming language and has approximately 2000 lines of code. The search engine runs on a Java web server and provides detailed searching, descriptions, and photographs of all archaeological discoveries found. The research gives archaeologists worldwide the ability to retrieve valuable information about the historically significant cave and its contents. The secure page also provides a visual display of artifact location giving way to an independent Geographic Information System (GIS) allowing researchers to utilize a fast and powerful search of the Cave Of Letters, Israel. The research database can easily be updated in the field on future expeditions.

Chris Morton
Faculty Advisor/Collaborator: **Harry Jol**
Real-Time Geo-Archaeological Database For The Cave Of Letters, Israel

Real-time Archaeological data sets were collect and stored directly into a relational database during the John F. Merrill Expedition to The Cave Of Letters, Israel. An Archaeological discovery was recorded into the database and plotted on the cave map at the exact location and of the discovery through the use of a Geographical Information Systems (GIS) program, Field Notes, and a Fujitsu Stylistic 1200 Pentop computer. The accuracy and efficiency of the data collection was analyzed and found to contain distance errors of up to ? a meter (1.5 feet) and database instabilities. The future of Archaeological cataloging is at the heart of the proposed research, and the results will be crucial in designing, and maintaining a real-time Archaeological database and cataloging system.

Casie Ollendick
Faculty Advisor/Collaborator: **Garry Running**
Surficial Geology and Land Use of the Glacial Lake Hind Basin

The Lauder Sandhills are located in southwestern Manitoba (Canada) within the basin of former Glacial Lake Hind. The Lauder Sandhills and adjacent areas within the Glacial Lake Hind basin is one of the four localities currently under investigation as part of the multi-disciplinary SCAPE project (Study of Cultural Adaptations in the Canadian Prairie Ecozones). The dominant landform in the Lauder Sandhills and other areas exhibiting simlar topographic expression within the basin are eolian sand dunes. These large, presently stable, parabolic dunes were constructed by episodic eolian deposition during post-glacial time. These dunes have received considerable scrutiny by geomorphologists and archaeologists in recent years. However, it remains unclear whether they formed under essentially modern environmental conditions or are relict of some former environmnetal regime. My research objective is twofold. First, to use methods aerial photographic interpretation to identify (and GIS technology to map) and determine the orientation of dunes in the Lauder Sandhills and other dune fields within the study area. If dune orientation is consistent with modern wind regime, the dunes are likely to be the result of modern environmental conditions. Second, to assist local land and resource managers by determining how (or if) current land use of the Lauder Sandhills differs from land use in the rest of the Glacial Lake Hind basin.

Nicholas Saeger
Faculty Advisor/Collaborator: **Harry Jol**
Ground Penetrating Radar Experiments At Forest Hills Cemetary, Eau Claire, Wisconsin

The Forest Hills cemetery in Eau Claire, Wisconsin has burial plots that are “potentially” not occupied and could possibly be for sale. While the cemetery sexton keeps extensive and up-to-date records of who is buried in what location, over the course of 150 years, details of older burialsare often not known due to old wooden markers that have decayed or paper records that have been misplaced. While the sexton can get a sense of where the older burial sites may be (break in the soil or a depression), there is no real way to know for sure, other than digging an exploratory hole. Ground penetrating radar (GPR) provides a non-invasive manner in which to see if there were previous burials at a location. The specific goal of the project was to concentrate on a test area of burial plots to determine if there is potentially open space for new plots to be sold, or if these areas are already occupied. GPR results showed that burials previous to 1950 were more difficult to recognize due to decomposition in sandy soils while burials post-1950 provided very strong diffraction patterns that in some cases shadowed nearby burial plots.

Geology

Nicole Bergstrom
Faculty Advisor/Collaborator: **Karen Havholm**
Documenting Sand Dune Stratigraphy Through Ground-Penetrating Radar, Flintstone Hill, SW Manitoba

Geoarchaeological study of Flintstone Hill, a stabilized parabolic dune in Glacial Lake Hind Basin (SW Manitoba) is ongoing. Previous studies of sediments in and below the dune in a Souris River cut-bank determined that glacial Lake Hind occupied the site and was replaced first by closed basin lake/wetland conditions by 9250 BP, then by eolian deposition by 6700 BP. Multiple thin sand sheet beds capped by soils were deposited between 5500 BP and 3250 BP. The lower condensed zone includes carbonate enrichment, indicating maximum aridity prior to 4000 BP when a flood truncated the section and deposited a silt layer. The upper condensed zone lacks carbonate but contains clay bands. The parabolic dune then migrated in, since experiencing deflation and soil formation. To determine the 3-D internal stratigraphy of dune and underlying sand sheet strata, five ground-penetrating radar (GPR) transects were collected, but only penetrated five meters. A prominent sub-horizontal reflection was imaged four meters below the highest point on the dune. Profiles and cores indicate this reflection corresponds to the condensed zone. Above this, concave upward and southward-dipping reflections are present

locally; these indicate soil-capped deflation scours and locally preserved dune cross-strata. GPR data from below the prominent reflector are very limited. However, profiles and cores expose angle-of-repose dune cross-strata up to 1.5 m thick below the condensed zone indicating migrating eolian dunes rather than sand sheets initially buried the wetland.

Sarah Gordee and **Carter Dettloff**
Faculty Advisor/Collaborator: **Bradford Burton**
Geologic and Geochemical Comparison of Late Eocene and Oligocene Volcanic and Intrusive Rocks, Carlin-Range and Central Ruby Mountains, Elko County, Nevada

The central Ruby Mountains and the Carlin-Range, northeast Nevada, are separated by a major northwest-dipping fault zone that accommodated large magnitude extension beginning in the late Eocene (~35 Ma). The Harrison Pass pluton is a composite granodiorite and monzogranite body that was emplaced at mid-to-upper crustal levels ~36.6 My. b.p. and is exposed in the footwall of the fault zone. Volcanic rocks of similar age and composition are exposed in the hanging wall of the fault near Robinson Mountain, 30 km to the west-northwest of Harrison Pass pluton. This study tested the hypothesis that the volcanic rocks in the Carlin-Pinon Range are the extrusive equivalents of Harrison Pass pluton. Proof of this relationship would provide piercing points to measure slip on the fault zone, and have important implications for the tectonic reconstruction of northeastern Nevada. Detailed geologic mapping was conducted to establish volcanic units, and geochemical analyses were used to compare the petrogenetic history of the rocks. Major and trace element compositional trends show strong similarities between the intrusive and extrusive suites, as do modal mineralogy and plagioclase zoning. The data are non-unique, but support a genetic relationship that should be further investigated using isotope geology.

April Johnson
Faculty Advisor/Collaborator: **Karen Havholm**
Documenting the Paleoenvironment of the Proterozoic Hinckley Sandstone

The Proterozoic Hinckley Sandstone, a late-stage sediment deposit in the Mid-Continent Rift, is exposed in east-central Minnesota. This mature, quartz-rich sandstone was previously interpreted as a shallow lacustrine system, but new evidence (Beaster and Kohn, 2000) indicates that it was deposited in a fluvial and eolian environment. This interpretation is based on recognition of two different types of cross-strata, trough and planar, that each displays a distinct paleocurrent direction. The unimodal trough orientation of trough cross-strata is consistent with southeastward bedform migration in a fluvial environment. Northeast-dipping planar cross-strata containing adhesion structures, which are indicative of wind blown sediment adhering to a damp surface, indicate wind-blown dunes migrating perpendicular to the adjacent streams. For this study, four additional stratigraphic sections were measured, described, and correlated to previously measured sections. New sections to the north and south of the previous study area show little difference in overall facies type or distribution. Overall, fluvial facies dominate over eolian. Detailed lateral tracing of beds demonstrates that locally thick eolian cross-strata thin and disappear laterally by downward cutting of fluvial basal scour surfaces over distances of 200m. Four types of deformation have been identified within the Hinckley Sandstone: upturned and broken laminations, flame structures, convolute bedding, and small-scale faults. Analysis of deformed strata to determine the cause(s) of the deformation is ongoing.

Brent Kabat and **Katie Thornburg**
Faculty Advisor/Collaborator: **J. Brian Mahoney** and **Robert Hooper**
Swan Lake Transect: Insight into Metal Speciation in the Lower Couer d'Alene River Valley, Idaho

Toxic metals (especially lead and zinc) are widely distributed throughout the lower Coeur d'Alene River Valley. Variations in the hydrologic regime, redox conditions, porosity/permeability, organic content and microbial activity results in complicated metal transport pathways. Documentation of these pathways is a prerequisite to effective remediation, and requires accurate analysis of lateral

and vertical variations. We have sampled a detailed transect of fluvial sediments in the Swan Lake area of the lower river valley. Sediment cores were retrieved from river channel, levee, back levee, marsh and lacustrine environments. An analytical approach combining sequential extraction, electron microscopy, and microanalysis provides a comprehensive assessment of particulate speciation in these varied environments. Flood redistribution of oxide, sulfide and carbonate phases results in periodic contaminant recharge generating a complex system of metal dissolution, mobilization, migration and precipitation. In levee environments, authigenic sulfides from flood scouring are quickly oxidized resulting in development of oxide coated grain surfaces. Stability of detrital minerals on the levee is variable depending on sediment permeability, grain size and mineralogy resulting in a complex stratigraphy of oxide zones (multiple Zn-Pb-Mn-Fc oxyhydroxide phases) mottled with zones dominated by detrital and authigenic carbonate and sulfide phases. Marshes subjected to periodic subaerial exposure/flooding are dominated by authigenic and biogenic mineralization. Lacustrine environments are dominated by colloidal inorganic and biogenic sulfide minerals.

Stephanie Larsen
Faculty Advisor/Collaborator: **Phil Ihinger**
Geology at Oregon Caves National Monument

Oregon Caves National Monument is a unique and complex geologic area. The main feature in this park is the unusual occurrence of a marble cave, which is intruded by plutonic dikes and locally as well as regionally metamorphosed. Through an internship sponsored by the Geological Society of America and the National Parks Service, I spent the summer of 2000 on the interpretation staff of this park. The formal duties of the internship included preparing and presenting an educational program to the public regarding the impacts of humans on the regional geology, rewriting the geological section of the tour guide handbook to include accurate geologic information, and continuing a water quality project which required collection of water samples within the cave for later analysis and interpretation. The water quality project included taking measurements in various locations in the cave for temperature, pH, conductivity, and taking samples to be geochemically analyzed for ionic concentrations. Based on the data, interpretations can be made regarding the creation and evolution of this distinctive cave.

Sarah Prindiville
Faculty Advisor/Collaborator: **J. Brian Mahoney**
Provenance Signature of Glaciofluvial Sediments, Puget Lowland, Washington

Quaternary sediments in the Puget Lowland comprise a complex succession of intercalated glacial, glaciofluvial, and glaciomarine sediments derived from two distinct source regions. Sedimentation patterns were alternately dominated by 1) the Puget Lobe of the Cordilleran Ice Sheet, which provided detritus rich in metamorphic and plutonic debris from southern British Columbia, and 2) smaller alpine glaciers to the east, which provided detritus dominated by volcanic detritus from Tertiary to Recent volcanism in the Cascade Range. Each source region provided sediment with distinctive petrologic and geochemical characteristics. Complex patterns of glacial and interglacial sedimentation have led to a complicated stratigraphy that varies widely across the region. This investigation attempts to fingerprint individual source regions in order to provide baseline data applicable to modeling sediment distribution in the Puget Lowland. Stream sediment samples from modern-day rivers have been acquired from four general areas. the Northern Cascades and Coast Mountains, the Central Cascades, the Southern Cascades, and the Olympic Mountains. Major and trace element geochemistry is being used to identify geochemical markers from each region in an attempt to identify distinctive characteristics that can be used to model temporal and spatial variations in sediment supply to the Lowland.

Katie Thornburg
Faculty Advisor/Collaborator: **Robert Hooper** and **Kent Syverson**
Clay Mineralogy of Till Units in Western Wisconsin

Semi-quantitative till clay mineralogy of the <1m fraction has been examined to determine if clay mineralogy can be used to differentiate the various till units in western Wisconsin. Older, calcareous till units of the Pierce and Marathon Fms. and the overlying, reddish-brown, sandy till units of the River Falls, Lincoln, Copper Falls Fms. and an unnamed till unit in Chippewa County, WI have been analyzed using the standardized laboratory procedures of Moore and Reynolds (1997). Methods include vacuum mounting clays, deconvolution of peak areas using JADE (v. 3.1), and determining mineral intensity factors (MIFs) from NEWMOD. Eighty basal till samples have been processed and the clay minerals quantified based on illite (I), kaolinite (K), vermiculite (V), and mixed layer illite/smectite (I/S).

Lithostratigraphic Units> I% K% I/S% V%
Copper Falls Fm. (n=12) 37.5±10.8 6.9±5.6 33.9±10.6 21.7±5.7
Lincoln Fm. (n=14)> 32.1±6.6 5.2±2.0 37.2±6.2 25.5±6.0
River Falls Fm. (n=12) 31.3±9.3 15.1±5.8 33.8±8.2 19.7±7.2
Unnamed Till Unit (n=16) 26.8±7.7> 18.7±6.0 37.9±7.1 16.6±7.1
Trade River Fm. (n=4) 42.6±8.9 6.3±2.1 39.5±11.2 11.7±7.1
Pierce Fm. (n=13)> 25.3±5.9 23.3±3.5 39.3±4.6 12.2±1.6
Marathon Fm. (n=5)> 26.3±11.2 6.3±1.0 50.3±11.3 17.1±4.9

Based on these results we conclude that the Illinoian River Falls Fm. has more kaolinite than the Wisconsinan Lincoln and Copper Falls Fms., which have low kaolinite and look very similar. The unnamed reddish-brown till in western Chippewa County is very similar to the River Falls Fm. and probably will be mapped as River Falls Fm. The pre-Illinoian, calcareous Pierce Fm. has much more kaolinite than the pre-Illinoian Marathon Fm. and the Late Wisconsinan Trade River Fm.

Katie Thornburg
Faculty Advisor/Collaborator: **Robert Hooper**
Transmission Electron Microscopy of Grain and Biocoatings from Lead and Zinc Contaminated Sediments in the Lower Coeur D'alene River Valley

Significant lead and zinc contamination occurs downstream from the Coeur d'Alene mining district. Prior sequential extractions and SEM examination of materials collected from different environments demonstrate complex mineralogical relationships dependent on physical dispersion, local redox conditions, and biologic controls. A substantial amount of the total metals in the lower Coeur d'Alene valley are held as sub-micron grain or bio-coatings that defy adequate characterization using SEM and XRD analysis. Analytical electron microscopy using a transmission electron microscope (TEM) has proven very useful in determining metal speciation in these problematic materials. A new technique for examining heterogeneous grains was applied to unconsolidated samples from different fluvial subenvironments in the lower Coeur d'Alene river valley. TEM analysis has resulted in identification of several new phases and better constraints on the chemistry of many other phases. In oxidized river levee samples, Zn is strongly partitioned into siliceous ferri-hydrite with typical zinc concentrations of 0.5-3 oxide wt%. Lead occurs in a wide variety of ferro-manganese/oxy-hydroxide phases that are typically non-stoichiometric and nano-crystalline. In samples from transitional and reduced redox environments, a wide variety of lead phases were identified including microcrystalline galena and amorphous biocoatings with variable sulfide compositions. Siliceous, ferro-phosphatic spherules occur in one transitional redox sample and contain up to 30 wt% PbO. Zinc is largely constrained to microcrystalline sphalerite or mixed nano-crystalline sulfides in the transitional and reducing fluvial subenvironments. TEM analysis has demonstrated that particulate speciation is far more complex than expected from conventional SEM/XRD analysis of the same samples.

Geology/Geography

Matt Kromrey and **David Hanson**
Faculty Advisor/Collaborator: **J. Brian Mahoney** and **Sean Hartnett**
GPS Mapping in Rugged Terrain: The Geronimo Frisbee Course, Kingston, New Mexico

A world-class 20-hole Extreme Frisbee Golf Course, known as Geronimo Golf, is located on the eastern edge of the Black Range, on the western flank of the Rio Grande rift near Kingston, New Mexico. The course is specifically designed to host two yearly professional Frisbee Golf tournaments in April and September. The course is located in the scenic Percha Creek drainage, a rugged area characterized by steep cliffs, rocky hill slopes and thick desert vegetation. The course is extremely challenging due to the aggressive vegetation and extreme elevation changes encountered on the resistant crystal tuff found in the area. The Geronimo Frisbee Golf course is legendary among hardcore frisbee golf players and enthusiasts. The course was mapped in January, 2001, with two different global positioning systems (GPS), including both Trimble and Garmin models. The Trimble provided waypoint information that describes the centerline of each fairway. The Garmin was used to collect data necessary for accurate elevation mapping of each individual tee and pin and for accurate distance measurements between holes. Two separate maps of the course are being developed. A map that superimposes the course layout over a detailed topographic map will give players a good concept of the elevation changes (up to 300 ft from tee to fairway) and challenging hiking they will be encountering on the course. A map that superimposes the course layout over an aerial photograph will give players a realistic overview of the entire course, allowing them to assess potential trouble areas and the best access routes.

Mathematics

Jeremy Alm and **Paul Johnson, Jr.**
Faculty Advisor/Collaborator: **Shyam Chadha**
On the Derivation of the Generalized Inverse of a Matrix

This project investigates the existence and construction of the inverse of non-square matrices. Algorithms and computer programs for finding the inverse of such matrices are also suggested. The computation of the inverse of such matrices (called the generalized inverse) has its application in many disciplines including the field of mathematical programming, regression analysis, network analysis, and maximum likelihood estimation when the information matrix is singular.

Jennifer Cox
Faculty Advisor/Collaborator: **Michael Penkava**
Deformations of Infinity Algebras

Infinity algebras play an important role in both mathematics and physics, appearing in such diverse applications as string theory, and the study of topology, where they first appeared as associahedra. Associative algebras and Lie algebras are ubiquitous in mathematics, and are examples of infinity algebras. Deformations of algebras are classified by cohomology, which involves the calculation of a special type of product, known as a Lie superbracket. In this project, we use computer algebra software to simplify the calculations of the brackets of cochains in the cohomology theory of infinity algebras, and apply these results to discover new examples of infinity algebras and their deformations.

Nicholas Saeger
Faculty Advisor/Collaborator: **R. Michael Howe** and **Alexander Smith**
Computer Algebra Computations of Bargmann-Fock-Segal Inner Products

Students in Science and Engineering are familiar with the notion of an inner product of two vectors (or forces), which is a useful mathematical tool that incorporates the geometric ideas of length and angle. Inner products can be used to reduce complex physical problems into more easily solvable parts. This idea of an inner product generalizes, allowing mathematicians to impose a geometric structure on spaces of functions, and similarly allowing complex problems to be reduced to more easily solvable parts. We develop and implement computer software algorithms to evaluate a type of such inner product, the Bargmann-Fock-Segal inner products.

Nicholas Saeger, Peter Misurek, Bradley Barth, and **Alex Johnson**
Faculty Advisor/Collaborator: **Marc Goulet** and **Alexander Smith**
Computational Biology and Mathematics

Entropy is a means of quantifying information in various settings. The symbolic structure of the human genome provides one of these settings and a tool developed by computational biologists is used to measure information in the genome. In particular a notion of multiple alignment entropy has been developed to study the statistics of binding sites. Algorithms developed by Tom Schneider of the National Cancer Institute maximized entropy of DNA binding sequences, resulting in optimal alignment of certain proteins. Faculty and students involved in this project implemented these algorithms using Maple and C programs, generated a visualization tool known as a sequence logo, and found an application to an area of pure mathematics in analytic number theory. Specifically we applied these methods developed in computational biology to analyze the distribution of spacings between zeros of the Riemann zeta function.

Timothy Tucek and **Paul Johnson, Jr.**
Faculty Advisor/Collaborator: **Yvonne Chueh**
Asset Marketability and Liquidity Analysis

Over the past few years, rating agencies such as A. M. Best, Standard & Poor, and Moody's have been assessing an insurance company's liquidity risk in order to deten-nine its claim-paying ability and financial strength. Liquidity refers to the ability to turn assets into cash at close to the fair market value within a specific amount of time, which is determined by the contracts with policyholders and the creditors. A major cause of recent General American's failure was due to the lack of liquidity. The purpose of this research project is to determine the historical experience for the disinvestment of large portions of an insurance company's asset portfolio under duress and to develop a relationship between the liquidity of various assets into influential variables. Specifically, we wish to address two issues: (1) To develop a mathematical model that, for each asset class, would produce the time (t) to sell an asset class given certain input items such as maximum tolerable market value loss, size of cash need, et al. (2) To estimate the market value loss upon sale given certain input items such as time to sell, size of cash need, et al.

Physics and Astronomy

Ryan Aschbrenner
Faculty Advisor/Collaborator: **Douglas Dunham**
Surface Studies of Semiconductors

The surfaces of Silicon (111) and b-SiC(100) were studied with low energy electron diffraction and x-ray photoelectron spectroscopy.

Casey Barka
Faculty Advisor/Collaborator: **Douglas Dunham**
Testing and Characterization of the Photoemission Electron Microscope

A photoemission electron microscope has been recently constructed in the physics department. The microscope design centers on a refurbished electron optics system contained in an ultrahigh vacuum chamber. Initials tests of all of the components have been completed. The first images obtained give a very good indication of the opticalparameters such as magnification, intensity, and resolution of the electron optics system. Future improvements have also been determined.

Kevin Bartig
Faculty Advisor/Collaborator: **Lauren Likkel**
Near-Infrared Spectroscopy of Young Planetary Nebulae

We are examining the near infrared emission of molecular hydrogen in planetary nebulae by means of long-slit spectroscopy. We present results from data obtained at near infrared wavelengths of several nebulae. The data were gathered in November 2000 and January 2001 using the 2.7 meter Harlan J. Smith Telescope at McDonald Observatory in Fort Davis, Texas. Spectra were extracted using the data reduction software IRAF. Examination of the molecular hydrogen line intensity ratios in these spectra reveal the excitation mechanism at work in the nebula. Two models of excitation are plausible, one of UV pumping and one involving shocked gas surrounding the nebula. Knowledge of the specific excitation mechanism will permit calculation of the total mass of hydrogen present, ascertained from the strength of the molecular hydrogen lines.

Michael Ehr
Faculty Advisor/Collaborator: **George Stecher** and **Lyle Ford**
Telescope Tracking and Pointing Corrections

We present improved tracking and pointing correction routines for the 0.6 m “Air Force” Telescope at Hobbs Observatory near Fall Creek, Wisconsin. We first pointed the telescope at roughly evenly distributed areas of the sky and made exposures at carefully recorded times. These exposures were used to determine the true coordinates of the telescope, which differed from the coordinates sent to the telescope control system. A set of functions were generated that mapped the true coordinates onto the control system coordinates. These functions were then used to correct for tilts and other irregularities in the telescope platform. The changes in telescope performance are discussed.

Theodore Jaeger
Faculty Advisor/Collaborator: **George Stecher**
Characterization of Vacuum-Formed Membrane Mirrors

Expanding on an idea proposed by Maurice Gavin in the May 1979 issue of Sky & Telescope magazine, a simple vacuum chamber was constructed. This chamber was use to create mirrors from various thicknesses of aluminized polyester. Focal length as a function of vacuum was recorded to evaluate the quality of the mirrors and suitability of the polyester films. The optical properties of the mirrors were also observed and tested using different methods including the Foucault and Ronchi tests.

Theodore Jaeger and **Paul Martin**
Faculty Advisor/Collaborator: **Lyle Ford** and **George Stecher**
Determination of the Rotation Properties of Asteroids

Light curves of two asteroids (39 Laetitia and 367 Amicitia) were measured using the 0.6 m reflecting telescope at Hobbs Observatory near Fall Creek, Wisconsin. Using these light curves, together with others’ previously published light curves, the orientations of the rotation axes (pole positions) of the asteroids were estimated using Wild’s epoch method. In this presentation, we

compare our results to the results obtained by others for 39 Laetitia. In addition, we present our results for 367 Amicitia, for which a pole position has not been previously determined.

Seth King
Faculty Advisor/Collaborator: **Paul Thomas**
Dynamics of Curling Stone Collisions

Curling is a sport where in 20 kg stones of granite are slid along a 2 ‘ 8m sheet of ice and often times collided. The trajectory of the stones is strongly influenced by the conservation of momentum and kinetic energy in the collisions. In order to study this in detail we made digital images of collisions in a laboratory environment. The images were then analyzed using kinematic motion analysis software to track the amount of momentum and kinetic energy before, during, and after the collision.

Jack Kollwitz
Faculty Advisor/Collaborator: **Kim Pierson**
Structure of Nanometer Topography Developed on the Surface of Ag/Cu Alloys Due to Argon Ion Bombardment Using X-ray Energy Dispersive Spectroscopy and Transmission Electron Microscopy

In the field of Materials Science the development of novel materials requires analysis of the composition of the sample as a function of depth into its surface. These “depth profiling” experiments consist of slowly eroding away the sample surface via ion bombardment. Diagnostic techniques are used to assay the elemental composition at each depth. Recently, while performing ion bombardment experiments on copper-silver alloys, we discovered the presence of nanometer sized “finger-like” structures on the surface of the samples. These structures would greatly complicate the interpretation of depth profiles performed on these types of alloys. They are a problem because they are so small that they can not be resolved with common surface imaging techniques. We are using a specialized technique called transmission electron microscopy (TEM) which allows much greater magnification than usual surface imaging techniques. We are also using x-ray energy dispersive spectroscopy to determine the composition of the structures.

Chong Hoong Leong
Faculty Advisor/Collaborator: **Andrew Swanson**
Monte-Carlo Simulation of Surface diffusion with Evaporation on Silicon

A Monte-Carlo simulation of diffusion on a generalized material surface has been developed. Specific parameters for the (100) surface of Silicon have been add to the model. This study includes verification of the model for simple initial conditions of submonolayer deposition. The study examined island coalescence over a larger temperature range and found that the model’s behavior matches theoretical models and experiment. In addition, adatom and surface vacancy concentrations have been observed.

John Peterson
Faculty Advisor/Collaborator: **J. Erik Hendrickson** and **Paul Thomas**
A Demonstration of the Galileo Magnetometer Evidence for a Subsurface Ocean on Europa

Recent magnetometer data from the Galileo spacecraft indicates a suppression of the background Jovian magnetic field in the vicinity of the satellite Europa. This effect has been interpreted as an induced secondary field, which would require a subsurface conducting medium to carry an electric current. Since Europa is observed to have an icy outer shell of thickness ~100 km and is tidally heated by an orbital resonance with two neighboring satellites, it is likely that this conducting medium is a subsurface ocean of liquid, saline water. We present a classroom model

of the induction effect that is believed to account for the Galileo magnetometer data. In this model, a small sphere is immersed in a periodically fluctuating magnetic field, representing the Jovian magnetic field surrounding Europa. A Hall effect magnetic probe is used to measure the induced magnetic field. The sphere can either be metallic (highly conducting), containing saline water (moderately conducting) or insulating. Results of this model with appropriate scaling to the length scales and magnetic field strengths of Europa will be presented.

Graduate Entries

Biology

Matthew Lloyd
Faculty Advisor/Collaborator: **Paula Kleintjes**
Butterflies as a Measure of Success for Planting Native Prairie Species on Conservation Reserve Program Parcels

We used butterfly species richness and abundance to assess the habitat quality for wildlife on native versus traditional plantings of Conservation Reserve Program (CRP) parcels. In 1997, the Natural Resources Conservation Service (NRCS-USDA) in Eau Claire County, Wisconsin, began offering cost-share incentives to landowners willing to plant native species on their CRP parcels. In addition to reducing soil erosion, it was assumed that these native plantings would improve habitat quality for prairie wildlife compared to traditional CRP plantings. To test this assumption, we assessed butterfly species richness and abundance using a modified Pollard-Yates census technique on twenty randomly selected parcels. The sites (0.09ha-3.38ha) included; four planted with a traditional species mix in 1998 and four in 1999; four planted with a native species mix in 1998 and four in 1999; and four prairie remnants. We conducted the butterfly census throughout two sampling periods (June and August). We also measured species abundance and composition of vegetation at each site. Preliminary results confirm that the greatest butterfly species richness and butterfly abundance was located on the native planted CRP sites during August, and that this was strongly correlated with the maturation of diverse flowering forbs that served as nectar sources for the adult butterflies. The prairie remnants supported more unique species, yet less overall diversity. This was most likely due to the small and isolated nature of the remnants.

Communication Disorders

Megan Kado
Faculty Advisor/Collaborator: **Lisa LaSalle**
Temperament Management Strategies to Treat Preschoolers Who Stutter

The term “temperament’ was first used by Thomas and Chess (1977) to refer to stylistic characteristics that are evident in the early infancy period. Simply put, temperament is the way in which an individual behaves. Preschoolers who stutter tend to demonstrate two problematic areas of temperament (LaSalle, 1999; Oyler, 1999): frustration reaction or lack of persistence and excitement, related to higher sensitivity, activity, and/or intensity levels. The purpose of this study was to determine the efficacy of “temperamental management strategies” (TMS) in the treatment of preschoolers who stutter. Based on research regarding temperament and stuttering, it was hypothesized that TMS would enhance standard, indirect fluency treatment (indirect therapy) for preschoolers who stutter. Subjects were two preschoolers who stutter, 2 to 5 years old, preceded by two preschoolers who served as pilot subjects. An alternating-treatments design was implemented, where “V”=baseline; “B”=indirect therapy; “C”=indirect therapy + TMS. Sets of A, B, and C conditions were randomized across the sessions. Results indicated that indirect therapy + TMS appeared more effective in stutter reduction than indirect therapy alone. For all four subjects, the most fluent days occurred when indirect therapy + TMS was implemented. In

addition, overall behavior was better, as indicated by less extraneous activity and greater cooperation, during the indirect therapy + TMS sessions, as compared to the indirect therapy sessions. Specifically, subjects persisted longer and completed the activities more on the indirect therapy + TMS sessions. On days in which TMS was not implemented, subjects seemed to begin more and complete less of the activities. The structure of the indirect + TMS sessions also led to an increase in the use of carrier phrases. The results have implications for future research regarding the combination of the indirect and direct approach enhanced with TMS.

Karleen Krause
Faculty Advisor/Collaborator: **Kristine Retherford**
The Frequency of the Normal Infant Swallow

The purpose of the proposed research project was to collect normative data on how often infants swallow within a 1-minute period. Knowledge- of this data could aid speech-language pathologists in the identification and management of infants with swallowing disorders. Subjects were selected from pediatrician's recommendations, area child care centers, and birth records. Subjects included 4 newborns, 4 six-month-olds, and 4 twelve-month-olds. Data collection occurred in treatment rooms at the Center for Communication Disorders (CCD) and in subjects' homes; data were collected using a miniature microphone , a wireless microphone system, a timer, and a cassette recorder. The microphone was placed on the side of the infant's neck. Signals were sent to the receiver, which was connected to the cassette recorder and these signals were recorded onto audiotapes. Data collection occurred while the infants were awake. Books and cause/effect toys were provided for a 10-minute interaction. When the data were collected, samples were analyzed to obtain a mean number of swallows per minute for each subject and group means were obtained and compared other two groups. Results showed that the swallowing frequency tended to decrease the older the subjects were. Few conclusions can be drawn due to the small sample size.

Matthew Moore, Lindsay Mueller, and **Shu-Jung Yin**
Faculty Advisor/Collaborator: **Larry Solberg**
The Predictive Value of Four Shimmer Measures

This study compared the 4 shimmer measures generated by the Multi-Dimensional Voice Program and determined which of the measures' best predicted vocal pathology. A step-wise discriminant analysis revealed that "shimmer percent" best predicted group membership (i.e., 25 normal voices and 25 voices of patients with vocal nodules) with 70% correct classification.

Shu-Jung Yin
Faculty Advisor/Collaborator: **Larry Solberg**
Voice Range Profiles of Speakers of Native Taiwanese-Mandarin and American-English

The purpose of the study was to determine if there are differences between Taiwanese-Mandarin and American-English speakers in three voice Range Profile (VRP) measures: maximum dynamic Frequency range (MDFR), maximum dynamic intensity range (MDIR), and average dynamic intensity range (ADIR). The VRPs of native female speakers of American-English were developed in this current study and compared to the VRPs of native female speakers of Taiwanese-Mandarin speakers in Taiwan developed by Chen (1996). It had been hypothesized that the tonal aspect of a language such as Mandarin provides daily vocal exercises for tonal-language speakers that might result in wider frequency and intensity ranges than seen in non-tonal language users, such as American-English speakers (Chen, 1996). The results of this study support the hypothesis stating that there would be differences in the MDFR, MDIR, and ADIR between Taiwanese-Mandarin and American-English speakers.

English

Gregg Nelson
Faculty Advisor/Collaborator: **Joel Pace**
Architecture and the Fiction of H.P. Lovecraft

Dr. Pace and I engaged in a variety of activities in Lovecraft's home town of Providence, RI—a trip I was able to undertake due to funding from the Office of University Research. We spent the days working in the John Hay Library, examining unpublished primary material: handwritten letters Lovecraft had written during his lifetime. We examined these letters at length, searching for architectural references. Additionally, since some of Lovecraft's stories were set in Providence, we were able to visit the actual settings for those stories, and view the specific architecture to which Lovecraft so often referred. A significant component of my thesis will be a discussion of Lovecraft's use of architecture and topography to set up geometric narrative structures in his stories, and by visiting Providence, I was able to examine these settings firsthand.

Gregg Nelson
Faculty Advisor/Collaborator: **Dennis Jerz**
Electronics Enabling Intellectual Endeavor: The Letters of H.P. Lovecraft

This project entails transcribing and coding a portion of the letters written by H.P. Lovecraft to August Derleth. Scholars estimate Lovecraft wrote over 70,000 letters in his lifetime, and only a small percentage of those letters exist in printed media. This presents a real danger to Lovecraft scholarship, since what most scholars claim Lovecraft believed or felt about a particular topic is based only on limited evidence. This is a real incentive to create new research materials that can be used effectively by scholars. The only reasonable way to examine Lovecraft's letters in any organized fashion is to make them available electronically, in a manner where they can be indexed and searched for a variety of uses. This, a preliminary searchable sample of Lovecraft's letters, is precisely what I have created in this project.

Human Development Center

Gwen Kalina
Faculty Advisor/Collaborator: **William Frankenberger**
Lac du Flambeau Service Learning Project

Over eighty undergraduate and graduate students from UW-EC attended a two day orientation seminar held in the Lac du Flambeau community. The orientation program began with a tour of the Lac du Flambeau museum to provide an understanding of Ojibwe history and culture. The students also toured Head Start, Lac du Flambeau school, Peter Christiansen Health Center, the Family Resource Center, and Youth Center to see the facilities and to meet the staff with whom they will be working. The purpose of this project was to assess changes in UW - Eau Claire students' attitudes about reservation communities as a result of their participation in the orientation session and their experiences working with children at Lac du Flambeau. Students were asked to complete the survey both before attending the orientation session and after their second visit to Lac du Flambeau. Data analyses revealed significant differences in sixteen responses on the questionnaire that show changes in UW-EC students' attitudes. Questions 5, 7, 9, and 26 were all significant at the .05 level. Questions 1, 2, 3, 15, 16, 17, 18, 19, 20, 21, 22, and 25 were significant at the .01 level. All these, and trends seen in the other responses as well, indicated that the orientation had been a positive educational experience for the students.

Psychology

Danielle DeGrood
Faculty Advisor/Collaborator: **Barbara Lozar**
Classwide Peer Tutoring Versus Traditional Teacher Led Instruction: A Comparison of Grade Point Averages and Self-Esteem

The purpose of this study is to examine the effects of Classwide Peer Tutoring on academic achievement and self-esteem. Classwide Peer Tutoring (CWPT) gives all children in a class the opportunity to be involved in a tutoring program serving both as the tutor and the tutee during the same lesson. The study will examine the differences in third grade student's grade point averages (GPAs) and overall self-esteem scores within classrooms currently employing CWPT compared to classrooms employing traditional teacher led instruction. Changes in achievement and self-esteem will be related to school rationale for using CWPT.

Kari Gruna
Faculty Advisor/Collaborator: **William Frankenberger**
The Relationship of Pre-service Training, Personal Philosophy, and Current Social Skills Instruction Practices Among First Grade Teachers in Wisconsin

This study aims to explore first grade teachers' pre-service histories as they relate to social skills instruction, their attitudes regarding social skills instruction, and their current practices in social skills instruction. One objective is to identify how commonly social skills instruction is implemented as part of the regular education curriculum. Another objective is to identify how much direct experience teachers have had in social skills instruction. A third objective is to assess how teachers view the importance of social skills instruction in the regular classroom. Finally, the study will aim to identify the relationship among these. First grade teachers in Wisconsin will complete a questionnaire.

Gwen Kalina
Faculty Advisor/Collaborator: **Barbara Lozar**
Graduates' Perceptions of the Eau Claire Area School District's Gifted and Talented Program

The purpose of this study is to examine the effectiveness of the Eau Claire School District's Gifted and Talented Program by conducting a follow-up study using students who have graduated from the school district in the years 2000, 1999, and 1998 after participating in the gifted and talented program. The study used a survey designed to assess the overall satisfaction of the graduates and which factors of the gifted and talented program contributed to their satisfaction.

Molly Mahoney
Faculty Advisor/Collaborator: **Kim Knesting**
Characteristics of Successful Collaboration in Inclusive Classrooms: Regular and Special Educators' Perceptions

The purpose of this study is to identify characteristics of successful collaboration and collaborators in inclusive classrooms through regular and special educators' voices, as well as to explore educators' perceptions of collaboration. The study will focus on the development of the collaborators' relationship in their practice of co-teaching as means to identifying characteristics of success. Inclusion is when special education and regular education students are taught together in the same classrooms. Regular and Special educators have reciprocal roles. The study will examine the experiences and perceptions of collaboration pairs to try and identify common themes that promote successful collaboration practices. The emerging themes will be compared and contrasted with guidelines other researchers have proposed.