

# Center of Excellence

for Faculty and Undergraduate Student Research Collaboration

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## Proceedings of the 16<sup>th</sup> Annual University of Wisconsin-Eau Claire Student Research Day

The UW-Eau Claire Student Research Day is supported by funds from the UW-Eau Claire Foundation. Grants supporting Faculty/Student Research Collaboration are made possible through funds provided by the Undergraduate Initiative of the University of Wisconsin System, the UW-Eau Claire Foundation, the University of Wisconsin-Eau Claire, and undergraduate student differential tuition.



**Office of Research and Sponsored Programs**  
UNIVERSITY of WISCONSIN - EAU CLAIRE

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# Schedule of Events

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## Monday, April 28, 2008

<b>Time</b>	<b>Event</b>	<b>Location</b>
7:00 – 9:00 a.m.	Students set up posters	Zorn Arena
8:30 – 9:00 a.m.	Judges' orientation	Gold Room, Zorn Arena
9:00 – 3:00 p.m.	Judging	Zorn Arena
Noon – 5:00 p.m.	Poster session open, with student presenters at posters from noon to 4:00 p.m.	Zorn Arena
3:30 – 5:00 p.m.	Student Research Day reception	Tamarack Room, Davies Center
~4:15 p.m.	<i>Reception Welcome Address:</i> Chancellor Brian Levin-Stankevich <i>Program:</i> Announcement of UWEC Student Research Day awards And Kell Container Corporation Collaborative Research Scholarship	Tamarack Room, Davies Center

## Tuesday, April 29, 2008

<b>Time</b>	<b>Event</b>	<b>Location</b>
8:00 – Noon	Poster session open to University community and public	Zorn Arena
Noon – 1:00 p.m.	Students remove posters	Zorn Arena

# Judges

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## Arts and Humanities

- Gretchen Minton, Montana State University

## Behavioral & Social Sciences

- Susan Clayton, College of Wooster
- Brett O'Bannon, Depauw University
- Richard Tafalla, University of Wisconsin-Stout

## Business & Professional Studies

- Matthew Broda, College of Wooster
- Joan Hamblin, University of Wisconsin School of Medicine and Public Health

## Natural and Physical Sciences

- Joseph Brom, University of St. Thomas
- Yolanda Cruz, Oberlin College
- Joseph Davidson, Carleton College
- David Wolfe, Illinois Wesleyan University

# Acknowledgments

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Many people helped to make this event possible, and we thank them for doing their part cheerfully and efficiently:

- **Karen Stuber and Event Services staff** for arrangements in Zorn and Davies Center.
- **Gene Olson** for carefully transporting poster panels.
- **Jason Jon Anderson and University Stage Crew** for setting up the Arena.
- **Terri Knudtson and Dining Services staff** for producing delicious victuals for the judges and for the reception.
- **Betty Feia, Shawn Seuferer, and Allyson Buccanero**, ORSP office staff members for helping with myriad organizational details.
- **Dan Urban** for the design of Research Day publicity materials.
- **Emily Elsner Twesme**, Graduate Assistant, for managing advertising, compiling this abstract booklet and keeping track of participants and poster locations.
- From **Learning and Technology Services**,
  - **Gene Leisz** for providing training in poster design and creation
  - **Charles Probst and his student crew** for managing the poster printing
  - **Rick Mickelson and Bill Hoepner** for recording the event with their cameras.

Lastly, we thank student participants and their faculty mentors for all the hard work that led up to the polished presentations that are displayed at this 16<sup>th</sup> Annual UW-Eau Claire Student Research Day.

# ARTS AND HUMANITIES

## Art and Design

### **Teri Sanders (51)**

Faculty Advisor/Collaborator: **Karen O'Day**  
*Rock Art of the Superior National Forest*

In the Superior National Forest, there are pictographs (rock paintings) that Native Americans painted. The images were painted by Algonkian speakers, whose descendants (Ojibwa, Cree, Ottawa, Shawnee, for example) are the present inhabitants of our region. I canoe and/or cross-country ski out to four of the twelve sites (the more accessible sites with the most images) to measure and draw the images. I will submit the drawings and measurements to the federal government (the National Forest Service) for their use in managing the heritage sites, as well as making the data available to researchers and Native tribes. In addition to fieldwork, I am researching the significance of the pictographs. Many of the images are sacred in Algonkian society and were painted for spiritual ceremonies. Others were functional and communicated facts regarding allocation of food and shelter. It is imperative that these paintings be documented now before they fade so that they can continue to be researched. Through our increased awareness, we can celebrate the rich cultural heritage of our region and all of its inhabitants.

## English

### **John Nicksic (52)**

Faculty Advisor/Collaborator: **Bob Nowlan**  
*Queer Tides: a Collaborative Feature-Length Fictional Screenplay*

Conflicts surrounding a series of alternative, non-traditional forms of loving and familial relations break out over the course of 72 hours on a university campus and the surrounding community of Green Lake, Wisconsin. A feature-length fictional screenplay, co-written by John Nicksic and Bob Nowlan.

## Foreign Languages

### **Maria Boland (238)**

Faculty Advisor/Collaborator: **Eva Santos-Phillips**  
*Señorita Extraviada: Latina Documentary Filmmakers*

This project explored the lives and works of a number of exceptional Latina documentary filmmakers working in the United States whose bodies of work have been socially and academically overlooked. The focus of the project was as follows: 1) Introducing these women, examining their lives and experiences, 2) Examining their body of work in the field of documentary film, choosing one film as a case study, and 3) an academic analysis of their works and their contribution to documentary filmmaking and videography in the United States. Their contributions are extremely important, and relevant, yet grossly underrepresented. Our aim was to shed light on their achievements in this ever-growing field and by doing so, provide a more well-rounded perspective of contemporary documentary cinema. Our final goal is to compile this data for use in a book to be used in university classrooms. Departments that could benefit from this book would be Latin American Studies, Critical Studies in Film, Video, and Moving-Image Culture, and Women's Studies, among others.

### **Kristin Schuck (91)**

Faculty Advisor/Collaborator: **Analisa De Grave**  
*Brazilian Travesti*

This research project, part of the Blugold Fellows program, dealt with the interesting topic of the travesti of Brazil. This is a particular type of cross-gender people that is prevalent in all the major Brazilian cities, quite different from both transgendered people and transvestites in the United States. The project looks at who they are, how prevalent they are, their societal status, and how they compare to non-binary gender behavior in other cultures.

## History

### **Mathew Boyeson (90)**

Faculty Advisor/Collaborator: **James Oberly**

*The Silent Professor: The Story of Wilhelm Lehmann (1802-1882)*

My research will focus on William Lehmann, a German immigrant from the Prussian territory of Westphalia. He immigrated due to political pressure from the government, and arrived in America unknown, continuing his life as a professor. He initially taught in colleges in Pennsylvania and Georgia, after which he made his way to Dodge County. His arrival and experiences raise questions on the education systems in America, as well as in Germany, in addition to questions of cultural reception. Because his national recognition is almost non-existent, I would like to attempt to show that his impact on German reception in American is under-appreciated. To help form the discussion on his impact in America, I will use the experiences of Francis Lieber and Karl Follen. Both individuals immigrated during the same period as Lehmann, though upon their arrival, achieved a position in society that is well known still today. My questions will involve the differences and similarities related to these three individuals in hopes to better understand German immigration and cultural reception of Germans in America. I would also like to look into their stories to tell a more complete story of the political refugee prior to the revolutions of 1848.

### **Katie L. Delacenserie (89)**

Faculty Advisor/Collaborator: **James Oberly**

*Wall Street and the Man on the Whitehorse: The 1934 Coup Plot*

In the course of American history there have been several assassinations and attempts on the lives of presidents, but never has there been an attempt to seize power from the White House, like the fascist coup plot that was exposed in 1934. Retired Marine Corps General Smedley Butler was approached to lead a *coup d'état* to overthrow President Franklin Delano Roosevelt in 1934 and replace him with a fascist dictator by representatives of several Wall Street banking firms and wealthy families who believed the country was on a perilous course with the New Deal and the gold standard. General Butler in an act of American heroism declined, and exposed the plot to Congress. This paper will show this powerful episode in American history. By reviewing newly released material from the National Archives and interviews with those involved, as well as articles written since the plot took place, this poster will show how attitudes have changed over time and how the story was nearly lost to history. In telling the story of the plot, it is important to keep in mind the state of our country today when the greatest threat to our country may come from inside.

### **Jasmine Wiley (92)**

Faculty Advisor/Collaborator: **Rick St. Germaine**

*Keepers of the Forest: The Menominee Indians' Practices of Forest Sustainability*

We researched the Menominee Indian Tribe of Wisconsin's practice of sustainable forestry on their reservation in Northeastern Wisconsin. Our research follows the growth of the forestry industry on the reservation from before contact up to present day. Running parallel to the history of the forest is the greatly interconnected history of the Menominee people; their survival and challenges alongside the sustained growth and vitality of their forest.

## Music and Theatre Arts

### **Andrea Fuss, Amanda Verstegan, and Lauren Tompkins (69)**

Faculty Advisor/Collaborator: **Mitra Sadeghpour**

*From "Dido and Aeneas" to "Carmen": An Exploration of the Role of Dance in Opera*

The research team, made up of three voice performance majors and two music and dance faculty, will collaborate in a study that explores the evolution of the relationship between dance and opera. The relationship of dance to dramatic action has developed significantly since the seventeenth century. Inevitably, the types of dance forms used have similarly evolved: as *divertissement* between acts, segregation from dramatic action, and an integrated facet of storytelling. Dance has been incorporated in opera over the last four centuries yet directors, musicians, dancers, and even composers do not always have a common dance vocabulary. This hinders true collaboration between the art forms and stylistically accurate performance. To address this gap the researchers will investigate vocabulary commonly cross-referenced in music and dance and undergo an in-depth study of operatic scores which incorporate dance. Analysis of these scores will trace the changes in musical and dramatic use of dance since the 1600s. Each team member will then undertake an in-depth study of an opera where dance has

importance and create a research and performance guide for dance in that opera. Results of this interdisciplinary research will be demonstrated through individual choreography crafted to a segment of the opera analyzed.

### **Courtney Karns (70)**

Faculty Advisor/Collaborator: **Mitra Sadeghpour**

*Samuel Barber's Use of the Texts of James Joyce*

Samuel Barber, one of the most respected composers of American twentieth-century art song composed nine songs to texts written by Irish author James Joyce. Due to the complex nature of Joyce's writing, performers of these songs often find it difficult to understand the events or emotions in the song texts. Barber once said of his piece "Nuvoletta," which is set to text from Joyce's *Finnegans Wake*, that at some points he had to set the text abstractly because it was impossible to know what it meant (Heyman, 1992). Inspired by this admission, I have completed an in-depth musical analysis of Barber's song and his setting of Joyce's text. A literature review outlining what was happening in Barber's life at the time of his composition of each of the Joyce songs creates a better understanding of Barber's interest in Joyce. The final product of this project is a lecture-recital which includes the performance of Barber's nine Joyce songs and a short lecture on how the songs are set and Barber's connection to them. Supplementing this is a scholarly paper of my analysis of "Nuvoletta."

### **Hayley Nelson (237)**

Faculty Advisor/Collaborator: **Ryan Jones**

*Creating a Jazz Discography: The Commercial Recordings of Jo Stafford*

This project assisted in the research and preparation of materials related to building a basic discography of recordings made by jazz artist Jo Stafford (b. 1917) during her prolific professional career as a singer. The collaborators researched and compiled a thorough and detailed discographical listing pertaining to Stafford's first commercial recording period under Tommy Dorsey (1939-1941) during which she collaborated with such notable figures as Frank Sinatra and Buddy Rich. This database of information (including but not limited to record label, recording date, song title and catalogue number, composer, and relevant ensemble personnel) will ultimately serve a central purpose in a larger monograph documenting and contextualizing Stafford's life and art in American jazz of the last century.

### **Kyrsten Olson (72)**

Faculty Advisor/Collaborator: **Mitra Sadeghpour**

*Choral Handbook for Church Choirs*

My Blugold project is designing a choral handbook that would be easily accessible to church choral conductors. There will be several different chapters in this book that address common problems and mistakes in all choirs, and give suggestions how to correct them through warm-ups and exercises. As a beginning step to my research, I sent out surveys to area church choir directors, asking them what warm-ups they used (if any), general goals of their warm-ups, and the main problems that they identify in their choirs. Consistently I received poor tone quality as my answer, and have chosen to direct my attention to "Tone" as the heading of the first chapter.

### **Mary Webster (236)**

Faculty Advisor/Collaborator: **Ethan Wickman**

*Composing a Musical: Loreum*

"Loreum" is a musical about the intersection of a 1940s era soldier, and the imaginary country featured in the title. The topic juxtaposes fact and fiction and intends to allow the viewer a perspective on history and human relationships from the distance of the fictional Loreum. My research was not only based on historical events, but on studying conventions from opera and musical theater.

### **Allison Wells and Katie LeBrun (71)**

Faculty Advisor/Collaborator: **Mitra Sadeghpour**

*Contemporary American Opera: An Exploration of American Operas of the Past 25 Years*

The research team - two students and one faculty member - underwent an extensive study of American Operas that received premieres in the past 25 years and combined that research into three final objectives: a list, a paper, a performance. The team compiled a list of full-length operas that had received American premieres in the past 25 years. Brief information was given on each opera, including the composer, lyricist, cast, premier date and location, and stage director. Each member of the team wrote a research paper on her specific area of research. The research was then combined into an hour lecture-performance that could be used to educate audiences about American Opera. The performance included arias and excerpts from seven diverse American operas as

well as spoken and video "lectures" on the history of American opera, women in American opera, the collaborative process of creating a new American opera, the major composers of American opera, and what is "American" about American opera. This combined lecture and performance was an ideal way to expose new audiences to this body of music that reflects the diversity of our contemporary American Culture.

## Philosophy and Religious Studies

### **Sarah Hestekin (109)**

Faculty Advisor/Collaborator: **Scott Lowe**

*When Guru is God, and Guru is a Woman*

This project began with a question: How do American followers of Mata Amritanandamayi (Amma) construct meaning from following a Hindu female religious leader, in a traditionally male-dominated role? We conducted an extensive review of the scholarship on female religious leaders and Hinduism in America, as well as materials by and about Amma and her Mission, specifically focusing on issues of gender. We conducted nine in-depth interviews at a spiritual retreat in Iowa held by Amma's organization; the transcribed interviews were then coded and analyzed. Our findings suggest that there are correlations between the gender and the spiritual backgrounds of Amma's followers and the ways in which they respond to her as a guru (spiritual teacher). While interviewees recognize significant differences between female and male spiritual leaders, their own spiritual backgrounds and gender identities are the primary determinants of their valuation of Amma's gender and femininity. Followers from the Transcendental Meditation community tend to understand Amma in terms of "pure consciousness" that transcends gender, while devotees from other backgrounds see Amma as feminine love incarnate, a divine mother. We see our data as contributing to the growing research on female religious leaders, especially in the subfields of feminism and Hinduism.

### **Grace Waring, Maren Hoye, and Jeremy Ham (239)**

Faculty Advisor/Collaborator: **Sean McAleer**

*Philosophy Through Film: Nietzsche's Birth of Tragedy*

The project is to do philosophy in film, rather than philosophy about film, by making a film that is genuinely philosophical. We dramatize the conflict between the Apollonian and Dionysian forces in Nietzsche's Birth of Tragedy, arguing cinematically that a well-lived life and good art require balancing these opposing forces rather than embracing one at the expense of the other. Our film, entitled "Kind of Blue", centers on a young jazz musician's learning that both his life and his music suffer from his Dionysian abandon; he comes to understand the need for order and symmetry both in his life and in his art by coming to terms with the death of a band-mate who embodied the Apollonian spirit.

## BEHAVIORAL AND SOCIAL SCIENCES

### Communication and Journalism

#### **Ashley Friedrich, Grace Pellegrino, Kristi Olson, and Kelly Sprague (226)**

Faculty Advisor/Collaborator: **Martha Fay**

*Portrayal of Hispanic Culture in Advertising*

Research on advertising effectiveness has shown that when people view themselves as similar to models depicted in advertisements, they are more likely to purchase the products (Briggs, Torres 2007). However, it's not known whether Hispanics view these models as similar to themselves, or whether they view the culture depicted in particular advertisements as accurate. If Hispanics view the portrayal of their culture in advertisements as inconsistent with their core cultural values, it may affect how they view the featured product and/or the company. Using General Motors' advertising campaign for Pontiac, in which young Hispanics are depicted as overtly sexual, this study tests whether Hispanics view themselves as similar to the models and what effect these perceptions have on their view of the product and the company. We used a sample of 20 young adult Hispanics in the Midwest and used the 2006 Pontiac television commercial that targets young Hispanics to understand their depiction of the advertisement and brand being advertised. Each participant viewed the Pontiac advertisements

and was then given a questionnaire to determine whether Hispanics cultural values were accurately depicted. The Perceived Homophily and Realism instruments were used to measure the participant's feelings toward the advertisements and product.

**Kristin Hartman, Andrea Thelen, Nicole Lillis, Jason Perry, Aaron Frase, and Jenna Johnson (73)**

Faculty Advisor/Collaborator: **Jennifer Becker**

*Student Perceptions of Cell Phone Use in Social and Academic Settings*

The problem our team has decided to investigate is whether students will have a more negative perception of cell phone use in academic settings compared to social settings on campus. The participants of our study will be one hundred and fifty University of Wisconsin Eau Claire students. We will collect our data using an online survey. Our survey will assess perceptions of cell phone use on campus academic and social settings. Participants will be asked to respond to items using a 5-point Likert-type scale, with responses ranging from 5 ("very appropriate") to 1 ("very inappropriate").

**Megan Kirt, Michelle Clemens, Kelsey Gustafson, Nicholas Miller, and Katie Brandt (68)**

Faculty Advisor/Collaborator: **Jennifer Becker**

*Facebook Friends Near and Far*

The research question under investigation is how the use of Facebook has strengthened the emotional relationships of those both geographically close and far away. Participants will be full time UW-Eau Claire students. To collect data, an internet survey will be issued to 200 participants in hopes of receiving feedback from 100 students. Each participant will be asked to choose a friend who they communicate regularly with on Facebook, and is also geographically close. The student will then be asked a series of questions about this relationship. They will use the same set of questions to answer about their relationship with a friend who they do not communicate with regularly on Facebook, but consider geographically close. They will also be asked about their relationship with a friend that they do not communicate regularly with on Facebook, but consider long distance, and finally about a friend who they communicate regularly with on Facebook, but consider long-distance. Our team will use Amy Johnson's 2001 closeness scale to measure the closeness of friends.

**Becky Lahr, Amanda Kroger, Amanda Richgels, Megan Lafontaine, Amber Hayden, and Hilary Rasmussen (87)**

Faculty Advisor/Collaborator: **Martha Fay**

*The Role of Self-Efficacy and Need for Affinity in Relationship to the Elaboration Likelihood Model and How Applicants Process Culture and Task-Oriented Job Descriptions*

The Elaboration Likelihood Model (ELM) states that persuasive communication has an effect on our attitudes and our capacity to process information by our use of either central or peripheral processing. This research utilizes the ELM to examine the correlations between applicants' Self-Efficacy and Need for Affinity and how they process the information provided in culture- versus task-oriented job descriptions. Since peripheral processing is hypothesized as prevalent in high fear or threat situations, it may be associated with low Self-Efficacy and high Need for Affinity. Similarly, high Self-Efficacy and low Need for Affinity may be related to central processing. This study also tests findings from previous research that suggest that women are primarily relationship-driven and men are primarily task-driven, based on attraction to either task- or culture-oriented job descriptions. These relationships were tested using a questionnaire administered to 100 juniors and seniors enrolled in a Midwestern liberal arts college.

**Joseph Lasley, Amy O'Connor, and Melissa Fordahl (95)**

Faculty Advisor/Collaborator: **Martha Fay**

*Team Leadership, Communicator Competence and Job Satisfaction*

Research has found that job satisfaction and task/relational leadership styles were significantly correlated (Madlock, 2008). Madlock also found that relational leaders were more competent communicators and their employees were more satisfied. This study focuses on effective team leadership using the Team-Review Questionnaire (Francis & Young, 1979). We measured the employees' perception of manager communicator competence using the Communicator Competence Scale (Rubin et al., 1994). The Job Descriptive Index was used to measure job satisfaction. We tested for a relationship between communicator competence and effectiveness of team leadership and how the two related to employee self-reports for job satisfaction. We analyzed the data for gender differences between managers' communicator competence scores and team leadership compared to men and women employees.

**Chang Bong Ok and Hyeyoung Han (108)**  
Faculty Advisor/Collaborator: **Won Yong Jang**  
*Ideology and News Coverage in North Korea*

The U.S. has been negotiating with North Korea in an effort to renounce its nuclear program for over a decade. Using a controversial foreign policy issue, named the "Six-party talks" on North Korean issues, this study examines whether dominant ideology has been used in their news editorials as a means to channel each political ideology into the society. The media in North Korea are closely tied to their communist sociopolitical structures. Therefore, news in North Korea has always been shown as the representation of the political ideology and interest of the communist party. The study will reveal that the news in North Korea reflects the discourse of the dominant ideological perspectives. Specifically, the North Korean media tends to emphasize confrontational and cold war frames to others and favored frame to their home country.

**Jenna Schnell, Anna Ryan, Shari Lau, and Sarah Chiodo (94)**  
Faculty Advisor/Collaborator: **Martha Fay**  
*Predictors of Academic Achievement of College Seniors*

This research examined predictors of academic achievement among college seniors. Specifically academic achievement was studied in relation to employment, organizational involvement, out of class communication with faculty, need for affinity, and gender. Although researchers generally argue that association exists between academic achievement in college and a number of demographics and behavioral variables, results have been sometimes conflicting and inconclusive. For example, Dixon (2003) found a positive correlation between G.P.A. and student involvement, Chee, Pino, and Smith (2005) found an association between gender and achievement, but DeBerard, Spielmans, and Julka (2004) found gender to be unrelated to academic achievement. Using Bell's (1987) Affinity Seeking Instrument and Knapp's (2001) Out-of-Class Communication Questionnaire, this study examined academic achievement and its potential correlations with employment, organizational involvement, out-of-class communication with faculty, need for affinity, and gender.

**Steven Schuett, Luke Nyberg, Jules Miller, Kyle Sulerud, Bryan Willkom, and Jana Dworski (227)**  
Faculty Advisor/Collaborator: **Martha Fay**  
*Facebook: The Effects of Self-esteem on Disclosure*

This study examined the amount of participant-reported self-disclosure on Facebook, particularly as it relates to participants' self-esteem. With over 60 million active users, Facebook is a social network site that connects friends with others who work, study, and live around them, which is the number one reason people use the Internet today (Kraut et al, 1999). Previous research within the area of computer-mediated communication (CMC) has shown that a primary reason people use online social networks is to "social search" or to find more information about people in offline communities (Lampe, Ellison, Steinfield, 2006). In Facebook-specific research, studies have found that positive feedback on a member's profile enhances adolescents' self esteem and negative feedback decreases their self-esteem (Schouten, 2005). However, this previous research has primarily focused on either self-disclosure or self-esteem, but not the bridge between the two, therefore illustrating ambiguity in the relationship between self-disclosure and self-esteem amongst online social networks. Facebook users completed an online questionnaire, providing data on frequency of use and type of content disclosed. Using Rosenberg (1989) Self-Esteem Scale and an adapted version of Wheelless' Revised Self-Disclosure Scale (1978) as modified for Facebook, this study examines relationships between self-esteem and self-disclosure on Facebook.

**Erin Suek, Zachary Hayes, Ashley Anderson, Amanda Collins, and Alicia Neubauer (88)**  
Faculty Advisor/Collaborator: **Jennifer Becker**  
*Facebook and Maintenance of Social Capital*

This study examines the usage of Facebook, a widely favored online social networking site, as a means to maintain social capital by University of Wisconsin-Eau Claire students. Since Facebook's emergence in 2004, college students' levels of usage have grown as the site was initially marketed to college students only. Various usages of the site have been studied on multiple levels. This study strives to examine the relationship between Facebook usage and maintenance of pre-existing social capital on three levels of criterion, bonding, bridging, and high school social capital. This study will also address to some extent the value of certain relationships and the extent to which individuals at University of Wisconsin-Eau Claire value Facebook as a tool to maintain those relationships. Approximately 200 University of Wisconsin-Eau Claire students that are Facebook members will be surveyed using an online survey administered via Facebook. The survey uses a researcher-developed scale measuring intensity of and motivations for Facebook usage and a modified version of the Lampe, Ellison and Steinfield (2006) scale measuring social capital and Facebook intensity.

**Melissa Taylor, Dana Neil, Amy Schmidt, Maria Soricelli, and Andrea Pendergast (74)**

Faculty Advisor/Collaborator: **Jennifer Becker**

*A Coach's Communication Strategy Related to a Collegiate Player's Motivation to Perform as an Athlete*

This study will explore how a coach's communication strategy affects a collegiate player's motivation to perform as an athlete. Participants will include male and female University of Wisconsin Eau Claire athletes who complete our online survey. Only athletes who had or are currently participating in division 3 athletics at the University are eligible. An email will be sent out to every athlete that has or is currently participating in one or more of the twenty sports teams on the UWEC campus, for the 2007-2008 academic year. Participants who choose to take part in our survey will be asked a series of questions from a modified version of Zhang, Jensen, and Mann's (1997) Leadership Scale for Sports (LSS).

**Eileen Wesener, LauraLynn Lammar, Michael Hildebrandt, Michael Boley, Mallory Markham, Tyler Slaby (93)**

Faculty Advisor/Collaborator: **Jennifer Becker**

*An Analysis of Social Distancing Related to College Students' iPod Use*

The aim of this study is to investigate whether a college student's usage of an iPod increases the social distance with others in social environments. The participants in this study are 100-200 graduate and under graduate students attending the University of Wisconsin–Eau Claire. The participants recruited will complete an online survey which is in part inspired by Jon Hess (2002, 2003).

**Dang Yang (86)**

Faculty Advisor/Collaborator: **Martha Fay**

*Intergenerational Accommodation of NONVERBAL Communication and Control Between Male Hmong-American Dyads: A Case-Study Using the Speech Communication Accommodation Theory*

Intergenerational nonverbal communication was examined among three Hmong-male dyads. Two dyads consisted of participants from the same generations (an older generation dyad and a younger generation dyad) and the third dyad consisted of one older generation participant and one younger generation participant. The two same-generation dyads were brothers and the mixed-generation dyad was a father and son. Using Siegel's (1992) Family Relational Communication Control Coding System, nonverbal cues in four categories - support, nonsupport, answer, and order/instruction - were coded during 30-minute conversations about various sensitive topics such as family values, gender roles, and religion. It was hypothesized that the older generation dyad would use more high-context communication - relying heavily on nonverbal cues in their communication - and the young generation dyad using more low-context communication - relying more on verbal communication (Ngampornchai, 2003). Furthermore, based on the Speech Accommodation Theory (Giles, 1987), it was hypothesized that the dyad with mixed generations would utilize accommodation - or adjusting their speech style - in order to attain communicative efficiency. Communicative efficiency was assessed using exit surveys to capture each dyad member's perceptions about their partner's convergence, divergence, and maintenance techniques during their communicative exchange.

## **Economics**

**Julie Baewer, Isaac Borofka-Webb, Christina Hansen, Corey Hilber, Jared Koerten, Ellie Lutz, Jodi Neuman, Jenna Pultz, and Matthew Rick (27)**

Faculty Advisor/Collaborator: **Eric Jamelske**

*Western Wisconsin Local Foods Project: Characterizing the Landscape of Local Foods*

This project is a partnership between the UWEC Chippewa Valley Center for Economic Research and Development and UW-Extension to document local food production and consumption in Western Wisconsin. In order to characterize local food production and consumption in Western Wisconsin we surveyed colleges and school districts. The questions asked included what local foods are purchased and what portion of the total food budget is allocated to local purchases as well as the perceived benefits of buying and serving local foods as well as barriers to purchasing local products. We surveyed 33 colleges and 23 school districts and have had approximately a 90% response rate. Of the colleges surveyed one third said they purchased at least some foods locally, while only 2 schools responded that they did so. Due to the timing of our project, we have just begun analyzing the data and therefore will not have any results to present until our poster in April. It is our intention to use these surveys to begin to characterize the demand for local foods in Western Wisconsin. Overall our research

will provide basic data and information as well as research analysis to inform the local/sustainable foods movement.

**Julie Baewer, Isaac Borofka-Webb, Christina Hansen, Corey Hilber, Jared Koerten, Ellie Lutz, Jodi Neuman, Jenna Pultz, and Matthew Rick (28)**

Faculty Advisor/Collaborator: **Eric Jamelske**

*Western Wisconsin Local Foods Database and Indicators Project*

This project is a partnership between the UWEC Chippewa Valley Center for Economic Research and Development and UW-Extension to document local food production and consumption in Western Wisconsin. We developed a comprehensive database of food outlets in Eau Claire and Chippewa Counties including restaurants, grocery and convenience stores, hospitals, schools and farm stands. We will use these data to develop a set of indicators for the CVCERD to track the growth (or decline) of local food sales within the two county region. We will also work with the Chippewa Valley Apple Growers network to choose an appropriate set of indicators to measure the effectiveness of their "Buy Local" campaign planned for fall 2008 growing season. The methodology and indicator sets will be shared statewide through the UW-Extension Emerging Ag Markets team and the Wisconsin Local Food Network so that other groups may utilize them to measure the success of their own "Buy Local" projects. Overall our research will provide basic data and information as well as research analysis to inform the local/sustainable foods movement.

**Sarah Fisher (67)**

Faculty Advisor/Collaborator: **Rose-Marie Avin and Nuria Hoff**

*From Emigration to Immigration: The Changing Face of Spain*

In one century alone, Spain has experienced the two extremes on the migration spectrum: emigration and immigration. With the exodus of the Spanish Republicans during and after the Spanish Civil War, millions of Spaniards fled the country in search of political asylum. Then, with the fascist dictatorship of Francisco Franco that followed the Civil War came a period of extreme economic isolation and depression. In the 1960's and 70's, millions of Spanish workers emigrated to France, Germany and Switzerland in search of a steady job. When Franco died in 1975, Spain went through a major transition from dictatorship to democracy, and witnessed an expansion and revitalization of its economy. The remarkable economic growth seen in Spain in the later part of the 20th century has allowed Spain to catch up to the rest of Europe. We have found that this economic revival has enticed immigrants from all over the world and that these immigrants have had a significant effect on the Spanish economy and society. This project provides some insights on how Spain moved from a country of emigrants to a country of immigrants.

**Casey Kettler and Matthew Pehler (47)**

Faculty Advisor/Collaborator: **Eric Jamelske**

*An Analysis of Employment and Unemployment Statistics*

This project is being performed for the Chippewa Valley Center for Economic Research and Development in the Department of Economics. We have collected data on employment and unemployment for the Eau Claire Metropolitan Statistical Area as well as Wisconsin and the United States as a whole. We present an organized look into employment and unemployment trends for the Eau Claire area and compare this data to the state and the nation as a whole.

**Adam Meyer and Erik Amend (48)**

Faculty Advisor/Collaborator: **Eric Jamelske**

*Chamber of Commerce Wage Survey Analysis: An Initial Look at Local Wages by Occupation in 2006 and 2007*

This project is being performed for the Chippewa Valley Center for Economic Research and Development in the Department of Economics. We have partnered with the Eau Claire Chamber of Commerce to work on a project that surveys local businesses regarding their employees and the wages they are paid. We have selected a list of 20 key occupations of interest for which we compare wage data from 2006 and 2007. Our poster presents an initial characterization of the wages paid by occupation in 2006 and 2007 for the local area. This project helps the Chamber of Commerce provide relevant wage and occupation data to member businesses.

**Thomas Michels (34)**Faculty Advisor/Collaborator: **David Schaffer***The Changing Effects of Education, Gender, Occupation, and State on Wage Rates*

We use 36 years of labor market data from the U.S. Census Bureau, covering 1971 through 2006, to analyze the determinants of wage rates across the entire U.S. population and the ways in which they have changed. We include all of the standard determinants: education level, years of potential experience, hours worked per week, weeks worked per year, industry of employer (15 categories), class of job, gender, and race. Then, we supplement this with detailed data on occupation (500 categories) and state of residence (51 categories). We use multiple regression analysis to determine the effects of each of these variables and how they have changed over time. We also use quantile regression to see whether the determinants are the same at both the low and the high ends of the wage distribution. Finally, we interpret the results and place them in the context of broad changes in the U.S. economy over this time period such as the large increase in college attendance and labor force participation by women, the smaller but still significant increase in average level of education within all other subcategories of the U.S. population, and the fast pace of technological growth.

**Thomas Michels and Levi Funk (33)**Faculty Advisor/Collaborator: **Eric Jamelske***An Analysis of Residential Building and Sales of Existing Homes*

This project is being performed for the Chippewa Valley Center for Economic Research and Development in the Department of Economics. We have collected data on residential building and also on home sales for the Eau Claire Metropolitan Statistical Area as well as Wisconsin and the United States as a whole. We present an organized look into both the building of residential homes and also the sale of existing homes in the Eau Claire area and compare this data to the state and the nation as a whole. We also present data on mortgage rates and foreclosures to complete the picture.

**Dan Platta, Ryan Tessmer, Eric Pritz, David Hennick, and Hugh Bealka (54)**Faculty Advisor/Collaborator: **Eric Jamelske***The Eau Claire Investment Track: A First Quarter Comparison of Investment Alternatives over Four Years*

This project is being performed for the Chippewa Valley Center for Economic Research and Development in the Department of Economics. We have partnered with the Leader-Telegram to collect and maintain stock market data for a list of publicly-owned companies that are of local or regional interest and we track the performance of these companies through a simple investment basket called the Eau Claire Area Stock Basket (ECB). We compare the performance of these companies to the performance of similar investments in variations of the Dow Jones Industrial (DOGS), the Standard & Poor's Index (RSP) as well as gold (GLD). We present a comparison of these investments for the first quarter of 2008 relative to the same period in the year 2005, 2006 and 2007.

**Xiao Zeng (53)**Faculty Advisor/Collaborator: **Maria N. Dacosta***Foreign Direct Investment Flow and Intra-region Trade in East Asian Countries: The Use of Gravity Model*

In this paper, based on the Gravity Model, we will explore a modified model to predict Foreign Direct Investment (FDI) outflow between two countries by their trade volume in East Asia. In the first section, the patterns of trade and the trend of FDI in East Asia will be discussed. Then, based on the Gravity Model, we will examine how intra-region trade affects FDI outflow in East Asian countries. Regression analysis and estimation methodology are used to prove the model. In the end, FDI outflow data in China will be predicted by using the trade statistics based on the model.

## **Economics and Psychology**

**Brandon Lauersdorf, Kathryn Glodowski, and Beth Lutz (13)**Faculty Advisors/Collaborators: **Eric Jamelske**, Economics and **Lori Bica**, Psychology*Findings from an Evaluation of the USDA Fresh Fruit and Vegetable Program in Wisconsin Schools After One Year*

In November 2005, Wisconsin was selected to participate in the United States Department of Agriculture (USDA) Fresh Fruit and Vegetable Program, which is designed to improve nutrition and help reduce childhood obesity. We are conducting a statewide evaluation of outcomes associated with this program. Twenty-five program

schools and 15 control schools are taking part in this study. We are utilizing student surveys, monthly site coordinator reports, teacher surveys, and parent surveys in our evaluation. This poster targets student survey findings from the pretest and 1-year posttest, focusing specifically on program participants' attitudes toward and willingness to try different fruits and vegetables relative to control participants. An earlier analysis of effects following just three months of program implementation yielded several positive findings. Compared to control schools, students in program schools reported increased willingness to try new fruits and vegetables in school. Moreover, among children who initially reported eating fruits and vegetables an average of one or less times per day, students from program schools reported increased fruit and vegetable intake compared to students from control schools. We expect to find continued evidence of positive effects following one year of program implementation. A companion poster presents findings from parent and teacher surveys.

## Geography and Anthropology

### **Mary Allman (9)**

Faculty Advisor/Collaborator: **Brady Foust**  
*Subway Stations and Ridership in New York City*

This study analyzes the relationship between ridership and socio-economic characteristics around the subway stations in New York City. My preliminary hypothesis is that there is an inverse relationship between distance from income around each station and ridership. I also assume that commercial activity will have a direct impact on ridership. My analysis involved distinct steps: 1) socio-economic attribute data development; 2) shapefiles of all subway stations; 3) attribute and spatial data joins for mapping and geospatial analysis; 4) mapping to visualize and extract spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. Most of the attribute data used were obtained in electronic form from the New York City Transit Authority. I made a preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional "on-the-ground" data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Daniel Berens (10)**

Faculty Advisor/Collaborator: **Brady Foust**  
*Place-Characteristics of Indian Immigrant Neighborhoods in New York City*

This study analyzes the place-characteristics of Indian immigrant neighborhoods in New York City. My preliminary hypothesis is that there is an inverse relationship between distance from the neighborhood's center and amount of visible Indian place-characteristics. Analysis involved distinct steps: 1) attribute data development in the form of block group socio-economic data; 2) acquiring spatial layer(s) that consisted of shape files for block groups; 3) attribute and spatial data joins for mapping and geospatial analysis; 4) mapping to visualize and extract spatial patterns; 5) graphical and statistical analysis. Most of the attribute data used were obtained in electronic form from ESRI Business Analyst. These data formed the basis for preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional "on-the-ground" data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Eugene Boyd (49)**

Faculty Advisor/Collaborator: **Ingolf Vogeler**  
*Wisconsin Sports Geography: High School Football Recruiting*

Over the last 150 years, gridiron football has cemented itself firmly within the fabric of the American culture. Communities, urban and rural, regional and national, unite Friday nights in high school grandstands and Saturday afternoons at college venues across the country to support their friends, nephews, brothers, and sons that play on the team. When high school student athletes decide to continue playing football on into college an interesting geographical relation develops involving the relocation and migratory path of those students. Past research has focused almost entirely on recruiting trends and practices of the country's best high school football talent being pursued with scholarships by the country's most superior collegiate football programs. Certain regions of the United States produce a great number of major college football players, and conversely other areas of the country produce well below the national average of players. In this research, I focus on the geographical relationships

and landscapes of high school football recruiting in Wisconsin as it pertains to the college programs that operate in absence of athletic scholarships within the Wisconsin Intercollegiate Athletic Conference. Further, I examine Wisconsin's college football player output by city, and compare productivity among the state's rural and urban areas.

### **Blake Christenson (12)**

Faculty Advisor/Collaborator: **Brady Foust**

*Land Value Along Park Avenue in New York City*

This study analyzes the relationship between key socioeconomic variables and distance along Madison Avenue in Manhattan. My hypothesis is that there is an inverse relationship between distance from key nodes, such as Central Park and variables such as income. Commercial activities may have a direct impact on socioeconomic conditions. Analysis involved six steps: 1) attribute data development in the form of socioeconomic data for block groups; 2) acquiring shape files for block groups along Madison Avenue; 3) attribute and spatial data joins for geospatial analysis; 4) mapping for visualizing spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. Attribute data used were obtained in electronic form from ESRI Business Analyst. I did some preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional "on-the-ground" data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Corey Gannon (11)**

Faculty Advisor/Collaborator: **Brady Foust**

*Relationships of Socioeconomic Variable on 7th Avenue, New York City*

This study analyzes the relationship between key socioeconomic variables and distance along 7th Avenue in Manhattan. My hypothesis is that there is an inverse relationship between distance from key nodes, such as Central Park and variables such as income. Commercial activities may have a direct impact on socioeconomic conditions. Analysis involved six steps: 1) attribute data development in the form of socioeconomic data for block groups; 2) acquiring shape files for block groups along 7th Avenue; 3) attribute and spatial data joins for geospatial analysis; 4) mapping for visualizing spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. Attribute data used were obtained in electronic form from ESRI Business Analyst. I did some preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional "on-the-ground" data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Nicholas Johnson (30)**

Faculty Advisor/Collaborator: **Brady Foust**

*Key Socioeconomic Variables and Distance Along Fifth Avenue in Manhattan*

This study analyzes the relationship between key socioeconomic variables and distance along Fifth Avenue in Manhattan. My hypothesis is that there is an inverse relationship between distance from key nodes, such as Central Park and variables such as income. Commercial activities may have a direct impact on socioeconomic conditions. Analysis involved six steps: 1) attribute data development in the form of socioeconomic data for block groups; 2) acquiring shape files for block groups along Fifth Avenue; 3) attribute and spatial data joins for geospatial analysis; 4) mapping for visualizing spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. Attribute data used were obtained in electronic form from ESRI Business Analyst. I did some preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional "on-the-ground" data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Joseph Kelly (50)**

Faculty Advisor/Collaborator: **Lisa Theo**

*Testing Segregation Measurements in Milwaukee: Reality vs. Perception*

Milwaukee, Wisconsin is widely known as the most segregated city in the United States. This study, employing indices developed from each of Massey and Denton's five categories of Hypersegregation (evenness, exposure,

concentration, centralization and clustering), evaluates residential segregation in the city of Milwaukee, WI. Racial, ethnic, occupational, and socio-economic status and related variables are examined. This research will determine the best segregation measurement method for all types of *de facto* segregation in the city of Milwaukee. The ideal outcome of this research is to aid public policy and development for government leaders in the city of Milwaukee.

### **Andrew Kelton (29)**

Faculty Advisor/Collaborator: **Brady Foust**

*Geographic Analysis of Relationship between Income and Distance along Park Avenue in Manhattan*

This study analyzes the relationship between key socioeconomic variables and distance along Park Avenue in Manhattan. My hypothesis is that there is an inverse relationship between distance from key nodes, such as Central Park and variables such as income. Commercial activities may have a direct impact on socioeconomic conditions. Analysis involved six steps: 1) attribute data development in the form of socioeconomic data for block groups; 2) acquiring shape files for block groups along Park Avenue; 3) attribute and spatial data joins for geospatial analysis; 4) mapping for visualizing spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. Attribute data used were obtained in electronic form from ESRI Business Analyst. I did some preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional “on-the-ground” data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Jessica Sager (32)**

Faculty Advisor/Collaborator: **Brady Foust**

*Radio City Music Hall Attendance Analysis*

This study analyzes the relationship between attendance at Radio City Music Hall and distance from New York City. My preliminary hypothesis is that there is an inverse relationship between distance from New York City and attendance and that socioeconomic variables will have a direct impact on attendance. Analysis involved: 1) attribute data [ZIP codes of ticket purchasers]; 2) shape files of ZIP codes for the United States; 3) attribute and spatial data joins for mapping and geospatial analysis; 4) mapping to visualize and extract spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. The attribute data used were obtained in electronic form from Radio City Music Hall. These data formed the basis for preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional data; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Wesley Sherry (31)**

Faculty Advisor/Collaborator: **Brady Foust**

*Demographics of New York Greenspaces*

This study analyzes accessibility to green-space in New York City. My preliminary hypothesis is that there is an inverse relationship between green-space accessibility and income. I also assume that other socioeconomic variables will play a role, having a direct impact on proximity. My analysis involved distinct steps: 1) socioeconomic data for block groups; 2) shape files for block groups and green-space; 3) attribute and spatial data joins for mapping and geospatial analysis; 4) mapping to visualize and extract spatial patterns; 5) graphical and statistical analysis; and 6) the evaluation of results. Attribute data used were obtained in electronic form from ESRI Business Analyst and NYC Department of Parks & Recreation. These data formed the basis for preliminary analysis before going into the field. Field work in New York (March 13-20, 2008) allowed me to: 1) acquire additional “on-the-ground” data and understanding of the problem; 2) personally observe the dynamics of the process under consideration; 3) take photographs to add an additional visual element to my analysis; and 4) interview and thank data sources in the city. Final results will be presented as cartographic, graphical, and statistical outcomes providing a basis for accepting (or rejecting) my hypothesis.

### **Amy Wichlacz and Eugene Boyd (8)**

Faculty Advisors/Collaborators: **Christina Hupy** and **Paul Kaldjian**

*Clean Commuting and College Campuses: Network Analysis to Identify Car-Free Travel Routes in Eau Claire, WI*

The purpose of this research is to identify safe and efficient routes by bike and bus to and from the UW-Eau Claire (UWEC) campus for students, faculty, and staff in order to reduce automobile use in favor of alternative,

car-free transportation. A Geographic Information System (GIS) is used to model both existing and potential routes to and from campus. We mapped the locations of commuters' residences by geocoding the addresses of students, faculty, and staff. Spatial statistics are used to identify the geographic center of a clustered set of addresses. Network analysis is then used to identify existing and potential alternative routes from the geocoded addresses and geographic centers to campus. The routes include bus transit lines, bike trails and lanes, pedestrian friendly paths, and potential barriers for commuters such as streets with multiple stop signs and dangerous intersections. The results of our research, as an extension of the Clean Commute Initiative, is intended for the Eau Claire community in general, and more specifically, city planners and UWEC administration. Results and output support strategic planning efforts to make UWEC a model, environmentally progressive institution.

## Political Science

### **Trevor Lippman (66)**

Faculty Advisor/Collaborator: **Justin Patchin**

*Cyberbullying Among Middle Schoolers: Focusing in on the Causes and Consequences*

The Internet and other technology has changed the way adolescents interact with each other. While computers, cell phones, and other portable electronic devices have provided countless benefits to adolescents, they have also introduced new ways in which peers can bully one another. Cyberbullying has been defined as "willful and repeated harm inflicted through the medium of electronic text." While there have been numerous studies exploring the causes and consequences of traditional bullying, very little is currently known about cyberbullying. For example, previous research points to a connection between school climate and traditional forms of bullying. The current study seeks to determine whether school climate and culture also influences the extent to which youth are involved in cyberbullying as well. Implications for the results of this study will also be discussed.

### **Heather Perrault (75)**

Faculty Advisor/Collaborator: **Justin W. Patchin**

*Trends in Online Social Networking: Youth Use of MySpace Over Time*

MySpace has received a significant amount of negative attention by the media and many concerned adults who point to several isolated incidents where predators have contacted, become involved with, and even assaulted adolescents whom they met through the popular social networking web site. Furthermore, concerned parents have expressed discontent with the amount and type of personal and private information youth seem to reveal on their profile pages. Hinduja and Patchin (2008) performed an extensive content analysis of approximately 2,423 randomly-sampled, publicly-accessible, adolescent MySpace profiles in the summer of 2006, and found that the vast majority of youth were making responsible choices with the information they shared online. In this follow-up study, the authors revisited the profiles one year later to examine the extent to which the content has changed during the previous year. Though exceptions occur, youth are generally exercising discretion in posting personal information on MySpace and increasingly limiting access to their profile. Moreover, a significant number of youth appear to be abandoning their profiles or MySpace altogether.

## Psychology

### **Elizabeth Aspinwall (25)**

Faculty Advisor/Collaborator: **Blaine Peden**

*A Longitudinal Study of Writing by Psychology Majors: A Quantitative Text Analysis*

This study measured linguistic variables associated with APA style writing in a longitudinal study of academic writings by undergraduate Psychology Majors. This study completes a pilot study exploring how psychology students write throughout the major. We used qualitative text analysis to assess the writing styles of Psychology students because there are few, if any, longitudinal studies on how individuals acquire APA Style. We used linguistic, emotional, and cognitive variables to assess how well undergraduate students write in APA style as they progressed through their required psychology coursework. Papers which were archived in the UW-Eau Claire Web Portfolio were retrieved for analysis. We identified students for whom there was a paper in each of the four years. In the pilot study we analyzed papers from 13 students; however, the sample size will increase to 40 students for the presentation. We examined papers from the following classes: Psychology as a Discipline and Profession (100 level course), Research Methods (200 level course), any 300 level Psychology course, and

Senior Research Seminar (400 level course). Papers are analyzed for a selection of linguistic variables applicable to the acquisition of APA style.

**Jonathan Baker, Lyndsay Nelson, Kimberly Melby, Mark Remiker, and Sarah Brandt (41)**

Faculty Advisor/Collaborator: **April Bleske-Rechek**

*Trolley Problem Decisions Follow the Laws of Inclusive Fitness*

According to the rules of W. Hamilton's (1964) formulation of kin selection, people's moral decisions should, on average, be biased toward favoring the well-being of those who are reproductively viable and who share genes with them. Our research investigates the effects of genetic relatedness, sex, and age on moral decisions in a life-or-death thought experiment in ethics known as the Trolley Problem. The original Trolley Problem forces the reader to decide whether they would save the lives of five people tied to a track by flipping a switch to sacrifice the life of one person tied to an alternate track. In this study, we manipulated the sex, age, and genetic relatedness of the one person tied to the alternate track. A total of 659 people responded to one version of the ethical dilemma. As expected, both men's and women's decisions favored the well-being of younger and genetically related individuals. Although past research on the Trolley Problem suggests that people save five people over one, our research suggests that genetic relatedness can override number. People save five over one -- unless that one is a genetic relative.

**Erin Barney, Kristine Funk, and Holy Perszyk (234)**

Faculty Advisor/Collaborator: **Dan Holt**

*Behavioral Applications Regarding Canines (B.A.R.C.)*

BARC is a UW-Eau Claire collaborative faculty/student, community-based (Eau Claire County Humane Association) program, where students are able to gain firsthand experience teaching dogs socially appropriate behaviors using a behavior analytic approach. This approach is based on the principles of operant conditioning that involve pairing a specific signal ("sit") with a specific behavior (dog sitting) that is followed by positive reinforcement (small treats, attention, etc.). These three components of training, often referred to as the "Three Term Contingency," are the basis for training new behaviors. In addition to the training we provide the dogs, this program also offers students opportunities to practice applying the principles and terminology of operant conditioning learned in prerequisite course work for the program. BARC members also practice developing and implementing training plans, collecting and analyzing data to guide training plans, and gain valuable experience presenting behavioral data and discussing training plans in weekly meetings. To date, more than 20 dogs have been adopted from the BARC program and a number of research projects are being conducted to empirically test innovative canine training methodology.

**Jonathon Burton and Simon Wallace (26)**

Faculty Advisor/Collaborator: **Blaine Peden**

*Comparing Cultural Clout in Professionals Codes of Ethical Conduct*

Whether cultural influence on ethical values is reflected in professional ethics codes of conduct was investigated by comparing codes of analogous organizations from different countries. The American Psychological Association's (APA) Ethical Principles and Code of Conduct for Psychologists was compared to the Ethics Code of the Australian Psychological Society (APS) and the British Psychological Society's (BPS) Code of Ethics and Conduct in order to evaluate similarities and differences in content and structure. The BPS and APS Codes were then compared and contrasted in a similar fashion. The findings indicated that the content of each code was comparable but their structures were distinct.

**Johnathan Chase, Amy Xiong, Amy Steffes, Carson Maule, Ashley Zellhoefer, Ian Halberg (14)**

Faculty Advisors/Collaborators: **Kathryn Hamilton** and **Allen Keniston**

*Does Students' Analytic Skill Affect Their Ability to Learn from a PowerPoint-Assisted Lecture?*

PowerPoint has become an industry-standard aid to lectures in both academic and business spheres. Curiously, it has received neither systematic empirical nor theoretical study. Last year, we completed one of the first truly rigorous tests of PowerPoint's effectiveness in a randomized experiment concerned with PowerPoint formatting. In that study, participants were randomly assigned to one of the three conditions. We found that neither detailed nor outlined PowerPoint slides produced superior recall of the lecture's content in comparison to a lecture presented alone. We currently speculate that any effects of the amount of information presented on PowerPoint slides may have been masked by the randomization procedure. Individual differences in the way that students process information may influence whether PowerPoint is effective. In the current study, we hypothesize that field dependence/field independence (FD/FI) interacts with the amount of information presented with PowerPoint slides. FD/FI refers to how well individuals create spontaneous structure from information being taken in.

Following completion of an FD/FI test, participants viewed one of three videotaped lectures: lecture alone, lecture presented with outlined PowerPoint slides, or lecture presented with detailed PowerPoint slides. Participants answered open-ended questions of retention and transfer of knowledge as measures of comprehension of the lecture.

**James Dobbe (36)**

Faculty Advisor/Collaborator: **Blaine Peden**

*The Lights Are On But Nobody Is Home: A Study of Proenvironmental Behavior on a College Campus*

Environment improvement, issues of climate change, and Proenvironmental behavior are currently a big issue in the news, the political arena, and the home in general. These issues are especially important for this University now that the Chancellor is a signatory of American College and University Presidents' Climate Commitment. The current study is a field experiment which investigates two possible cost effective ways that a "green initiative" could be carried out. The two ways studied were the posting of signs near the light switches in classrooms that advertise the benefits of turning the lights off and personal e-mails sent to the last professor to teach a class in the room asking him or her to turn the lights off after class is done for the day. This study reports on the efficacy of these simple solutions as well as makes policy recommendations about their possible introduction.

**Cassandra Drees and Tasha Rieck (24)**

Faculty Advisor/Collaborator: **Kevin Klatt**

*Effects of Teacher Intonation on the Responding of Young Children with Autism*

This study examined performance on maintenance skills when using a conversational or enthusiastic voice tone for children diagnosed with autism. The procedure consisted of five trials delivered using a conversational voice tone and five trials with an enthusiastic voice tone per session. An alternating treatment, single subject experimental design was used to analyze whether differences existed between the two conditions. Data were collected and coded for correct and incorrect response, problem behavior and no response. Two children diagnosed with autism participated, a male aged 2 years and a female aged 4 years based on their ability to respond to a three or more word instructions. Results will be reported and implications discussed in the poster.

**Michelle Engen and Jared Klotz (35)**

Faculty Advisor/Collaborator: **Blaine Peden**

*Reply to Horvath et al. (2006)*

Horvath et al. argued that all research studies had to be conducted in person, even online studies. Three concerns were educational value, external validity of the study, and over exploitation of the participant pool. We considered each of the three points and showed that there are reasonable alternatives to each of these three concerns. We conclude that their policy of an "in person" educational study for online studies are over restrictive. Overall, their approach is more harmful than helpful. Clearly this is a logical argument rather than empirical.

**Kristine Funk, Erin Barney, and Holy Perszyk (233)**

Faculty Advisor/Collaborator: **Dan Holt**

*Evaluating Effectiveness of Prompting Ratio Procedures in Basic Canine Obedience Training*

Canine obedience training commonly utilizes hand movements, called prompts, of varying degrees to guide dogs to perform a behavior for the first time. Trainers employing various prompting procedures have observed that these prompts often become the signal for the behavior to occur, instead of a verbal command serving as the signal. It has been hypothesized that behaviors come under control of the prompts due to excessive use of prompting and a lack of appropriate planning to quickly and gradually remove the prompt from the procedure. The goal of Study 1 was to evaluate the effectiveness of a common training procedure using three different ratios of prompted trials to probe trials (5:1, 3:1, and 1:1) when teaching young canines to sit and shake. The prompting ratio procedure found to require the least number of trials to teach behaviors to acquisition (exceeding 85% correct for 3 consecutive sessions) was considered most effective. Using the procedure found to be most effective in Study 1, Study 2 added a basic correction procedure to test for any further decreases in number of trials to skill acquisition.

**Alia Groth and Christina Franzke (38)**

Faculty Advisor/Collaborator: **Kevin Klatt**

*Increasing Eye Contact in Children with Autism*

Children with autism generally make less eye contact with adults and peers than typically developing children. This is a direct replication of Morrison (1999) who was able to increase eye contact levels in children with autism without using an instruction. Instead of verbal instructions, environment cues were established to signal when the participant should make eye contact with the researcher. We examined the effects of continuous and intermittent reinforcement of eye contact on three children with autism. A multiple baseline design across participants was used to assess the frequency of eye contacts as well as independent eye contacts to cues. These findings will suggest whether this procedure is effective at increasing eye contact in children with autism.

**Erin Hirsch and Cierra Micke (21)**

Faculty Advisor/Collaborator: **April Bleske-Rechek**

*Attraction in Young Adults' and Middle-Aged Adults' Cross-Sex Friendships*

Research suggests that sexual attraction and mating motives play a role in the initiation of some cross-sex friendships. In the current study, we investigate young adults' and middle-aged adults' reports of their attraction to a cross-sex friend and their perceptions of flirtation and attraction as factors that facilitate the maintenance of the friendship. A total of 107 young adults and 142 middle-aged adults completed a questionnaire about a specific cross-sex friend of theirs who was not a family member or romantic partner. Participants rated 32 different variables for the degree to which each contributed to the maintenance of the friendship. Finally, they reported their degree of romantic attraction to the friend. In replication of previous research, young adult men in our sample reported higher levels of attraction to their friend than did young adult women. Middle-aged adult men and women did not differ in their reported attraction to friend or in their perceptions of attraction as a contributor to the maintenance of the friendship. Although middle-aged adults reported less attraction overall to their cross-sex friends than young adults did, those who reported romantic attraction to their cross-sex friend also reported lower levels of satisfaction with their current romantic relationship.

**Nicole Koktavy, Ian Halberg, Johnathan Chase, Amy Steffes, Amy Xiong, Carson Maule, and Ashley Zellhoefer (15)**

Faculty Advisor/Collaborator: **Kathryn Hamilton and Allen Keniston**

*Do Lecture Pace and PowerPoint Detail Affect Students' Comprehension of and Memory for a PowerPoint-Assisted Lecture?*

Research on the effectiveness of PowerPoint as an aid to lecture presentations is rarely guided by cognitive theory. However, Mayer's cognitive theory of multimedia learning is well-suited to guide the design of PowerPoint presentations and generating predictions about the effects of those presentations on learners. Mayer's theory suggests that pace, concurrency, redundancy, and segmentation are key variables influencing the impact of multimedia presentations. Among these variables, pace appears to be the least studied but most central of the four. In theory, pace conditions the effects of the other variables. For example, lecture pace may interact with the amount of detail contained in PowerPoint slides to determine whether the slides help or hinder recall and understanding of the lecture. A fast pace may impair memory of and comprehension for detailed slides vs. slides that present brief outlines, but a slow pace may have just the opposite effect. In an experiment just completed, student participants viewed either a fast or slow lecture accompanied by either a detailed or outlined PowerPoint display of the information. We expect our results to confirm the hypothesized interaction between lecture pace and slide detail.

**Samantha Langan and Emily Moen (6)**

Faculty Advisor/Collaborator: **Mary Beth Leibham**

*Action Figures and Dolls: Exploring Preschool Children's Interests*

This study examined preschool children's (N = 48) interests, particularly sex differences in interests, agreement between children's and parents' reports of interest, and the relationship between interest and achievement. For the purpose of this study, a questionnaire was designed to assess children's perceptions of their interests. This measure included 16 items pertaining to common children's interests (e.g., dolls, sports, animals). For each item children were asked to rate how much they liked the particular domain. Their answers were assessed using a 3-point Likert-type scale ranging from 'no, not at all' (1) to 'yes, a lot' (3). Parents used an identical questionnaire to rate their children's interests. Children's achievement was assessed using a subtest of the Kaufman Survey of Early Academic and Language Skills (KSEALS). Results indicated that boys exhibited greater interest than girls in five domains (sports, science, video games, action figures, and dinosaurs) and girls exhibited greater interest than boys in one domain (dolls). Further, children's and parents' reports of interests were similar, with agreement

occurring in over 75% of the cases. Finally, parental reports of children's math and science interests were positively correlated with children's achievement scores.

### **Andrea Leisen (5)**

Faculty Advisor/Collaborator: **Mary Beth Leibham**

*The Realism of Preschool Children's Career Aspirations*

Although most research on career development focuses on adolescents and adults, some theorists believe that career aspirations originate during early childhood. The current study contributes to the existing career development literature by investigating the realism of 3-, 4-, and 5-year-olds' career aspirations. This study included 49 middle to upper-middle class children (30 boys; ages 3,0 to 5,7,  $M = 4,5$ ). Children's career aspirations were measured through the question "What do you want to be when you grow up?" and were coded as realistic if they fit the definition of a job listed in the Standard Occupational Classification (SOC) system. Aspirations were classified as fantasy if no such occupation existed. More than half of the children (27) were able to provide realistic career aspirations. Seven children did not know what they wanted to be when they grow up, and 15 children provided a fantasy career aspiration (e.g., "princess" or "spiderman"). Of the 27 children who provided a realistic career aspiration, 6 (22%) aspired to enter the same career as one of their parents. Although the likelihood of indicating a realistic career aspiration increased with age, this developmental trend was not statistically significant.

### **Carson Maule, Johnathan Chase, Amy Steffes, Amy Xiong, Ashley Zellhoefer, Nicole Koktavy, and Ian Halberg (7)**

Faculty Advisors/Collaborators: **Kathryn Hamilton** and **Allen Keniston**

*Do Lecture Pace, Detail, and Segmentation Affect Students' Comprehension of and Memory for a PowerPoint-Assisted Lecture?*

Research on the PowerPoint's efficacy as an aid to lectures is rarely guided by cognitive theory. However, Mayer's cognitive theory of multimedia learning is well-suited to guide the design of PowerPoint presentations and generating specific predictions about the effects of those presentations on learners. Mayer's theory suggests that pace, redundancy, and segmentation are key variables influencing the impact of multimedia presentations. Among these variables, pace is the least studied but most central. In theory, pace conditions the effects of the other variables. Lecture pace, segmentation, and detail may interact to determine whether students are able to understand and remember material in the lecture. For example, a fast pace may be effective if a PowerPoint assisted lecture is divided into two parts separated by a memory test; a slow pace may be optimal for an uninterrupted lecture. In an experiment just completed student participants heard either a complete lecture at once or the same lecture interrupted by memory testing, the lecture itself delivered at a slow or fast pace, and both combinations of these variables accompanied by either detailed or briefly outlined PowerPoint slides. We expect our results to confirm the hypothesized interaction between lecture pace and lecture segmentation.

### **Stephanie Maves (40)**

Faculty Advisor/Collaborator: **April Bleske-Rechek**

*Friends as Rivals: Perceptions of Attractiveness Predict Rivalry in Female Friendships*

Same-sex friendships provide numerous benefits, such as companionship, laughter, shared interests, and advice. They also entail costs. For example, both men and women report competing with their same-sex friends to attract attention from the opposite sex, and they perceive such mating rivalry as one of the most costly aspects of their same-sex friendships (Bleske & Buss, 2000). Because women compete with one another primarily in the domain of physical attractiveness (Dijkstra & Buunk, 2002), we predicted that female friends' perceptions of each others' attractiveness would be linked with their perceptions of rivalry in the friendship. To test this hypothesis, we collected perceptions of self and friend from both members of 46 pairs of female friends. Friends also reported on various aspects of their friendship, including rivalry (e.g., "She flirts with guys I am interested in."). Although women reported that their female friends were more physically attractive than other women their age were, this friend-enhancement bias decreased when they compared their friend directly with themselves. And, as we predicted, women who perceived their friend as more attractive than themselves reported more rivalry in their friendship.

### **Cierra Micke and Erin Hirsch (39)**

Faculty Advisor/Collaborator: **April Bleske-Rechek**

*The Good and Bad of Friendship*

In this study, we investigate adults' perceptions of the good and bad of friendship as a function of their age group (young adult or approaching middle-age), sex (male or female), and type of friendship (same-sex or cross-sex).

On a written questionnaire, 107 young adults and 142 middle-aged adults nominated the most beneficial and most costly aspects of their current and recent same-sex friendships; then they did the same for their cross-sex friendships. The order was reversed for half of participants. Across age, sex, and type of friendship, our participants valued their friendships for the emotional support and companionship they provided. However, some costs and benefits varied with age, sex, and type of friendship. Particularly in same-sex friendship, middle-aged adults were more likely than young adults to nominate time as a cost of friendship. Participants in both age groups nominated mating rivalry as a cost of same-sex friendships but not of cross-sex friendships. Finally, in both age groups, women nominated sexual attraction as a cost of cross-sex friendships far more frequently than men did, and men nominated sexual attraction as a benefit of cross-sex friendships more than women did.

**Emily Moen and Samantha Langan (16)**

Faculty Advisor/Collaborator: **Mary Beth Leibham**

*Preschool Children's Self-Concepts and Academic Achievement: Preliminary Findings*

Although the relationship between self-concept and academic achievement has been documented in numerous studies, little attention has been given to young children's self-concepts. In fact, some researchers believe that measuring self-concept in young children is difficult, if not impossible. The current study attempts to measure preschool children's self-concepts, and explores the relationships between self-concept and academic achievement. Participants included 48 3-, 4-, and 5-year-old children who were recruited through two local child care centers. Children's self-concepts were assessed using two measures: the Joseph Picture Self-Concept Scale and the Self-Description Questionnaire for Preschoolers. Academic achievement was assessed using the Kaufman Survey of Early Academic and Language Skills. Preliminary findings indicate that 79% of preschool children display positive self-concepts. Further, females', but not males', academic achievement scores are related to their academic self-concepts,  $r = 0.68$ ,  $n = 18$ ,  $p = 0.00$ . There were no sex differences in achievement scores or self-concept scores.

**Lydia Moua and Hua Xiong-Her (22)**

Faculty Advisor/Collaborator: **April Bleske-Rechek**

*Check Her Out! Does Viewing Sexy Individuals Affect Perceptions of Self and Partner?*

Past research shows that exposure to images of attractive and sexy women, such as those pictured in soft-porn magazines, negatively affects women's self-views and men's perceptions of their female partners. The current study extends past research in two ways. First, we investigate the effects of non-pornographic, yet atypically attractive, media images -- such as those found in high-status store catalogues -- on men's and women's perceptions of their partners and of themselves. Second, we investigate the potential facilitative effects of sexual unrestrictedness (short-term mating interest) on psychological response to viewing such images. After measuring men's and women's short-term mating interest, we exposed them to one of three sets of images: abstract and traditional art; highly attractive men; or highly attractive women. Subsequently, participants assessed their own and their current partner's desirability as well as their satisfaction with and commitment to that relationship. Contrary to expectation, viewing attractive same-sex images did not negatively affect men's and women's self-perceptions, and viewing attractive opposite-sex images did not negatively affect men's and women's perceptions of partner and relationship. However, men who were high in short-term mating interest liked the attractive opposite-sex images much more than did men who were low in short-term mating interest.

**Joseph Muellenberg, Katelyn Parker, and Angela Peper (46)**

Faculty Advisor/Collaborator: **Allen Keniston**

*Self-efficacy and Locus of Control as Predictors of the Efficacy of a Lifestyle Modification Program for Patients with Pre-Diabetes*

Research in Finland and the U.S. has demonstrated that lifestyle interventions succeed at reducing diabetes risk among sedentary, overweight patients. Teaching, coaching, and counseling help participants lose weight. Our project sought to demonstrate (1) that a classroom approach to diabetes education produces similar results; (2) that relative program success depends on participants' self-efficacy and internal locus of control. Sixty-seven of ninety-five patients at risk for Type 2 diabetes completed 16 classes over six months. They learned how diet, eating habits, and exercise comprise a diabetes-preventing lifestyle. Teaching materials were taken from the United States Diabetes Prevention Project; teachers were a dietician and nurse practitioner at Marshfield Clinic in Eau Claire. Participants completed measures of self-efficacy and locus of control at the beginning of the project. They subsequently attended 8 classes, one per week for 8 weeks, then 8 more classes at two week intervals. The primary criteria were weight loss and weekly time spent in exercise. A qualitative review of the data shows that all but a few participants lost weight. Statistical analyses will show whether the loss was significant and whether the amount of weight loss was conditioned by participants' senses of self-efficacy and locus of control.

### **Matthew Newquist (2)**

Faculty Advisor/Collaborator: **Daniel Holt**

*Delay and Probability Discounting of Gains and Losses in Gambling and Non-gambling College Students*

Discounting refers to the fact that the present/immediate, subjective value of an outcome decreases as the delay to/uncertainty of receiving that outcome increases. The purpose of the current study is to examine how both “impulsive” (e.g., gamblers) and “non-impulsive” (e.g., non-gamblers) individuals make decisions about delayed and uncertain monetary losses. Previous research has found that college-aged gamblers treat probabilistic rewards differently than their non-gambling peers. That is, the gamblers were more risk-taking (Holt, Green, & Myerson, 2003). That same research found that college-aged gamblers and their non-gambling peers’ choices were indistinguishable in terms of delayed rewards. Taken together, these findings suggest that ‘impulse control’ problems do not necessarily include both an inability to delay gratification and a tendency to take more risk. In the current study, both problem gamblers and matched non-gamblers completed an online computer-based gambling screen and decision-making task where they chose between hypothetical monetary payments/rewards that differed with respect to delay or probability. By examining decisions about losses the current study will expand our understanding of ‘impulse control’ problems.

### **Matthew Newquist (3)**

Faculty Advisor/Collaborator: **Daniel Holt**

*A Psychophysical Approach to Discounting: Sex and Food*

Discounting refers to the fact that the present, subjective value of a reward decreases as the delay to/uncertainty of receiving that reward increases. Past research that has evaluated whether consumable outcomes (e.g., candy, beer, drugs, etc.) are discounted differently suggests that when delay to/probability of receipt is manipulated, consumable rewards are discounted similarly (Estle, Green, Myerson, & Holt, 2007; Odum & Rainaud, 2003). The present study extends past research by using a psychophysical approach to examine how a previously uninvestigated consumable outcome (sex) is discounted relative to a previously investigated consumable outcome (food). Participants made decisions about the receipt of delayed and uncertain consumable outcomes at different magnitudes. All outcomes were quantified in terms of vertical lines of different length, as opposed to numerical values, to allow for the comparison of qualitatively different rewards on a quantitatively similar scale.

### **Matthew Newquist and Erin Barney (1)**

Faculty Advisor/Collaborator: **Daniel Holt**

*A Psychophysical Approach to Discounting: Sex and Money*

Research has evaluated whether consumable and non-consumable rewards are discounted differently and suggests that when delay to receipt is manipulated, consumable outcomes (e.g., food and drugs) are discounted more steeply than money, but consumable outcomes were not discounted differently from each other (Estle, Green, Myerson, & Holt, 2007; Madden, Petry, Badger, and Bickel, 1997; Odum & Rainaud, 2003). Estle et al. also found that when probability of receipt is manipulated, consumable rewards are discounted similar to money. The present study extends past research by using a psychophysical approach to examine how a previously uninvestigated consumable outcome (sex) is discounted relative to a previously investigated non-consumable outcome that is more fungible (money). Participants made decisions about delayed and uncertain outcomes at different magnitudes. All outcomes were quantified in terms of lines of different length, as opposed to numerical values, to allow for the comparison of qualitatively different rewards on a quantitatively similar scale.

### **Matthew Newquist and Kevin Schlichenmeyer (19)**

Faculty Advisor/Collaborator: **Kevin Klatt**

*A Review of Naturalistic Teaching Models for Children with Autism*

Several different naturalistic teaching models have been used to teach skills to children with autism. These models include: Incidental Teaching, Natural Language Paradigm, Multiple Incidental Teaching Sessions, Pivotal Response Training, Milieu Teaching, Enhanced Milieu Teaching, and Speech and Play Enhancement for Autistic Kids. The procedures within these models vary, and some overlap. The purpose of the current study was to provide a review of these models and the procedures used to aid in the discrimination of their similarities and differences. The review of the naturalistic teaching models revealed that among all of the models there were 23 different procedures. Sixty one percent of those procedures were used by at least two of the models, 48% of the procedures were used by at least three of the models, and 17% of the procedures were used by all of the models. These results suggest that while there are several different naturalistic teaching models that have been used to teach skills to children with autism these models are not as distinct from each other as one might expect.

**Emily Offerdahl (232)**Faculty Advisor/Collaborator: **Catya von Karolyi***International Study and Attachment*

Is students' participation in study abroad programs associated with their emotional attachment to important others? We hypothesize that students who are securely attached, compared to those who are not, will be more interested in or have more experience participating in study abroad programs. To test our hypothesis, undergraduate students complete on-line questionnaires that measure interest in and experience studying abroad and attachment status. Results reveal such an association between study abroad behaviors and attachment status exists. We discuss the implications of our findings in relation to student participation in study abroad programs and career planning.

**Jodi Ogle, Cierra Micke, Kelly Paulson, Carrie Haessly, Kevin Schlichenmeyer, Matt Newquist, and Amanda Verriden (37)**Faculty Advisor/Collaborator: **Kevin Klatt***Assessing Preference for Attention in Children Diagnosed with Autism*

This study explored whether preferences for attention could be assessed and whether the results were predictive of reinforcing effects. Three children diagnosed with autism, ages 3-5 participated. The study consisted of four phases: determining forms of attention (activities) to be assessed via therapist and parent interview; utilizing a comparison design to teach the participants to label pictures of the activities; conducting a preference assessment to determine a hierarchy of preference for the activities; and utilizing an alternating treatments design to assess reinforcing effects of the activities. A Pearson's R correlation will be conducted to determine whether the preference assessment results are predictive of reinforcing effects. Analysis of the data will be presented along with study implications.

**Michael Ojibway (42)**Faculty Advisor/Collaborator: **April Bleske-Rechek***Students' Perceptions of Their Educational Mentoring Experiences*

Underrepresented (or "ethnically diverse") students of color have consistently displayed lower retention and graduation rates when compared to White/Non-Hispanic (or "non-diverse") students in postsecondary education. Because mentoring relationships have been proposed to be important for academic success (Johnson & Huwe, 2003), we investigated the mentoring perceptions of 189 current ethnically diverse and non-ethnically diverse students at the University of Wisconsin-Eau Claire. Ethnically diverse and non-diverse students reported nearly identical ideal mentor preferences and neither group reported a strong preference for a mentor of the same gender or ethnicity. However, ethnically diverse students were less likely to report being in an informal mentoring relationship and voiced greater instances of negative regret towards their mentor. We discuss our findings in the context of previous studies showing the effectiveness of informal mentoring relationships over formally assigned ones and, hence, the implications of our findings for designing successful academic interventions for ethnically diverse students (Hopkins, 2003; Rose et al., 2005).

**Kelly Paulson, Elizabeth Kooistra, Kristina Vargo, and Tasha Rieck (43)**Faculty Advisor/Collaborator: **Kevin Klatt***The Independence of Tacts and Mandas as a Function of Preference.*

In this study, we did a systematic replication of the research done by Wallace, Iwata, and Hanley (2006) by studying one possible condition under which the acquisition of labeling an item (tact) may facilitate the establishment of asking for the item (mand). This was done by using a delayed multiple baseline across participants single subject experimental design. Four children diagnosed with autism, ranging from age 2 to age 5, were taught to tact both a high and low-preferred item, as determined by a preference assessment. Following tact training, mand tests were conducted to determine whether a transfer of stimulus control from a nonverbal stimulus to a motivating operation occurred using differential consequences. Results and their implications will be discussed.

**Katrina Sandager, Stephanie Maves, and Sarah Hubert (23)**Faculty Advisor/Collaborator: **April Bleske-Rechek***Can You Match These Friends? A Test of Genetic Similarity Theory*

Genetic Similarity Theory proposes that people associate with those individuals who resemble themselves at the genetic level. In a novel test of this theory, we asked outside raters to match pairs of same-sex friends on the basis of their physical appearance. We photographed 12 pairs of female friends and 12 pairs of male friends. We

took a facial shot and a full-body shot of each friend, and asked outside judges to rate each person for their physical attractiveness and apparent attention to appearance. Then, a new sample of 102 men and 228 women attempted to match friends. Each participant viewed one of eight different versions of a 12-slide PowerPoint show. On every version, each of the first six slides showed four women and asked, "Which two of these women are friends?" The remaining six slides showed men. For each slide, the probability of matching the friendship pair was 1 in 6. No slide show displayed the same person twice. Men and women matched female friends more easily than they matched male friends. Female friends who had been rated more similarly in attractiveness and attention to appearance were matched more frequently relative to other friends.

**Kevin Schlichenmeyer (231)**

Faculty Advisor/Collaborator: **Dan Holt**

*The Effect of Trained Attending on Skill Acquisition Rate in Canines*

Applied dog trainers claim that training an attending response is important when teaching skills to canines. Little research, however, has been done to verify the claim that attending is a necessary prerequisite to teaching skills. The goal of this study was to assess effects of trained attending on teaching a dog to sit on command. A convenience sample of 6 canines was randomly assigned to either the experimental group or the control group. Canines in the experimental group were trained an attending response prior to being trained to sit on command. Canines in the control group did not receive attending training, but were trained to sit on command. Comparisons of acquisition rates between groups were made in order to assess the effect training an attending response has on the efficacy of training a dog to sit on command.

**Travis Smith, Sara Clark, Ryan Stone, Noah Novinska, Tischman Corey, Lauren Puhl, Robyn Hertig, Victoria Raber, Braiden Andersen, Katie Filtz, Kayla Edwards, and Sarah Hammon (17)**

Faculty Advisor/Collaborator: **David Jewett**

*Effects of Food Deprivation and Diet on Reports of Hunger*

Rats were trained to discriminate between 2 and 22 hours of food restriction by choosing between two levers. Lever presses on the right and left levers were associated with internal states associated with the 2 hr ('full') and 22 hr ('hungry') food deprivation conditions, respectively. Upon acquiring the discrimination task, the rats were repeatedly tested across sessions – the dependent measures included food intake (measured prior to the discrimination test) and lever choice during the discrimination task. Two different tests were conducted. The first assessed to what extent food consumption alters effects of different deprivation durations. The second test compared the effects of consuming different diets on stimuli associated with 22 hour food deprivation. Results demonstrated food consumption did not preferentially affect the effects of different deprivation durations. Additionally, rats consuming solid chow, ground chow, and high carbohydrate chow displayed an equivalent direct relationship between amounts eaten and reduced or eliminated 'hunger' responses, regardless of chow composition.

**Travis Smith and Isaac Portz (4)**

Faculty Advisor/Collaborator: **Dan Holt**

*Schedule Induced Procrastination in College Students*

When the frequency of congress' bill production is plotted as a cumulative function across a congressional term, the result is a positively accelerated curve which is reminiscent of a fixed-interval scallop (Critchfield, Haley, Sabo, Colbert, & Macropoulis, 2004). The positively accelerating curve can be conceptualized as a feature of "procrastination." The present study attempts to replicate the Critchfield et al. study by applying the same method of analysis to the homework completion behavior of college students. Data from a 200-level psychology course were analyzed across two consecutive semesters. Of interest is the completion date and time for each of 25 separate homework assignments for each student. The cumulative number of students completing their homework was plotted as a function of time across the semester. At issue is whether the obtained function will produce the positively accelerating curves as found by Critchfield et al.

**Travis Smith, Rochelle Smits, Alia Groth, and Ryan Stone (18)**

Faculty Advisor/Collaborator: **Dan Holt**

*Gambling Behavior in the Pigeon*

With an increase in gambling problems comes a need to understand the psychology of gambling behavior. Considering that human behavior can be difficult to study experimentally and because humans and animals share similar behavioral processes, there is a demand to create an animal analog to gambling behavior. This study was designed to create a gambling behavior analog in the laboratory. In this analog, we used a three-key operant chamber which also had 9 visible lights. One response key was the "work" key where pigeons "earned" lights by

pecking. The lights earned from working could be exchanged for direct access to food via the “food exchange key.” The lights earned could also be used to gamble. That is, responses to the third response key, the “gambling key,” allowed the pigeons to risk a single light with a probabilistic outcome of either a gain or loss of lights. Pigeons were able to freely distribute their behavior between the three keys. Across conditions the probabilities associated with the gambling response key were varied. Results indicate that when the gambling probability favored winning, pigeons would strongly prefer to gamble rather than work when given a choice.

**Rochelle Smits and Matthew Newquist (235)**

Faculty Advisor/Collaborator: **Daniel D. Holt**

*A New Method for Quantifying Outcomes in Discounting*

Research has evaluated how consumable and non-consumable rewards are discounted and suggests that when delay to receipt is manipulated, consumable outcomes (e.g., food and drugs) are discounted more steeply than money, but the different consumables were not discounted differently. When the probability of receipt is manipulated, consumable rewards are discounted similar to money (Estle, Green, Myerson, & Holt, 2007; Madden, Petry, Badger, and Bickel, 1997; Odum & Rainaud, 2003). The purpose of the present study is to validate an approach to quantifying consumable rewards that allows for the comparison of qualitatively different rewards on a quantitatively similar scale. Participants in the present study made decisions about the receipt of large and small amounts of money at different delays and probabilities. The amounts of money were presented both in terms of lines of different vertical lengths (representing the amounts), and different dollar amounts. Comparing participants’ discounting of money quantified as lines and money expressed as dollar amounts will allow future researchers to use length of lines to quantify various rewards that otherwise may be hard to objectively quantify.

**Sarah Tillman, Jonathan Baker, Mark Remiker, Lindsay Matteson, and Kara Kneisl (20)**

Faculty Advisor/Collaborator: **April Bleske-Rechek**

*The Etiology of Adult Romantic Attachment Style*

Adult romantic attachment style refers to the degree to which individuals are comfortable with closeness and feel that others are available to meet their needs. Although research has linked adult romantic attachment with numerous relationship processes, the etiology of individual differences in romantic attachment style is unknown. We conducted three studies to explore this issue. In Study 1, men and women reported their beliefs about the potential causes of a hypothetical character’s secure or insecure attachment style. Participants frequently nominated parents’ romantic relationship style, childhood relationship with parents, and past romantic relationship experiences as causes of attachment. In Study 2, we investigated attachment styles of 180 adult children and their parents to explore the possibility that parents’ own relationship style is transmitted genetically or through experience (or both) to their children. In Study 3, we again investigated similarity among 169 adult children and their parents; we also collected data from 52 siblings to determine if being reared in the same home induces similarity in romantic attachment style. Family members did not demonstrate systematic similarity in their romantic attachment styles. We discuss the potential importance of nonshared environmental influences in the development of adult romantic attachment.

**Kristina Vargo, Kelly Paulson, and Tasha Rieck (44)**

Faculty Advisor/Collaborator: **Kevin Klatt**

*Comparing the Effects of Single and Multiple Target Trials in Teaching Skills to Children Diagnosed with Autism*

Children with autism generally have difficulty communicating with others. Therapists working with these children must decide how to most effectively teach new skills such as verbal behavior. The purpose of the current study was to investigate two different procedures to teach new skills to children diagnosed with autism. One procedure included teaching one target (for a skill) until mastery before beginning to teach a second target. The other procedure included teaching multiple targets at the same time until all targets were mastered. The two procedures were evaluated using an experimental single-subject design. Participants included 4 children (ages 2-6) all diagnosed with autism. Results will suggest differences between procedures regarding errors during teaching, the number of trials until mastery, generalization, and maintenance.

## Psychology and Economics

**Beth Lutz, Kathryn Glodowski, and Brandon Lauersdorf (45)**

Faculty Advisors/Collaborators: **Lori Bica**, Psychology, and **Eric Jamelske**, Economics

*An Evaluation of the USDA Fresh Fruit and Vegetable Program in Wisconsin Schools: Teacher and Parent Thoughts After One Year*

Our previous research suggests that the Wisconsin Fresh Fruit and Vegetable Program has been effective in increasing student willingness to try new fruits and vegetables served in school after just three months of program implementation. However, for the program to succeed in the long run, the effects must reach beyond school and into the home. The best way for this to happen is for teachers and parents to become actively involved in the program implementation. In addition, we believe the program is likely to have the greatest influence on younger children. Therefore, we surveyed both parents and teachers of the 5th grade students in the program schools. Our results suggest that both parents and teachers like the program and perceive that students also like the program. Moreover, parents generally reported students trying more new fruits and vegetables and eating more fruits and vegetables overall and almost half of parents reported their children asking them to buy more fruits and vegetables. On the downside, nutrition education activities in the classroom and parental involvement in the program are lower than desired.

## Sociology

**Michelle Curci, Hannah Jones, Renda Sweeney, and Wendy Weimerskirch (55)**

Faculty Advisor/Collaborator: **Pamela J. Forman**

*Researchers Giving Piggyback Rides: Ethnography as a Tool for Understanding Female Adolescent Development*

Ethnography allows undergraduate researchers to observe 5th grade girls in a setting where they are not seen as authority figures (Hadley 2007). By positioning themselves as “buddies,” the girls see their researchers as friends and mentors. They become privy to the worlds that these girls inhabit, getting to know their family situations and the challenges they face in school. By taking field notes on the information disclosed, we collect in-depth data about these girls’ lives. Importantly, the buddies also serve as a sounding board in encouraging these girls in their progress in school, broader goals and in dealing with challenges. Recent studies demonstrate that girls are facing problems such as depression, weight issues, exposure to alcohol and drugs earlier than their predecessors (LeCroy and Mann 2008), probably because they are entering adolescence at younger ages. In this dual role as researcher/buddy, these undergraduates enrich our understanding of adolescent females as they mentor these girls.

**Ashley Vacha, Emily Cooper, and Amanda Albert (56)**

Faculty Advisor/Collaborator: **Melissa Bonstead-Bruns**

*Gender Differences in Family Expectations and Subsequent Career Decisions Among College Students*

The work-family conflict is part of many adults’ lives. The extent that it currently affects families is often studied, but the plans of college students who are soon entering the workforce are not considered as often. Our study looks at how college students are planning for the work-family conflict in their future. Initial results indicate that women are planning for this conflict in the majors that they choose and the careers that they expect to achieve, whereas men generally are not. Qualitative and quantitative analyses of several vignettes included in the survey provide insight into respondents’ general ideas about addressing the work-family conflict. Respondents were asked to play the role of a college guidance counselor and advise four imaginary students with different substantive interests, extracurricular interests, and family expectations. Preliminary results indicate that family plans and the gender of the imaginary student both impact career advice given by respondents, though the impact of each varied by field of study.

**Kyle Zander (65)**

Faculty Advisor/Collaborator: **Jeff Erger**

*Solidarity in Student Organizations*

This research investigates the effects of organizational structure, individual attitudes, and identity on behavioral and attitudinal solidarity in voluntary campus organizations. Two theoretical approaches are investigated. Structural theories of solidarity focus on organizational structures, arguing that greater monitoring and sanctioning mechanisms increase solidarity and decrease free riding behavior. Identity-based theories argue that higher

levels of shared identity by group members increase solidarity and decrease free-riding behavior. Data was collected through a two stage survey, interviews, and content analysis of public documents. Contrary to expectations about organizational structure, dues requirements had a strong negative effect on behavioral solidarity and also had negative effects on individual solidarity attitudes and members' organizational identity. Other organizational structures had little effect. Members who strengthened their organizational identity over the course of the study had higher levels of behavioral solidarity, and showed increased solidarity attitudes. Given these results, organizations and advisors might consider that focus on dues requirements and other strict rule structures may actually weaken connections to the organization, while actions that build connections between members and a shared sense of identity may have wide ranging positive effects, contributing to higher organization and student success, and greater student satisfaction with the college experience.

## BUSINESS AND PROFESSIONAL STUDIES

### Art and Design

**Jennifer Curwick and Stacy Reddy (189)**

Faculty Advisor/Collaborator: **Lia Johnson**

*Learning About Research of Teaching and Learning in Art Education*

We, Jennifer Curwick and Stacy Reddy, are researching in the scholarship of teaching and learning with Dr. Lia Johnson in the department of Art and Design. The work focuses on winter and spring semester Art 300 non-art major teaching methods courses. Our work focuses on analyzing the differences between cognitive and affective learning in two different learning timeframes. We are generating descriptive statistics using survey data from pre and post surveys, putting it into excel, and analyzing it. In addition, we are initiating interviews and using qualitative analysis to discover cognitive and affective patterns in the data. Thirdly, we are involved in doing a literature search for other research pertaining to differences of learning in different timeframes. From this experience we are hoping to understand general public attitudes and values about the arts, and how they are affected by education. Secondly, we are interested in seeing our perceptions, as artist and future art teachers, compared to students' perceptions of what is being taught and learned. Finally, we are interested in learning how to gather and interpret qualitative and quantitative data in our field. We are excited to be involved and to continue researching about teaching and learning within art education.

### Biology

**Rebecca O'Brien (105)**

Faculty Advisor/Collaborator: **Julie Anderson**

*Diabetes in the Latino Population of the United States*

The Latino population accounts for the largest minority group in the United States and is expected to make up 25% of the country's total population by the year 2050. Consequently, health care professionals must be aware of issues affecting Latino health. The most pressing of these issues is the high incidence of type 2 diabetes. Latinos in the United States are twice as likely to develop type 2 diabetes as non-Hispanic whites. The prevalence of diabetes in the Latino population is attributed to several factors including acculturation, a genetic propensity towards obesity, and a lack of access to health care. Public health workers and health care providers must offer effective and culturally sensitive education to prevent, treat, and manage diabetes in the Latino population.

## Communication Sciences and Disorders

### **Tae Asahina (113)**

Faculty Advisor/Collaborator: **Larry Solberg**

*The Effect of Lemon Ice on Swallowing in Persons with Dementia*

Persons with advanced dementia frequently experience swallowing problems that increase their risk for malnutrition and mortality. Recently, sensory stimulation has been investigated as a possible treatment for these neurologically based swallowing problems. The purpose of this study was to determine whether feeding lemon ice to persons with severe dementia decreased their mealtime duration and increased their amount of food consumed. Seven nursing home residents with a diagnosis of dementia participated. Participants were fed their breakfast meal on three consecutive days in their natural setting. The first day residents were fed a standard meal (Control Condition). On days two and three, participants received one of two treatments while being fed a standard breakfast meal. The order of these treatments was randomized across participants. Treatment A included alternating one bite of lemon ice and two bites of breakfast food. Treatment B included combining lemon ice and breakfast food in each bite. Meal duration was measured with a stopwatch, and dishes were weighed before and after the meal to determine the amount of food consumed. Results of this study will be presented and discussed in light of research related to sensory stimulation of swallowing.

### **Cortney Bongard, Megan Pederson, Heidel Brady, Angela Heacock (127)**

Faculty Advisor/Collaborator: **Kristine Retherford**

*Acquiring Play Behaviors*

Play, essential to a child's life, is also a cognitive indicator of language acquisition potential. The connection between language acquisition and play development is most consistently evidenced by typically developing children. This research project, however, focuses on one adopted Ethiopian boy with minimal first language exposure. Because of E's difficult history, including factors such as malnutrition, we hypothesized that upon entering the United States, E was developmentally delayed in play behaviors. Once immersed in stimulating environments rapid change in play activities occurred. This study documents the sequence and breadth of play behaviors observed over a 10 month period of time.

### **Kristen Diermeier, Alyssa Retzlaff, Pakou Vang (134)**

Faculty Advisor/Collaborator: **Marie Stadler**

*Culturally Diverse Materials for Oral Storytelling and Literacy*

Oral Stories were collected from adults with culturally diverse backgrounds (American Indian and Hmong). These stories were audio-taped, transcribed and analyzed for length (number of words, clauses and C-units), cohesion, sequencing, story grammar elements, and linguistic complexity by three undergraduate students majoring in Communications Sciences and Disorders. The stories were then compared to normative data for stories told by individuals from European descent. Several stories will then be chosen and adapted to include elements that are considered important for literacy. Finally, an artist will draw pictures to accompany each story. These books will be used in a later study with children in Head Start and/or Early Childhood Classrooms.

### **Lisa Govier, Lauren Derksen, Anna Talbot, Abby Freiborg, Kelly Bernhardt (128)**

Faculty Advisor/Collaborator: **Kristine Retherford**

*Perceptual Voice Ratings of Individuals with Cleft Palate*

Resonance is the "quality of the voice that is determined by the balance of sound vibration in the oral, nasal, and pharyngeal cavities during speech" (Kummer, 2006). This study investigates effectiveness of listener training on perceptual ratings of resonant quality, anticipating training results in more accurate and consistent ratings. Researchers were trained by certified speech-language pathologists at the University of Minnesota Cleft Palate Craniofacial Clinic to make qualitative, perceptual judgments of resonant quality. Following training, researchers developed scripts to consistently conduct training. Volunteers majoring in communication sciences and disorders were divided into two groups: Trained vs. Untrained. Training consisted of description, demonstration and practice of rating procedures. Trained and untrained subjects listened to 15 recordings of speech samples collected from individuals with varying degrees of clefting and severity of resonance disorders. Listeners rated the samples presented on a 0-7 Likert rating scale: 0 = no perceived distortion, 7 = severe distortion. Mean scores and standard deviations for each sample will be computed for trained versus untrained listeners and subjected to statistical analysis for differences in means compared to standard mean scores. Results will be discussed in terms of accuracy and variability of responses within each group.

**Jenna Komarek (169)**Faculty Advisor/Collaborator: **Linda Carpenter***Student and Faculty Views of Learning with Technology*

This poster will report the results of a survey distributed via email to all students and faculty on campus during the fall 2007 semester. The survey was conducted in collaboration with EDUCAUSE, a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology in instruction. The survey was designed to gather student and faculty ratings related to preferred ways of learning new technologies, beliefs about learning, and expectations for use of technology in teaching. Respondent characteristics closely mirror characteristics of students and faculty on campus and results indicate some significant differences in preferences, beliefs, and expectations. The poster will present these results and draw implications for enhancing student learning with technology.

**Jennifer Mick, Julie Endvick, and Stacy Heath (133)**Faculty Advisor/Collaborator: **Marie Stadler***Documenting the Language Development of 2 year old Children*

This study compared the language development of one foreign born child to that of two native born children. Researchers followed these children, two males and one female, from 26 to 36 months of age. Six language samples were collected from each child and analyzed for semantics, pragmatics, and morphosyntax. Each researcher followed one child and procedural reliability was checked three times for each student by their advisor, an experienced speech-language pathologist. A total of 18 samples were gathered, analyzed by the student researchers and checked by the speech-language pathologist. Results were then compared to discover differences and similarities in English language development across the three children. This research provides insight into this critical period of child development which is predictive of later communication, social-emotional and cognitive skills. The poster will present key findings from the study and implications for practice will be suggested.

**Heather Mosley (114)**Faculty Advisor/Collaborator: **Larry C. Solberg***A Normative Study of the Change Counting Assessment*

This project is a normative study of the *Change Counting Assessment (CCA)* developed at Sacred Heart Hospital in Eau Claire, WI. This study included 30 senior volunteer participants (aged 60-90 years) from the community. Qualifying participants had no history of stroke or other neurological disorders, demonstrated normal cognitive function, and possessed sufficient visual acuity and manual dexterity skills to carry out the tasks. Participants were given the Mini-Mental Status Examination to rule out potential cognitive impairment, the *CCA*, and the Counting Money sub-test of the Assessment of Language-Related Functional Activities to establish concurrent validity of the *CCA*. Test/re-test reliability of the *CCA* was completed. The results of this study will be presented and discussed.

**Katelyn VanDreese and Emily Leitner (147)**Faculty Advisor/Collaborator: **Lisa LaSalle***Risk Factors of Childhood Stuttering Persistence Related to Treatment Outcomes*

Our objective is to inform clinicians' decision-making as to whether a child is at risk for developing a lifelong stuttering problem. Risk factors for persistence from longitudinal data (Yairi & Ambrose, 2005) can now be paired with retrospective data (Yaruss, LaSalle & Conture, 1998) to evaluate and improve decision-making and client outcomes. Forty-five children under the age of 10 who had concerns about stuttering were evaluated at our university clinic in 2000-2007. These children (36 boys; 9 girls) had a mean age of 52.4 months (SD = 19.1 months) when they were first evaluated. Preliminary results reveal that the mean age of stuttering onset was 35 months of age (SD = 9.2), or a mean time post-onset of 19 months (SD = 16.5). For eight of the 45 children, all boys, therapy was deemed unwarranted, and for the remaining 37/45 (82%), therapy was recommended and received. Mann-Whitney U tests were used for the two independent samples of children who did and did not receive therapy because normal distribution could not be assumed. Further results will be analyzed on the basis of the predictive values.

## Counseling Services and Psychology

**Jenna Sage, Laura Merrill, Betsy Aspinwall, Andy Baldwin, Jeanie Schoenhals, and Paula Crossfield (151)**  
Faculty Advisors/Collaborators: **Patrick Kennedy**, Counseling Services, and **Allen Keniston**, Psychology  
*The 2008 University of Wisconsin-Eau Claire Counseling Services Needs Assessment*

A cover letter and the 2008 University of Wisconsin-Eau Claire Counseling Needs Assessment were sent to a 20% random sample of University of Wisconsin-Eau Claire (UWEC) students. The purpose of the current study is to replicate the 2000 UWEC Counseling Need Assessment which was used to assess the self-reported needs of UWEC students for UWEC Counseling Services. The 2008 UWEC Counseling Needs Assessment takes an in-depth look at what students expect from Counseling Services. More specifically, these data are being used to assist in focusing limited resources to address the counseling needs identified by the students.

## Curriculum and Instruction

**Kelly Pietsch, Laura Headrick, Dana Abel, and Tonya Miller (208)**

Faculty Advisor/Collaborator: **Robin UMBER**

*Does It Reflect Your World?: Middle School Students' Reactions to Novels with Middle School Characters*

In our research we wanted to determine if middle school students have positive reactions to current young adult literature in which children their age are the main characters, and reasons for the positive or negative reactions. We also wanted to better understand how middle school students can use information presented in novels to help them in their personal development. Finally, we wanted to determine what students find to be worthwhile activities after reading books that focus on the issues and experiences of the middle school years and what activities they find tedious or disengaging.

**Karsten Powell (213)**

Faculty Advisor/Collaborator: **Deb Pattee**

*Girl Bullying and Frienemies: Alternative Aggressions*

Research shows that girls participate in bullying as much or more than boys. However, this girl bullying takes a form very different from the pushing, fighting, hitting, yelling, boasting, and easily observed form that boys exhibit. Girls are more likely to participate in bullying typified by telling secrets behind each others' backs, group exclusion, turning group members against each other, persuading "friends" to do things they know they should not do - namely alternative aggressions. For this project, we researched girl bullying by reviewing topic-related literature and by conducting a survey of middle school students in the Chippewa Valley. This project includes information from both sources and points out that girls' alternative aggressions are a serious problem in our schools and a comprehensive solution is needed. We offer this solution in the form of curriculum aimed directly at girls and stopping alternative aggressions before it becomes a problem through education and training. This ongoing project includes survey results from 115 eighth grade students as well as the results of our bullying curriculum that was used to educate fourteen middle school girls labeled as being "under resourced."

## Economics, Management & Marketing, and Nursing

**Kathy German, Ian Hansen, and McKenzie Johnson (194)**

Faculty Advisors/Collaborators: **Eric Jamelske**, Economics, **Jennifer Johs-Artisensi**, Management and Marketing, and **Lois Taft**, Nursing

*A Descriptive Analysis of Health Care Coverage and Concerns in Western Wisconsin*

In the summer of 2007 surveys were conducted among a convenient sample of 223 Western Wisconsin residents. We present statistics characterizing the level of health care coverage and attitudes regarding health care reform among survey respondents. Sixty-eight percent of respondents felt that Wisconsin health care has at least major problems and only 2.7% said there were no problems. Approximately 60% were extremely or very worried about not being able to afford the health care they need, while over 70% were extremely or very worried that insurance companies care more about profits than patients. These concerns translate into a desire for reform with over 90% of respondents saying that it is extremely or very important for Wisconsin to make health care more affordable for all residents. Similarly, over 90% agree or strongly agree that all Wisconsinites should have access to the same

basic health care coverage. Although there were many differences between the insured and uninsured, the concern and resulting call for reform was significant among both groups. Our research confirms that there is broad support for substantial health care reform in Western Wisconsin. We hope our results will guide the current policy debate on health care reform in Wisconsin.

## Foreign Languages

### **Emily Adler (210)**

Faculty Advisor/Collaborator: **Anne Cummings Hlas**

*The Assessment of Culture Learning: Issues, Frameworks, and Techniques*

According to ACTFL's National Standards for Language Learning, culture is one of the five main categories of language learning; yet the assessment of culture learning is something not widely addressed. In our research, we surveyed the foreign language faculty and looked at the current practices for teaching and evaluating culture learning. We found that culture is mostly taught and assessed through memorization and recitation of facts, but the most effective way to teach and assess culture learning is through using the three Ps of culture: products, practices, and perspectives. We then designed innovative and alternative culture assessments centered around the three Ps for beginning language learners. We presented our findings to the Department of Foreign Languages during a professional development workshop and to state teachers at the state foreign language conference in November, 2007.

### **Caryn Drewiske (211)**

Faculty Advisor/Collaborator: **Jessica Miller**

*Phonetics: a pedagogical tool in a college-level beginner French course*

In this experimental study, we hypothesize that using phonetics, i.e. "the study of the sounds of speech, their production, combination, description, and representation by written symbols" (Dansereau 1995: 639), can be an efficient way to help adult learners of French acquire solid pronunciation skills. Using visual support to reinforce audio stimuli may help learners become better attuned to the sounds of French and memorize them more accurately. Dansereau however argues that such a method is likely to be confusing. She suggests that learning both French and a new set of codes (i.e. the phonetics alphabet) at the same time may be overwhelming. Instead, she proposes to refer students to familiar words as a comparison tool. To evaluate the effects of using phonetics as a pedagogical tool in a college-level beginner French course, we are currently collecting data in the classroom to evaluate different ways to instruct pronunciation, namely with and without phonetics. To date, little quantitative research has been done on this topic, and we hope to contribute to the improvement of teaching techniques in the college-level foreign language classroom. This poster will describe our research design and experiment currently in progress.

### **Kaitlyn Hellenbrand (212)**

Faculty Advisor/Collaborator: **Anne Hlas**

*An Investigation of World Language Teaching Methodologies and Language Usage in the Classroom*

This research project sought to answer several questions: Who are the Spanish teachers in Wisconsin? In what context do these teachers decide to switch from Spanish to English in the classroom? What is their reasoning in doing so? The researchers answered these questions through observations of Spanish teachers, interviews with these local teachers, and an online survey, completed by 106 teachers in CESAs 2, 10, and 11. The survey reveals that the average Wisconsin teacher has been teaching for more than 10 years, is working in a suburban or rural area, and holds a B.A. or B.S. in Spanish. In addition, findings from this study suggest that most teachers find it acceptable to switch to English during grammar and culture lessons. Finally, respondents report similar reasons for switching between the target language and the first language, such as the students' inadequate understanding of grammar and the fear of students becoming too frustrated to learn.

## Foundations of Education

**Elizabeth Crammond and Sheila Runge (209)**

Faculty Advisor/Collaborator: **Jill Prushiek**

*The Investigation and Creation of a Peer Mentoring Program for Students in the College of Education and Human Sciences at UW-Eau Claire*

This project is designed to gather and analyze information about the creation of a peer mentoring program in the College of Education and Human Sciences for all new and transfer students. Specifically, this project followed the program from its original conception, to its framework and to the launch of the pilot program. The student researchers worked with faculty members, mentors, and mentees to gather and analyze data from the pilot program during the beginning, middle and end of the spring semester. Results of the data analysis will be used to modify the current pilot program in order to fully implement a peer mentoring program in the College during the 2008-2009 academic year.

## Geography and Anthropology

**Jessica Soine (107)**

Faculty Advisor/Collaborator: **Robert Barth**

*Interpreting the Past for the Public*

This project focuses on educating the public about local archaeological research in the Chippewa River Valley. Each article written is used to create an electronic database of text and accompanying images which can be used to create posters, pamphlets, and websites to educate regional residents about past American Indian cultures and archaeology of the region. Sharing such knowledge is important because it provides an accurate account of the past and generates public support for preservation of archaeological resources.

## Kinesiology

**Mike Borgertpoepping and Brett Gressick (168)**

Faculty Advisor/Collaborator: **Don Bredle**

*Updated Wingate Anaerobic Power Test Norms*

Wingate anaerobic testing is a widely accepted lab test to measure an individual's ability to generate power at a high rate for a 30 second period of time, similar to power demands in many American sports. The few available norming charts have been created using surprisingly few subjects (<70). The purpose of this study is to create current, local norms using retrospective data on hundreds of subjects measured in the UW-Eau Claire human performance lab over several years with Monark Peak bikes and Monark Anaerobic Test Software version 1.0. Subjects in the study are college-age individuals with varied exercise habits. Peak power, average power, and power drop % will be analyzed using Microsoft Excel and SPSS 15.0. Mean, standard deviation, and percentile rank for both absolute power and power relative to body weight will be calculated in each gender. It is hypothesized that UW-Eau Claire group means for both genders will be higher than available norms.

**Mitchell Davis (167)**

Faculty Advisor/Collaborator: **Don Bredle**

*Resting Metabolic Rate Measured by Oxygen Consumption*

Resting Metabolic Rate (RMR) reveals how many calories are burned throughout the day without any added body activity - eating, working, and exercise. Since RMR typically accounts for the largest proportion of daily energy expenditure, it is an important variable to quantify in anyone trying to maintain, gain, or lose bodyweight. RMR can be estimated from predictive equations using age, gender, height, and weight, but a measure of oxygen uptake is a more scientific, laboratory technique. For best results, subjects are measured early in the morning after an overnight fast. We tested RMR by this method in 24 students in an advanced nutrition class. After resting quietly in a reclining chair for 30 minutes, subjects breathed into a Cosmed oxygen analyzer via a comfortable facemask for 15-20 minutes. The oxygen uptake of the final 10 minutes was averaged and converted to calories burned (5 kCals/liter O<sub>2</sub>) and then expressed per 24 hour period. This measured RMR was compared to two different predictive equations. Analysis of the results to date are tending to confirm our hypothesis that the

equations to estimate RMR lack accuracy, due to individual factors such as heredity, muscle mass and tone, and activity level.

### **Jenna Grotthus (154)**

Faculty Advisor/Collaborator: **Lance Dalleck**

*Examining the Effects of Detraining and Retraining on Health Outcomes in Community Fitness Program Participants*

The primary purpose of this study was to determine if not participating in a regular community fitness program (CFP) during the summer months (12-wk) negatively impacts health (detraining). The secondary purpose was to determine if potential decreases in health for participants not exercising during the summer months could be regained after resuming the fall CFP (retraining). Baseline observations were collected from 27 participants. Participants were divided into two groups: summer CFP group (N = 15) and non-summer CFP group (N = 12). Participants from both groups completed the fall (13-wk) CFP. The following health outcomes were measured at baseline, post-summer CFP, and post-fall CFP: waist circumference, body mass, systolic and diastolic blood pressure, energy expenditure, cardiorespiratory fitness, blood lipids, and glucose. In the non-summer CFP group, all health outcomes worsened. Conversely, health outcomes were maintained or improved in the summer CFP group. Our data suggests that not participating in the summer CFP resulted in detraining and a worsening of numerous risk factors for heart disease. Furthermore, the non-summer CFP group failed to reach pre-summer health outcome values despite resuming regular exercise for the fall CFP. In conclusion, participation in fitness programs needs to be regular and uninterrupted to avoid diminished health.

### **Whitney Hay, Laura Geissler, and Brittany Allen (153)**

Faculty Advisors/Collaborators: **Lance Dalleck**

*Transforming our Future: Why Health and Wellness needs to be a Priority in the University of Wisconsin – Eau Claire Strategic Plan?*

Objective: The purpose of this study was to risk stratify college students for cardiovascular disease according to the American College of Sports Medicine and to assess their cardiovascular fitness. Participants: Eighty-one college students from a mid-size public university participated in the study. Methods: Each participant completed a health knowledge survey. A Rockport 1-Mile Walk sub-maximal test was performed to evaluate cardiovascular fitness. Each participant's body composition, lipid profile, and blood pressures were taken by the researchers to determine risk factors. Participants self reported smoking, family history, and physical activity factors. Results: There was a lack of knowledge among participants regarding cardiovascular disease. Fifty-five percent were dyslipidemic and 57% did not meet physical activity recommendations. Forty-nine percent and 51% were risk stratified at moderate and low risk, respectively. Conclusion: There is clearly a need for intervention within this population. Primary prevention may impose healthy lifestyle habits that may decrease the prevalence of cardiovascular disease later in life.

### **Amy Nikolai, Brittany Novotny, Cortney Bohnen, and Kathryn Schleis (148)**

Faculty Advisor/Collaborator: **Lance Dalleck**

*The Cardiovascular and Metabolic Responses to Water Aerobics Exercise in Middle-Aged and Older Adults*

The purpose of this study was (a) to assess the cardiovascular and metabolic responses to water aerobic exercise and (b) to determine if water aerobics exercise meets the American College of Sports Medicine (ACSM) guidelines for improving and maintaining cardiorespiratory fitness. Methods: Fourteen men and women (mean  $\pm$  SD age, height, weight, body fat percentage, and maximal oxygen uptake ( $VO_2\max$ ): =  $57.4 \pm 7.6$  years,  $171.3 \pm 7.8$  cm,  $89.9 \pm 13.9$  kg,  $32.5 \pm 5.8$  %, and  $31.0 \pm 8.3$  mL/kg/min, respectively) completed a maximal treadmill exercise test and 50-min water aerobics session. Cardiovascular and metabolic data were collected via a portable calorimetric measurement system. Results: Mean exercise intensity was 43.4% and 42.2% of heart rate reserve (HRR) and maximal oxygen uptake reserve ( $VO_2R$ ), respectively. Training intensity in metabolic equivalents (METs) was  $4.26 \pm 0.96$ . Total net energy expenditure for the exercise session was  $249.1 \pm 94.5$  kcal/session. Conclusions: Results indicate that water aerobics is a feasible alternative to land-based exercise for middle-aged and older adults that fulfills the ACSM guidelines for improving and maintaining cardiorespiratory fitness.

# Management and Marketing

## **Sara Aschenbrener (187)**

Faculty Advisors/Collaborators: **Jennifer Johns-Artisensi** and **Douglas Olson**

*Development of a Self-Assessment Tool to Facilitate Decision-Making in Choosing a Major in Health and Aging Service Administration*

Health and Aging Services Administrators must have a broad base of knowledge, skills and interests to provide leadership and be successful in managing a fiscally responsible, quality health care organization. Researchers developed a self-assessment tool to help determine whether a health and aging services administration major is a compatible fit for someone. With input from professionals in the field and in context with the literature, a tool has been developed and refined that focuses on the following 10 characteristics necessary for effective leadership: Organization, Critical Thinking, People Skills, Attitude, Confidence, Communication, Visionary Leadership, Sense of Caring, Change Agent, and Business Sense.

## **Julia Kramer (188)**

Faculty Advisor/Collaborator: **Rhetta Standifer**

*The Impact of Temporal Diversity on Team Process and Team Effectiveness*

Teams are increasingly important in today's business world. Our research heeds the call of team researchers to go beyond "surface-level" demographics like age and gender to study one form of "deep-level diversity," specifically, temporal diversity. In a longitudinal study, we examine six individual temporal characteristics (polychronicity, time urgency, temporal depth and focus, punctuality, and scheduling/deadline preference) with regard to their impact on team process and effectiveness. We collected data from 160 undergraduate students engaged in 37 teams within College of Business courses. Data were collected through online surveys three times during the semester. The first survey focused on individual temporal and demographic characteristics. The second survey, two-thirds through the project, focused on team processes. The last survey at the end of the project asked about team processes again and team member satisfaction. Results indicate temporal characteristics affect team processes and effectiveness. Team homogeneity regarding scheduling/deadline preference was related to motivation and confidence building. Heterogeneity in temporal depth was related to member satisfaction. Finally, higher levels of polychronicity in team members were related to processes like goal specification and strategy formulation. Further data are being collected this semester.

## **Daniel Rozumalski and Justin Huegel (193)**

Faculty Advisors/Collaborators: **Charles Tomkovick** and **Rama Yelkur**

*Super Bowl Advertising Effectiveness: Is There a Return on Investment Based on Stock Market Data?*

From a business perspective, the number one issue surrounding Super Bowl ads continues to be, "Are they worth the investment?" In our study, we examine this question by comparing the performance of the stocks of companies who ran Super Bowl ads from 1996-2008, versus the Standard and Poors 500 Index for this same time period. Specifically, we compared the prices of Super Bowl stocks on the Monday before the Super Bowl through to the Friday after the game. Our results show that Super Bowl stocks outperformed the S&P 500 by approximately 1.2 percent and that this result is statistically significant at  $p < .05$ . Our study additionally profiles daily and category differences. This study's preliminary research findings were published in the Wall Street Journal, Barrons, Smart Money.com, Forbes.com, BusinessWeek.com, CNNMoney.com, yahoo.com, and many other outlets. A research manuscript which encapsulates this work is currently under review at the Journal of Marketing Theory & Practice.

# Mathematics

## **Mark Frie (116)**

Faculty Advisor/Collaborator: **Chris Hlas**

*Achieving Flow in Mathematics*

If you have ever wondered if there was a way for students to get more out of their homework and have a better time doing it, then this is the presentation for you. We will be discussing the correlations between the two main flow variables, skill and concentration, as well as correlations with other variables that are indirectly related with flow. Case examples will also be used to show how students move between the flow categories from week to

week. Some major topics will be the positive correlations between challenge and concentration and between interest and challenge.

**Maggi Varsho (170)**

Faculty Advisor/Collaborator: **Susan Harrison**

*Factors Influencing Mathematics Performance and Attitudes*

Mathematical attitudes and achievement vary greatly amongst incoming college freshman. Factors such as race, gender and socioeconomic status impact student performance and attitudes in mathematics and have already been studied by others. Which factor or factors in combination are the most influential was the focus of this study. A survey was compiled in order to ascertain which factor, according to the respondents and through a series of questions, was the most influential to their mathematical performance and attitudes. This survey was then distributed to all incoming college freshmen at a Wisconsin University. The purpose of the poster will be to review the major conclusions, particularly which factors students believe are most influential. Armed with this information, students (particularly future educators) may have a better understanding of the influences upon students' math performance and attitudes and adjust accordingly.

## **Music and Theatre Arts**

**Megan Hoffman (106)**

Faculty Advisor/Collaborator: **Lee Anna Rasar**

*Improvisation Toolbox: Harmonic Structures, Dance, and Rhythmic Games*

This presentation will describe harmonic structures which allow access to clients with neurological and behavioral impairments including dementia, impulse control issues, and difficulty with attention focus. These harmonic structures enable the clients to independently perform actual 3-chord familiar songs without playing wrong notes given the choices of instruments and the accompaniment. Rhythmic matching games with beat groupings and tempo, volume matching games with dynamic levels, and visuo-motor imitation of rhythm instrument performance in specific ways (i.e., tremolo, basic beat, subdivisions of beat, playing instruments in designated manner) were integrated within the harmonic structures to further engage the patients successfully. Dance and movement to music activities to target impulse control, attention focus, decision making, relaxation, healthy posture, and emotional expression were used in experiential activities for juveniles and for nursing home residents with dementia. Both comparison and contrast of movement improvisation in these two settings will be made, with suggestions provided for presentation tips to maximize successful participation on the part of clients at various levels of cognitive and social functioning. Analysis of choices of presentation structures will be presented. Activities for warm-up and cool down will be compared to activities for energy release and categorized for targeting specific goals.

**Samantha Michaelson and Brent Bergstrom (190)**

Faculty Advisor/Collaborator: **Toni Poll-Sorensen**

*Investigation of Student Satisfaction with Dance Courses: Expectations and Responsibility*

This project will be a preliminary exploration of surveys addressing student satisfaction with dance classes. This project will result in a pilot questionnaire to be circulated locally and with selective area university dance programs. Throughout the project, the dance program at the University of Wisconsin - Eau Claire will be compared to six area schools of equivalent minor programs. These include schools in both Wisconsin and Minnesota. The goal of this project is to see what is lacking in the program at the University of Wisconsin - Eau Claire and what our program may have that other schools have overlooked.

**Vanessa Stacknik (191)**

Faculty Advisor/Collaborator: **Vanissa Murphy**

*Inhibitions to Singing as Exhibited by College Students*

At the university level, some students are eager to join choir, and have no inhibitions singing in front of others in either formal or informal environments. On the other hand, some students will not sing if anyone is around. The purpose of this study was to investigate whether or not there are implications concerning experiences when singing as a child with singing as a university-age student, and to investigate university students' inhibitions during the use of their singing voice. An online survey was compiled and sent out to university students. Results are showing that only slightly fewer students sing around others than sing when they are by themselves. Several students indicated that they used to be more self-conscious singing in middle school and high school. There is a

clear link between comments by others about a person's singing voice quality and that person's inhibitions while singing. There is no noticeable correlation between students who answered that they did not sing as a child and their tendency to sing in front of other people. More in-depth research is needed that looks into perceptions of experiences singing as a child and implications for inhibitions singing later in life.

## Nursing

### **Cynthia Chapek (186)**

Faculty Advisor/Collaborator: **Joan Stehle Werner**

*Family Practice Physicians', Nurse Practitioners', and Physician Assistants' Spiritual Care*

Several studies have indicated strong relationships between spirituality and health status and lower rates of mortality. Primary care practitioners, however, are reluctant to engage in spiritual care, often citing lack of: time, education, and spiritual self-awareness as barriers to giving spiritual care. The objective of this phenomenological study was to examine how primary care providers incorporate spirituality into their practice. Semi-structured interviews were conducted with ten primary care family practitioners – physicians, nurse practitioners, and physician assistants at three clinics. Policies for protection of human subjects were followed. One primary interview question was asked, inviting participants to describe their incorporation of spirituality into their practice when caring for patients. Several probes were used to further explore issues pertaining to spiritual care. Data were analyzed using Colaizzi's method. Analyses indicated four theme clusters supporting how these practitioners addressed patients' spiritual needs: (1) discerning instances for overt spiritual assessment; (2) displaying genuine caring; (3) encouraging use of existing spiritual practices, and (4) sometimes documenting spiritual care for continuity of care. Since very little interpretive research has been done with primary care practitioners regarding their spiritual care practices, this study contributes important insights into this relatively unexamined area.

### **Katie Divyak, Ann Hoepner, and Kevin Moore (195)**

Faculty Advisors/Collaborators: **Lois Taft** and **Cheryl Lapp**

*Stress and Coping Strategies of Spouses of Deployed Military*

National Guard and reserve families that live in rural settings do not have the full access or support of the military as do active duty soldiers living on a military base. Deployment may create or exacerbate existing levels of stress and bring about coping challenges. The purpose of this research is to describe and explore experiences related to stress levels and coping strategies of spouses of deployed military members living in a rural setting. A naturalistic inquiry design was used to describe and explore levels of stress and coping strategies, through open-ended questions. The sample consisted of 20 spouses including two men who had wives who were deployed. Spouses on the home front reported emotional stress including worries about the safety of their deployed spouse and physical stress as they assumed all parenting and household responsibilities. Most of the participants reported minimal support from the military and felt isolated in facing the challenges of coping on the home front. Themes related to stress and coping strategies will be described to better understand their experience, and potential interventions to support coping with this stressful experience will be discussed.

### **Chelsea Goebel and Kathleen Henderson (171)**

Faculty Advisor/Collaborator: **Rita Sperstad**

*Nursing Students' Cultural Competence: Pre and Post a Short Term Diverse Clinical Immersion Experience*

Increased population diversity and world globalization has created the mandate for culturally competent care by the professional nurse. The purpose of this educational research study is to describe the influence of a short-term culturally diverse clinical experience on students' learning. The sample is eight undergraduate nursing students who comprise one section of FMHN 368, which is a required undergraduate clinical course. This particular section was offered as a week-long diverse clinical opportunity at a free standing birth center in Texas, near the border of Mexico. Campinha-Bacote's model (2002), *The Process of Cultural Competence in the Delivery of Health Care* will be used as the organizing framework. Students and faculty met for preparation seminars prior to the clinical experience to discuss topics such as American values, Mexican-American cultural values/practices, and cultural competence. Students completed the Inventory for Assessing the Process of Cultural Competence Among Healthcare Professionals-Student Version (IAPCC-SV) (Campinha-Bacote, 2002) before and again after the clinical immersion experience. The results describe comparisons in the level of cultural competence scores of undergraduate nursing students' pre and post the cultural immersion clinical experience. Implications are suggested for nursing education, research, and practice.

**Jennifer Hermsen and Stacie Druga (206)**

Faculty Advisor/Collaborator: **Debra Jansen**

*The “Spice of Life”: Community-Dwelling Elders’ Perceptions Regarding the Significance of Variety to Their Lives*

Variety has been referred to as “the spice of life” and appears to contribute to the psychological well-being of people of various ages. Due to changes in physical functioning, living situations, and roles with age, elders may be particularly vulnerable to threats to psychological well-being and opportunities to experience variety. Much of the research related to variety has been done in the fields of consumer research and psychology. Although it may be important to the well-being of elders, variety is a concept that has not been well-defined or explored in the nursing literature. The purpose of this study was to more fully ascertain the meaning and importance of variety to the lives of community-dwelling elders. Thirty-four community-dwelling elders (25 women, 9 men), ages 65-87 years (M = 71.6 years), were interviewed regarding their perceptions related to variety. Content analyses are being conducted to categorize the interview information. For the analyses, the research team is reviewing the individual thoughts or themes expressed by the participants and are creating and defining categories based on similarities among the data. Information from this study may be useful to researchers and clinicians interested in designing and testing means of promoting functioning and well-being for elders.

**Lindsey Hintz (172)**

Faculty Advisor/Collaborator: **Janice Berry**

*An Alaskan Immersion – Enhancement of Cultural Competence*

The higher education accrediting bodies of colleges of nursing are evaluating curricular programs for cultural inclusiveness, competence and awareness. The UW – Eau Claire College of Nursing and Health Sciences has been offering senior nursing students an opportunity to travel to Anchorage, Alaska. The purpose of this clinical is to give the students a cultural experience in an immersion venue, as well as a pediatric experience in which they provide care to patients and families of another culture. To assess whether students were gaining cultural benefits from this opportunity, all participants in the August 2007 clinical were asked to complete the Schim and Miller Cultural Competence Survey prior to and shortly after the clinical experience. This survey was chosen based on its test-retest reliability, and utilized after obtaining permission from the author. The Schim and Miller Cultural Competence Survey measures both practice behavior and awareness of cultural differences. The survey indicated that the students were now cognitively seeking avenues of intervention for each individual within the context of that person’s understanding of their illness and personal “ways of healing”. The survey supported that the students demonstrate growth in culturally competent behaviors after the Alaskan clinical experience.

**Lisa Neseth, Karen Crowley, Jessica Branson, Catherine Emmanuelle, Tiffeny Swenby, Kimberly Walde, Lindsey Gavronski, Katie Divyak, Katie Danecki, Mia Nhia Vue, and GaoTsong Thao (173)**

Faculty Advisor/Collaborator: **Susan D. Moch**

*Undergraduate Students Lead Teams to Obtain Research for Practice*

Through this project, undergraduate students obtained research articles for nurses in practice. Teams of diverse students, with the leadership of a senior nursing student, connected with nurses in practice through a faculty member and a hospital research coordinator. The students met with the nurses in practice to learn about the identified evidence needs. This project is an evaluation of team effectiveness in obtaining evidence for use within nursing practice. The purpose of this project was to evaluate how effectively undergraduate, student-lead research teams are in teaching evidence-based practice to students and in obtaining evidence for nurses in practice. The sample for this project includes three student leaders, seven research team members, three healthcare agency staff, and one faculty member. All persons involved were asked to complete a post evaluation survey. In addition, students are completing both a pre and a post evaluation related to learning, group involvement, leadership abilities, and interest in research. Process summaries of meetings, team leader journal entries, and faculty member involvement descriptions were also collected. All data sources are summarized and analyzed.

**Lisa Neseth, Diana Watkins, and Linda Lee (174)**

Faculty Advisor/Collaborator: **Sue Peck**

*Games and Puzzles to Boggle the Mind*

A replication study based on the research done by Palker, N., Barr-Silk, M., and Lender, N. was conducted. This study took place over a five week period with each session lasting one hour. Each session consisted of a different game or puzzle activity geared to stimulate memory enhancement. A pre-test was given at the beginning of the first session consisting of an objective and a subjective section. A post-test was administered the week following the last game. Residents from an assisted living facility in a western Wisconsin community volunteered to participate. Memory enhancement activities consisted of music bingo, category word game, word puzzles,

bingo trivia and matching games. Due to the limited number of participants, results of the study were inconclusive. If the sampling size was larger, we would anticipate results similar to the original research study.

### **Joseph Pruis (207)**

Faculty Advisor/Collaborator: **Rosemary Jadack**

*Social Network Profiles of Clients Accessing a Rural Health Department Clinic*

The purpose of this study is to describe and compare personal network characteristics, risk behaviors, and health promoting behaviors of clients accessing a rural health department clinic. Recent data show persistent increases in reports of smoking, alcohol/drug use, and unprotected sexual activity. Yet, individual interventions to prevent risk and promote health have not resulted in a sustained decline in risk behaviors. The current sample includes 61 clients with a mean age of 25.9 years; 67.2% report having health insurance, 55.7% report having a health care provider. Overall, 32.8% report using tobacco, 62.3% used alcoholic beverages in the past month, and 63.6% used condoms inconsistently. Respondents report an average of 5 persons in their social networks. The networks have a mean density of .91 (a measure of connectedness between network members), and a mean multiplicity of 3.2 (a measure of the number of social support types provided by network members). Results showed similar patterns of risk behaviors between respondents and their network members. Findings suggest that social context needs to be considered when developing interventions to reduce risk. These results provide nurses with important data that can be used to understand the dynamics of risk and health in public health settings.

### **Jillian Tapper (214)**

Faculty Advisor/Collaborator: **Lee-Ellen Kirkhorn**

*Unraveling the Mystery of Mood and Exercise In Healthy Older Women: A Literature Review*

The present study will provide a scholarly review of existing research and will lay the foundation for a qualitative study of the benefits of moderate physical activity upon the mood of a select group of healthy older women in Eau Claire, Wisconsin. The hypothesized benefits include shedding new light upon the protective effects of exercise for mental depression, affect, and mood. While much of nursing literature is replete with examples of physical activity and its beneficial effects upon the cardiac and respiratory system of older women the present study seeks to uncover a clearer and more systematic understanding of the role of exercise upon the emotional and psychological well being of post-menopausal women. Through a systematic review of relevant research in nursing and health sciences, the present study seeks to answer the following two questions: 1. Does a systematic review of literature suggest that moderate physical activity (at least 20 minutes 3 times a week) makes a difference in perceived well-being of older women? 2. Are older, healthy women less likely to suffer mental depression if their activity level is greater than the activity of older, healthy women who are sedentary?

### **Stephanie Vach (215)**

Faculty Advisor/Collaborator: **Sheila Smith**

*Diabetes Health Stories*

Little published research is available regarding the impact of diabetic patients using free clinics as their primary care provider. This study will look at the practices and education needed to aid in the effective treatment of diabetic patients in a free clinic setting. Participating in the study were diabetics using the Chippewa Valley Free Clinic. Interviews of the participants were conducted and analyzed regarding descriptions, perceptions, and health management practices. Information was also gathered on their successes, obstacles to care, and experience of past and present care. Diabetes is an increasing problem in the United States and good control and long term health is difficult. Free clinic populations provide special challenges to treating chronic illness due to lack of access to health care and socioeconomic difficulties.

### **Megan Wertjes (175)**

Faculty Advisor/Collaborator: **Jan Berry**

*Assessing the Comfort Level of Emergency Medical Services with Providing Care to Children with Special Health Care Needs*

Over the years, the number of Children with Special Health Care Needs (CSHCN) in the community has risen (Loyacono, 2006). With this increase, Emergency Medical Services (EMS) have found themselves being expected to provide specialized care which they are often not comfortable or educated to do (Smith, Thompson, Shield, Manley, Haley, 1997 and Glaesner et al., 2000). The purpose of this study was to assess the education, experience, and comfort level of EMS providers with giving care to CSHCN. Data, including a survey based on a Pediatric Education Task Force tool (Glaesner et al, 2000) and focus group, was gathered from six local volunteer EMS departments with a variety of providers from first responders to Emergency Medical Technician (EMT)

Basics to Immediate EMTs. Evaluation of the data exposed three main themes: 1) current education and experience directly impacts the provider's comfort level, 2) specific methods and opportunities for educational intervention, and 3) system barriers that hinder EMS's access to education. The significance of this project's results is that it provides information about appropriate interventions for improving prehospital health care and for developing community support of CSHCN. Strong, professional prehospital care is a crucial component of an effective healthcare system.

## Physics and Astronomy

### **Amy Raplinger (192)**

Faculty Advisor/Collaborator: **Matt Evans**

*Use of Student Response Systems in a Small Classroom*

In the past, we have done research on the use of Student Response Systems (SRS or "clickers") in large introductory physics classes. In the summer of 2007, however, SRS was used in a second semester, calculus-based physics course. Seven of the nine students completed a survey that looked at their experience using the clickers. The results of this survey, discussed here, led us to the conclusion that SRS is just as effective in small classes as in large ones. We were also able to reaffirm our previous conclusions that SRS helps students learn, understand, and remember material and that students enjoy using SRS.

## Service Learning

### **Megan Buysse (152)**

Faculty Advisor/Collaborator: **Donald Mowry**

*Assess, Inform & Measure (AIM) Court: An Evaluation of an Alternative to Incarceration*

The use of incarceration as a response to criminal behavior has been increasingly a focus of controversy and debate. Jails and prisons are very expensive approaches that in many cases fail on several measures of effectiveness, including problems with recidivism, lack of treatment programs, and inadequate or non-existent reentry programs. For local jurisdictions such as counties, the cost of incarcerating both juveniles and adults coupled with budgetary restrictions has lead policymakers to search for alternatives to incarceration that are thought to better address the need to respond to crime in a cost-effective and treatment-effective manner. This project seeks to conduct a community-based participatory research (CBPR) project on a recently established alternative to incarceration, the Assess, Inform, & Measure or AIM Court. AIM is a pilot project of the District IV Wisconsin Court lead by Judge Benjamin Proctor. The target population for AIM Court is women with dependent children under 12 years of age who have been convicted of misdemeanor or non-pre-sentence investigation felonies and who have alcohol or other drug issues/addictions. AIM is a pilot project in five Wisconsin counties which was an initiative of the PPAC Subcommittee on Alternatives to Incarceration.

## Student Health Services

### **Kyle Zander (115)**

Faculty Advisor/Collaborator: **Ashley Borman**

*Tobacco Cessation: College-Aged Users*

This research looks at tobacco cessation programs aimed at college-aged users. The data from this project will be used to pilot a peer facilitated tobacco cessation program here at UWEC.

## Biology

### **Mitchell Banach (82)**

Faculty Advisor/Collaborator: **Chris Floyd**

*Testing the Influence of Willow Proximity on Nestling Feeding Rate in a Keystone Species: The Red-Naped Sapsucker*

Woodpeckers are considered ecosystem engineers because they excavate nest cavities that eventually provide habitat for other cavity-nesting species. In aspen (*Populus tremuloides*) woodlands of the southern Rocky Mountains, red-naped sapsuckers (*Sphyrapicus nuchalis*) are the predominant woodpecker, providing essential nest cavities for multiple bird species. Sapsuckers also create sap wells in willows (*Salix* sp.), providing a sugary resource for many species. Previous work by Daily et al. (1993) in the upper East River Valley (ERV) in Gunnison County, Colorado indicated that sapsuckers avoid nesting in aspens far (> 500 m) from willows. Daily et al. (1993) thus argued that the loss of willows could precipitate the local extinction of cavity-nesting species. This hypothesis was supported by our study of sapsuckers in the ERV during June-August 2005, in which we found that nestlings in aspens located further from willows were fed significantly less often than those closer to willows. However, in June-August 2006, when we repeated our study in ERV with a larger sample size we found no relationship. Our conflicting results cast doubt on the importance of willows to sapsucker nest site choice.

### **Benjamin Bonis (58)**

Faculty Advisor/Collaborator: **Lloyd Turtinen**

*Cytokines Released from Kidney Cells Exposed to Amphotericin B*

A human proximal tubule kidney cell culture (HK-2) was established as a cell model for the study of Amphotericin B-induced nephrotoxicity. Optimal conditions for the culturing of HK-2 cells consisted of a keratinocyte serum-free medium supplemented with 50 µg/mL bovine pituitary extract and 5 ng/mL epidermal growth factor in a 5% CO<sub>2</sub>, 37°C environment. HK-2 cells formed epithelial cell monolayers on collagen coated plates but remained in clustered masses without collagen. Exposure of HK-2 cells to 5 µg/mL deoxycholate-amphotericin B (DAMB) for 5 hours was done to identify inflammatory cytokines released from cells in response to the drug. Using an antibody array panel of 42 different cytokines, only IL-6 and IL-8 were constitutively released from untreated cells. Exposure to DAMB caused no increase in release of these cytokines, and no *de novo* release of additional cytokines.

### **Matthew Brewer (84)**

Faculty Advisor/Collaborator: **David Lonzarich**

*Examining the Early Life History of Coho Salmon (*Oncorhynchus kisutch*) From the Study of Otolith Microstructure*

Birth date can be an important correlate to evolutionary fitness because birth timing can profoundly affect subsequent patterns of growth and survival. As part of an ongoing study, we report here on birth date and growth patterns for two populations of coho salmon (*Oncorhynchus kisutch*) exposed to different stream environments, one from Washington and the other from Wisconsin. Microscopic examinations of fish ear bones (otoliths) from 400 fish were used to determine fish age (in days). Both populations show prolonged hatching seasons (> 6 wk), but fish from Wisconsin hatched approximately 3 weeks later, emerging from nests at least one month after snow-melt and peak stream flows. Wisconsin fish also grew at a much slower rate during spring months (nearly 40% slower) and had a longer nest residency than Washington fish, findings that probably reflect the existence of warmer, more productive stream conditions out west. This pattern was reversed by late summer, however. By September, Wisconsin fish were growing faster than fish in Washington; a finding that may be linked to lower fish densities and greater stream productivity. From our findings we also conclude that birth date is a poorer predictor of growth than birth size or metabolism.

### **Matthew Brewer and Nathan Butler (83)**

Faculty Advisors/Collaborators: **Darwin Wittrock** and **Julie Anderson**

*Molecular Identification of Cryptosporidium Species Infecting Wisconsin Dairy Calves*

*Cryptosporidium* is a genus of protozoan parasites that infect the gastrointestinal tract of many vertebrate hosts. In livestock, cryptosporidiosis often occurs in young animals, causing diarrhea and dehydration. Infected humans

experience severe gastroenteritis, and immunocompromised individuals often face life-threatening infections. Many human outbreaks in Wisconsin have been blamed on agricultural runoff of cattle manure. At least three morphologically similar species of *Cryptosporidium* are known to infect cattle. Of these, only *Cryptosporidium parvum* is zoonotic, as it infects both animals and humans. We determined the species identity of 25 *Cryptosporidium* positive fecal samples obtained from area dairy calves. An 830 bp fragment of the 18S rRNA gene from *Cryptosporidium* was amplified using the polymerase chain reaction (PCR) and digested using SspI and MboII restriction enzymes. Restriction fragment analysis of the products identified all 25 positive samples as *C. parvum*. These results support the hypothesis that young dairy calves are reservoir hosts for human cryptosporidiosis in Wisconsin.

**Matthew Brewer, Nathaniel Butler, Jessica Dorschner, Matthew Skalski, and Dylan Thomas (228)**

Faculty Advisor/Collaborator: **Wilson Taylor**

*Visualizing Incremental Growth Rings in Coho Salmon Using Scanning Electron Microscopy (SEM)*

Calcareous balance-sensing structures in the middle ears of fish, called otoliths, are useful tools for aging fish. Daily depositions of calcium carbonate on the otolith can be viewed after thinning and polishing, resulting in countable increments. These layers each consist of a mineral rich zone and an organic rich zone. Using scanning electron microscopy (SEM), we observed the increment structure of otoliths from coho salmon (*Oncorhynchus kisutch*) collected in Wisconsin and Washington. Otoliths were prepared for SEM viewing by etching with hydrochloric acid and sputter coating with gold. In theory, the acid should preferentially remove more of the mineral rich layer, allowing the organic rich layer to stand out. Otoliths from Wisconsin fish were morphologically similar to those obtained from Washington salmon, in terms of overall size and shape. Comparisons of the relative thickness and overall distribution of the organic vs. mineral rich layers, revealed little difference between the two populations. Technical aspects of the surprisingly simple sounding protocol proved to be subtle and challenging, but continuing refinements of these methods will ultimately contribute to the otolith database at UW-Eau Claire.

**Billie Jo Buechler, Dane Ferguson, Kris Hennig, and Brian Pauley (77)**

Faculty Advisor/Collaborator: **Todd Wellnitz**

*Campsite Ecology of the Boundary Waters Canoe Wilderness Area*

The Boundary Waters Canoe Area Wilderness (BWCWA) has regulations reflecting a "Leave No Trace" philosophy for its campers. Despite these regulations, and efforts to abide by them, human impacts are apparent in and around lakeshore campsites. To quantify these impacts, we examined 12 campsites at different distances from a common BWCWA entry point and assessed tree species richness, campsite trash counts, and soil compaction, pH, and conductivity. As distance from entry points increased, trash counts declined ( $R^2 = 0.57$ ;  $P=0.005$ ). Likewise, trash counts decreased as distance between adjacent campsites increased ( $R^2 = 0.70$ ;  $P<0.001$ ). Within campsites, impact was measurably greater near fire pits. Soil pH increased with proximity to the fire pit ( $R^2 = 0.45$ ;  $P < 0.001$ ), whereas tree species richness decreased ( $R^2 = 0.48$ ;  $P < 0.001$ ). These data indicate that localized human impacts affect natural communities as well as aesthetics (e.g., trash). Our results suggest that removing fire pits and promoting use of camp stoves may ameliorate negative effects at BWCWA campsites.

**Tyler Bunton (59)**

Faculty Advisors/Collaborators: **Evan Weiher and Julie Anderson**

*Diversity, Functional Traits, and Ecosystem Processes: Cause or Coincidence?*

We conducted a field experiment where diversity was indirectly manipulated by altering the number of initially planted species (6-30 species). We followed the communities for four years, allowing both species gain and loss to occur. Within the diversity treatments, we nested nitrogen addition and fungicide (to suppress mycorrhizal fungi (MF)). We collected biomass two weeks after a spring burn, and again in August. Above-ground Net Primary Productivity (ANPP) was determined from dry biomass as  $g\ m^{-2}d^{-1}$ , and as  $g\ g^{-1}d^{-1}$ . Nested anova showed that diversity manipulations increased species richness and fungicide reduced MF colonization of plant roots by about 40%. The diversity manipulations significantly increased ANPP. Fungal suppression reduced ANPP; the reductions were slightly larger if Nitrogen was also added. The diversity manipulations and chemical treatments may have indirectly affected ANPP via community composition. ANPP was correlated with plant richness ( $r = .53$ ), mycorrhizal fungal richness ( $r = .37$ ), prokaryotic diversity ( $r = -.18$ ). ANPP was correlated with community functional parameters (mean leaf DMC  $r = -.44$ , height =  $.56$ ) and simple measures of functional diversity (ranges of height  $r = .46$ , SLA  $r = .33$ ). These relationships may be causal or coincidental due to shared common causes.

**Krista Carlson (97)**Faculty Advisors/Collaborators: **David Lonzarich** and **Winnifred Bryant***Exploring the Molecular Basis for Differences in the Sensitivity of a Freshwater Fish to Alarm Pheromones*

As a group, minnows (Family *Cyprinidae*) possess an unusual ability to detect pheromones released from nearby fish injured or consumed by predators. In experiments conducted over the past year, we have found evidence of a strong age-specific alarm response in creek chub (a cyprinid fish) exposed to conspecific alarm odors. Juveniles (< 50 mm) exposed to alarm odors consistently exhibited anti-predatory behaviors, while adults (>130 mm) showed a more nuanced response, which included no reaction, foraging (searching) or less frequently anti-predatory behaviors. The G-protein coupled V2R receptor has been identified as the putative receptor mediating this behavioral response. We have begun to examine the physiological basis for this shift in behavior by quantifying age-specific differences in the expression or abundance of alarm substance protein receptors located in the nasal epithelium of creek chub. Following rapid dissection of the nasal epithelium, membrane proteins were extracted and electrophoresed on a 12% acrylamide gel. The V2R receptor was identified based on molecular weight.

**Jesse Coleman, Glenn Fisher, Traci Griffith, and Kenneth Lear (78)**Faculty Advisor/Collaborator: **Todd Wellnitz***How Do Light and Moisture Gradients Affect Lichen Abundance in the Boundary Waters Canoe Area Wilderness?*

Understanding lichens presents a challenge to biologists because they are a symbiotic relationship between fungal and algal cells, and consequently, do not conform to the characteristics of any one kingdom. To examine how moisture and light gradients influence lichen distribution and abundance, we studied shoreline lichen communities in the Boundary Waters Canoe Area Wilderness. We tested two hypotheses: 1) Lichen abundance will be low near waterline due to wave action disturbance, increase as undisturbed rock surfaces becomes available, and then decline as rock gives way to soil; 2) As the shoreline slope increases, lichen abundance will decrease due to declining light exposure. We recorded percent lichen cover and species abundance along 15 rocky shoreline transects using 0.25 m<sup>2</sup> quadrats spaced 0.5 m apart. As distance from shore increased, lichen percent cover showed a “hump-shaped” distribution, first increasing, then decreasing ( $R^2 = 0.986$ ). Percent coverage and species diversity (H) was highest between 1.0 and 2.5 m from shoreline. We found near-significant correlations between shore slope and lichen percent cover ( $R^2=0.21$ ,  $p=0.074$ ), and slope and lichen species diversity ( $R^2=0.09$ ,  $p=0.057$ ). These data suggest moisture may be more important than sunlight for structuring lichen communities.

**Michael Donath (57)**Faculty Advisor/Collaborator: **Lloyd Turtinen***How Does Amphotericin B Activate Inflammatory Gene Expression in Monocytic Cells?*

Amphotericin B is an Anti-fungal drug used to treat systemic fungal infections. Different formulation of Amphotericin B have been shown to activate inflammatory genes in monocytic like cells. A signal transduction pathway that is likely activated by Amphotericin B is the NF- $\kappa$ B pathway. NF- $\kappa$ B is a transcription factor that is activated when its inhibitor, I $\kappa$ B is phosphorylated which frees NF- $\kappa$ B to enter the nucleus. After being phosphorylated, I $\kappa$ B is released into the cytoplasm where it is ubiquitinated and degraded by the proteasomes. Western blots were used to detect activation of NF- $\kappa$ B in THP-1 monocytes treated with three different Amphotericin B formulations (5 $\mu$ g/mL) for 0, 5, 15, 30 and 60 minutes. NF- $\kappa$ B activation was detected by observing a decrease in the I $\kappa$ B levels overtime. The predicted decrease in I $\kappa$ B levels was not detected in any of the Amphotericin B treatments which suggests that Amphotericin B may activate another pathway that results in the activation of proinflammatory genes.

**Jessica Dorschner (80)**Faculty Advisor/Collaborator: **Daniel Herman***Digital Reconstructions of Drosophila FraX Neurons from Image Stacks*

Fragile X Syndrome (FraX) is the most common inherited mental retardation disease. The disease results from the silencing of the fragile X mental retardation 1 (*fmr1*) gene which encodes for the fragile X mental retardation protein (FMRP). FMRP is a widely expressed translational suppressor with many potential regulative targets. In the *Drosophila* model of FraX, dFMRP has been shown to be a potent translational suppressor of neuronal complexity and synaptic differentiation. Subsequently, *Drosophila fmr1* null mutant neurons have increased dendritic elaboration and axonal branching. Overexpression of dFMRP, on the other hand, results in reduced neuronal complexity. An effective way to analyze the morphology of *Drosophila* FraX neurons is via digital reconstructions from image stacks. Digital reconstructions allow for analysis of 3D neuronal structure, and provide

morphometric data such as branch number, branch order, average diameter, total path length, and total surface area.

**Yaron Fireizen and Vinay Rao (104)**

Faculty Advisors/Collaborators: **Julie A. Anderson** and **Evan Weiher**

*From Genes to Ecosystems: A Molecular View of Microbial Diversity in Plant Communities from a Prairie Restoration Project*

A prairie restoration project started in 2004 was designed to increase our understanding of the links between plant communities, microorganisms and overall ecosystem processes. For the project, forty-five plots in a field site near Eau Claire, WI were seeded with different plant species each with various treatments. Our primary objective is to use a molecular genetic approach to assess the diversity of the microbial populations and ultimately its effect on ecosystem functioning. We can assess diversity by examining the intergenic region (rDNA spacer) between the small (16S) and large (23S) subunits of ribosomal RNA genes in bacterial genomes. Our role in the overall research project involves three integral parts: PCR amplification of the rDNA spacer region from the DNA, visualizing these amplified products by gel electrophoresis, and analysis of the varying sizes of the rDNA spacer fragments using an automated capillary electrophoresis system. Preliminary results suggest a positive correlation between microbial diversity and relative cover of non-native grasses and possibly a negative correlation with primary productivity. The diversity data will be subjected to additional statistical analyses and used in comparison to other large data sets collected in the prairie restoration project.

**Kaitlin Hartshorn (99)**

Faculty Advisor/Collaborator: **Alexander Bezzerides, UW-Barron County**

*Tests for Associative Learning in the flatworm *Dugesia tigrina**

We investigated the learning capabilities of the flatworm *Dugesia tigrina* through a series of choice tests following the simultaneous presentation of food with a variety of stimuli. The types of stimuli we addressed in our trials were texture, light, and novel chemical cues. We found evidence that *D. tigrina* are able to learn to associate light with the presence of food, but are unable to make such an association via texture differences or novel chemical stimuli. In addition, we also investigated *D. tigrina*'s response to operant conditioning. We utilized previous studies and our own pilot studies that show *D. tigrina*'s negative phototaxis, and employed darkness as a reinforcer to increase the behavior of seeking out a stimulus (rough texture). Finally, we also examined the influence of several method variations on *D. tigrina*'s response to association and operant conditioning, such as training dish size, maintenance conditions, and the number and length of training sessions. Our results suggest that *D. tigrina* are capable of limited learning, but that their behavior is largely intrinsically motivated.

**Daniel Hehli (96)**

Faculty Advisor/Collaborator: **Daniel Janik**

*Video Analysis of Hamster Behavior During Circadian Clock Resetting*

Previous work suggested that vigorous locomotor activity (usually in an exercise wheel) was needed for the circadian clock to shift phase in response to a transition to darkness during a nocturnal rodent's normal sleep period. However, we have recently discovered that under particular stimulus conditions (a long prior period of continuous light), animals often appear not to run at all in response to the dark transition. If an animal isn't running its exercise wheel, which is easily monitored remotely, what is it doing in the period immediately after the dark transition that might be related to the subsequent phase shift? The current work attempts to answer this question. Hamsters (n=7) entrained to a BD (Bright-Dim) cycle were transferred to continuous darkness in the middle of the bright phase. Immediately after darkness was initiated, their behavior was recorded for 4 hr using infrared-sensitive video cameras. The recordings were analyzed for the time spent engaging in the following behaviors: motionless in normal sleeping spot, active in sleeping spot, active outside sleeping spot, motionless outside sleeping spot, locomoting in wheel, and motionless in wheel. Analyses were conducted in an attempt to correlate these behaviors with the size of the phase shift displayed.

**Jennie Jacobson (100)**

Faculty Advisor/Collaborator: **Joseph Rohrer**

*Increasing Awareness of Putnam Park and its Moss Species*

This study was undertaken to determine which species of moss are present in Putnam Park on the University of Wisconsin-Eau Claire campus, and to increase awareness of the park. Moss specimens were collected from various locations in the west section of the park near the Chippewa River, and were identified to the species level using a microscope and with the help of various identification books. In total, 14 species of moss were identified

and added to the UWEC Herbarium. In order to increase awareness of Putnam Park, a website was created featuring information on the park such as the history, species present, some identification guides, updates on what's happening in the park, and children's activities.

### **Elizabeth Juetten (62)**

Faculty Advisor/Collaborator: **Daniel Herman**  
*Killing of Candida albicans Using Microwaves*

Microwaves have been shown to be effective at killing a variety of bacterial species, however very little data exists documenting the use of microwaves to kill the pathogenic yeast *Candida albicans*. Our investigation used 50ml broth cultures inoculated to a cell density of  $1 \times 10^6$  cells/ml with *C. albicans* and exposed these cultures to microwaves for increasing time increments. The number of viable cells remaining after exposure to the microwaves was determined by performing standard plate counts on the broth cultures. Our data show that 10 seconds of exposure did not result in any significant killing, while 20 seconds of exposure resulted in an approximately 100-fold reduction of viable cells. Exposure of the broths to microwaves for 30 seconds resulted in 100% killing. Our data suggest that microwaves may be an effective method of killing *Candida albicans* present in liquids.

### **Sarah Korb (103)**

Faculty Advisor/Collaborator: **Winnifred Bryant**  
*Synergistic Action of 17-beta Estradiol and Bisphenol A in Pituitary Cell Lines*

17  $\beta$  estradiol (estrogen,  $E_2$ ) is an ovarian steroid that regulates gene expression in number of targets, including the breast, uterus, and pituitary gland. The effects of this steroid are mediated by the estrogen receptor alpha and beta ( $ER\alpha$  and  $ER\beta$ ). Other nonsteroidogenic compounds can mimic the effects of  $E_2$  via interactions with the ER. Xenoestrogens are  $E_2$  mimics that are commercially produced and are frequently utilized in the production of plastic products, pesticides, food preservatives and cosmetics. Phytoestrogens are nonsteroidal  $E_2$  mimics that are produced by plants. Because hormones may interact with each other to influence the activity of a target cell, we examined the effects of the xenoestrogens bisphenol A (BPA) and the phytoestrogen genestein (G) on  $E_2$ -induced gene transcription. As determined by antagonist studies, BPA stimulates gene transcription via  $ER\alpha$ . When co-administered with  $E_2$ , BPA acts synergistically at  $ER\alpha$ . These data indicate that BPA utilizes a genomic mechanism of action distinct from  $E_2$  that may involve the recruitment of a different amount or a unique set of transcription factors in the nucleus (as compared to  $E_2$ ).

### **PaHoua Lee (63)**

Faculty Advisor/Collaborator: **Todd Wellnitz**  
*Scour Disturbance Affects a Nuisance Algae, Didymosphenia geminata, and the Associated Diatom Community*

Blooms of the diatom *Didymosphenia geminata* have reached nuisance proportions in montane streams worldwide. Little is known about the factors promoting "Didymo" blooms. Our manipulative field experiment examined how scour frequency affected substrate cover by Didymo and the epiphytic diatom community. The 19 day experiment was conducted in the East River of Gothic, Colorado. Four stream cobbles of similar size and Didymo cover were randomly assigned to be scoured 1, 3 or 6 times, or serve as a control within 10 replicate blocks. Didymo percent cover was estimated every three days. On the final day, cobble surfaces were sampled to determine chlorophyll-a, periphytic biomass, and algal species composition. Data showed scour treatments effectively reduced Didymo cover, but Didymo recovery was rapid. After 19 days cobbles scoured 3 and 6 times did not show significant differences in percent Didymo cover compared to controls (ANOVA,  $P < 0.05$ ); however, cobbles scoured only once did. Epiphytic diatom abundance was positively correlated to Didymo abundance. Diatom species richness increased significantly with decreased scour frequency ( $r^2 = 0.32$ ,  $P = 0.04$ ). These data suggest Didymo blooms are resilient to scour and that less frequently disturbed mats show greater community complexity.

### **Ka Lor (60)**

Faculty Advisor/Collaborator: **Kristina Beuning**  
*Holocene Shifts in Grass-Community Composition Along the Prairie-Forest Ecotone of Minnesota*

This study examined the carbon isotopic composition of charred grass (*Poaceae*) cuticle preserved in Holocene deposits within Kimble and Sharkey Lake in south-central Minnesota. Kimble Lake and Sharkey Lake lay in a critical location along the current prairie-forest ecotone. As such, *Poaceae* fossils preserved in the sediments of these lakes provide outstanding records to test the hypothesis regarding changes in grass community composition associated with climatically driven longitudinal shifts in this boundary throughout the Holocene.

Preliminary results indicate a mixed C3/C4 grass community from 10,000 yBP to present with bulk  $\delta^{13}\text{C}$  values ranging from  $-17$  to  $-24$  ‰. Surprisingly, an approximate 1000-year periodicity is evident in these results within shifts from more C3 ( $-24$  ‰) to more C4 ( $-17$  ‰) grasses in the surrounding landscape, occurring about every 500 years. These carbon isotopic shifts mirror closely changes in total charcoal influx to the community composition or reflect differential flammability of grass species biomass, with C3 species only burning extensively during periods of increased fire intensity. Ongoing work seeks to clarify the cause of our observed Holocene shifts in charred grass carbon isotopic composition in these lakes.

**Stephen Nikolai, Matthew Faust, Matthew Troia, Stephanie Zinken (64)**

Faculty Advisor/Collaborator: **Todd Wellnitz**

*Zooplankton Biodiversity, Lake Size and Productivity in the Boundary Waters Canoe Area Wilderness*

Two major ecological generalizations about lakes are that biodiversity increases monotonically with habitat size, and in a unimodal fashion with respect to primary productivity. To test these predictions, we sampled 15 lakes in the Boundary Waters Canoe Area Wilderness to determine whether lake productivity or lake size better predicted zooplankton diversity. Lakes were sampled during October, 2007, and ranged in size from 1990 - 14 ha in surface area, and had Secchi depths (a technique using water clarity to estimate lake primary production) ranging from 1.7 - 5.9 m. Although lake productivity increased with lake size ( $R^2=0.758$ ,  $P<0.001$ ), we found no significant relationship between either of these parameters and zooplankton diversity; however, other relationships were noted. *Cladoceran* zooplankton diversity was significantly correlated with lake littoral area ( $R_2=0.47$ ,  $P<0.01$ ), and there was a strong relationship between the number of inlets and outlets and lake size ( $R_2=0.65$ ,  $P<0.001$ ). These results, while not sufficient to address the study's original objective, pave the way for future investigations to be carried out during summer 2008.

**Danielle Priem, Tenzin Wangzor, and Nathan Butler (79)**

Faculty Advisor/Collaborator: **Tanya Falbel**

*The Effect of Arabidopsis scd-1 on Vein Formation*

A pleiotropic temperature-sensitive *Arabidopsis* mutant stomatal cytokinesis-defective1-1 (*scd1-1*) displays defective stomata, reduced cell expansion, and other mutant phenotypes when plants are grown at temperatures above  $22^\circ\text{C}$ . Below  $22^\circ\text{C}$ , none of the multiple facets of the mutant phenotypes are observed. Cell expansion is an important process influenced by the plant hormone, auxin. Appropriate transport of auxin to generate localized concentrations of auxin is a key event regulating plant growth and morphogenesis. We suspect that many facets of the *scd1-1* mutant phenotype are auxin-related. Our research focuses on the effects of *scd1-1* on vascular development, one of the other auxin related plant developmental processes. The vein patterns observed in *scd1-1* leaves grown at the non-permissive temperature are markedly different from wild-type, displaying areas of vasculature thickening and non-continuous growth. This distorted vascular growth resembles that of scarface (*sfc*) mutants. As *sfc* mutants are defective in a protein linked to auxin transport regulation, we have been investigating if *scd1-1* mutations may also influence auxin transport. We will also compare other facets of *scd1-1* mutants to *sfc* mutants to see the extent of the similarities.

**Amanda Rodning, Benjamin Carolan, Dylan Thomas, and Rena Christman (102)**

Faculty Advisor/Collaborator: **Sasha Showsh**

*Evaluation of Student Susceptibility to Caries Based on Relationships to Their Oral Health Habits and Presence of Pathogenic Bacteria*

The development of dental caries is a significant health problem in today's world of advanced technology and awareness. Poor oral health is linked to such anomalies as heart disease, diabetic health, and preterm labor. Smoking and exposure to second hand smoke has been implicated in caries as have carbonated soft drinks. In this research project, the correlation between these types of oral habits and the presence of bacteria that cause dental caries were examined. This was accomplished through the analysis of saliva samples from human volunteer donors.

**Matthew Smrz (76)**

Faculty Advisor/Collaborator: **Daniel Janik**

*Central Administration of Noradrenergic Drugs and Circadian Phase Shifts*

Earlier work has shown that systemic administration of the beta-adrenergic antagonist (beta blocker) propranolol greatly reduces nonphotonically induced phase shifts of circadian rhythms indicating that noradrenergic transmission is crucial to nonphotic phase shifts. To verify that this effect is centrally mediated and to determine the type(s) of receptors responsible for the effect, we have begun to administer drugs that stimulate or block adrenergic receptors via cannulae implanted in lateral ventricles of hamsters. This mode of administration eliminates the

possibility of drug effects through interaction with peripheral receptors and allows us to use drugs that cannot cross the blood-brain barrier or that are subject to rapid degradation in the peripheral circulation. We predict that noradrenergic antagonists will attenuate nonphotically-induced phase shifts whereas noradrenergic agonists will induce nonphotic-like phase shifts in the absence of nonphotic stimulation. Our preliminary results with the administration of isoproterenol, a beta-adrenergic agonist, indicate that it does indeed induce nonphotic-like phase shifts.

### **Staci Solin (61)**

Faculty Advisor/Collaborator: **Daniel Herman**

*MBP1 Null Mutant Strains of Candida albicans Do Not Show Defects in Responding to Oxidative Stress*

*Candida albicans* is the most frequently isolated fungal pathogen in humans. Morphogenesis, the transition from a yeast to filamentous morphology, has been demonstrated to play an important role in the organism's ability to cause systemic disease. Morphogenesis is triggered by a number of environmental signals, such as the presence of serum, a pH of 7 or greater, and limiting amounts of available nitrogen. We have cloned and characterized the MBP1 gene of *Candida albicans*, which appears to play a role in inducing morphogenesis under nitrogen-limiting conditions. To further characterize the role of the Mbp1 protein in *C. albicans*, we tested the survival of wild-type, heterozygous, and null mutant strains in the presence of various peroxides. The results show that all strains showed similar abilities to survive in the presence of the peroxides tested. We conclude that the Mbp1 protein does not regulate gene expression required to respond to the presence of oxidizing agents such as peroxides.

### **Dylan Thomas, Matthew Skalski, Jessica Dorschner, Nathaniel Butler, and Matthew Brewer (98)**

Faculty Advisors/Collaborators: **Wilson Taylor** and **Tanya Falbel**

*TEM Analysis of Arabidopsis adl1A2 adl1E-1 Double Mutant Embryos*

Arabidopsis is used as a model system in plants to understand, among other things, developmental cellular processes. One powerful aspect of this process is identifying mutants and studying them to establish what defects they have. To understand plant cell division (cytokinesis) and expansion, a double mutant was developed with disrupted *adl1A-2* and *adl1E-1* genes. Both these genes code for proteins within the dynamin-related protein family. These are large GTP binding proteins that are involved in membrane trafficking, a process that is essential for plant embryonic development, principally due to its role in cell wall formation. Examination of the ultrastructure of *adl1A-2 adl1E-1* double mutant embryos (and possibly root tips) via transmission electron microscopy (TEM) gives further insight into the roles of *adl1A-2* and *adl1E-1* proteins in plant embryonic development.

### **Sarah Tillman (85)**

Faculty Advisor/Collaborator: **Daniel Janik**

*Nonphotic Clock Resetting in Mice*

Shifting of the circadian clock using nonphotic stimulation has not been studied in mice because mice do not react to known phase shifting stimuli. We developed a stimulation procedure in which mice are held on a 24 hr cycle of bright light and dim light for at least 11 days and are then abruptly transferred to constant darkness (DD) and kept there for at least 2 ½ days. Using this procedure, we found large nonphotic shifts and have constructed a phase-response curve (PRC), showing that phase shifts are specific to the phase of the daily cycle at which they are administered. As is true for nonphotic PRCs in other species, the mouse PRC shows large advance shifts when animals are stimulated during the normal rest phase and little or no shifting when animals are stimulated during the activity phase. We also tested the idea that phase shifts generated in this way can be blocked by the beta blocker propranolol as they are in other species. We administered propranolol at doses of 0 (control), 5, 10, and 20 mg/kg together with the nonphotic stimulation procedure and assessed the effect on phase shift.

### **Matt Troia (81)**

Faculty Advisor/Collaborator: **Chris Floyd**

*Nest Site Selection by Red-Naped Sapsuckers: Influence of Willow Proximity, Aspen Heartwood Fungus, and Other Ecological Factors*

Woodpeckers are considered ecosystem engineers because they excavate nest cavities that eventually provide habitat for other cavity nesting species. In aspen (*Populus tremuloides*) woodlands of the southern Rocky Mountains, red-naped sapsuckers (*Sphyrapicus nuchalis*) are the predominant woodpecker, providing essential nest cavities for multiple bird species. Sapsuckers also create sapwells in willows (*Salix* sp.), providing a sugary resource for many species. Previous work indicated that sapsuckers avoid nesting in aspens far (> 500 m) from willows. However, previous work did not account for potentially confounding effects of other variables such as

prevalence of the heart-rot fungus, *Phellinus tremulae*. The sapsuckers nest exclusively in *Phellinus*-infected aspens. In summer of 2007 we sampled 0.25 ha plots (sites with sapsuckers and sites without) in order to determine how willow proximity, *Phellinus* prevalence, and other variables influence nest-site choice by sapsuckers. Our preliminary results suggested that willow proximity was not an important factor in determining sapsucker nest-site location. The most important predictor variable was prevalence of *Phellinus*-infected aspens, which indicates that sapsuckers chose nest sites primarily on the basis of tree suitability. Thus, in order to conserve the aspen cavity-nesting community, we need to better understand the ecology of the aspen heart-rot fungus.

#### **Kurt Zimmerman (229)**

Faculty Advisor/Collaborator: **Kristina Beuning**

*New Results Constrain the Timing of Movement of Early Hominins out of Africa*

Pollen records from Lake Malawi, Africa spanning the last 135 kyr show substantial and abrupt vegetation response to multiple episodes of extreme aridity. The most extreme episode of aridity from ~ 105-80 ka is marked by the greatest abundance of grass (*Poaceae*) pollen as well as and the disappearance of forest taxa such as *Uapaca* and *Brachystegia* and montane taxa (*Podocarpus*, *Olea* spp. and *Ericaceae*) within the pollen source area of Lake Malawi. The resultant semi-desert vegetation would have been inhospitable for early humans living within or traveling through the Lake Malawi region. A mere 10,000 years following the end of arid conditions in tropical Africa (~80 ka) aridity began elsewhere on the continent and in the Levant (~70 ka). Thus, a likely period for human population expansion out of southern and equatorial Africa (especially along a corridor up the Nile from tropical to North Africa) would have been during the climatic “crossover” time, between ~80 ka and 70 ka, when intermediate precipitation regimes would have prevailed throughout Africa. This timing is early enough to accommodate even early proposed arrivals of humans into Australia.

## **Chemistry**

#### **Lee Behling (142)**

Faculty Advisors/Collaborators: **Warren Gallagher** and **Scott Hartsel**

*Structural Characterization of Methanobactin using Nuclear Magnetic Resonance (NMR)*

Methanobactin is a small copper-sequestering molecule produced by the bacteria *Methylosinus trichosporium* OB3b. This unusual chromopeptide appears to be a part of the copper acquisition system for these methane-oxidizing bacteria. A variety of activities are ascribed to methanobactin, including scavenging copper from the environment and delivering it to the enzyme that converts methane to methanol. Our current research employs nuclear magnetic resonance (NMR) and mass spectroscopy to elucidate the structure of methanobactin when exposed to low levels of copper. Based on our experimental data, we believe the published structure for methanobactin is incorrect. Our data indicate that the N-terminal isopropyl ester in the published structure should instead be an isobutyl ketone. In order to maintain the correct mass, we are also proposing that the two imidazole rings should be oxazole rings. We have carried out <sup>15</sup>N-NMR experiments that appear to support this hypothesis. We will discuss how our proposed structure not only supports our NMR and mass spectroscopy data, but also makes more sense than the published structure from a biological standpoint.

#### **Clinton Cook (159)**

Faculty Advisor/Collaborator: **Kurt Wiegel**

*Density Functional Calculations and HOMO/LUMO Orbital Structure as a Probe of Hydrogen Bond Strength and Mesophase Stability in Supramolecular Liquid Crystalline Polymers and Small Molecules*

Density functional calculations are used as a probe for mesophase stability and hydrogen bond strength. These methodologies have been used to examine the relative stabilities of a series of analogous 2-ring bispyridyls, (1,2-di(4-pyridyl)ethylene (2RP), and 4,4'-azopyridine (AzoP) have been hydrogen bonded with a series of mono and bisfunctionalized benzoic acid derivatives to generate mesogenic small molecules and polymers. The correlation between the clearing temperature and results of the density functional calculations will be discussed, as well as an in-depth analysis of HOMO/LUMO energetics and interactions.

**Kelsey Dunkle (140)**Faculty Advisor/Collaborator: **David Lewis***Reactivity of the Heterocyclic Ring in Naphthalamide Derivatives*

It is conventional wisdom that, once formed, the heterocyclic ring of 4-substituted-1,8-naphthalimide derivatives is unaffected during reactions with nucleophiles. Thus, N-alkyl-4-chloro-1,8-naphthalimides react with primary amines above 80°C to give the corresponding N-alkyl-4-alkylamino-1,8-naphthalimides without loss of the N-alkyl group. We have found that this is not universally true, and that certain 1,8-naphthalimide derivatives react with primary amines at lower temperatures to give products in which the N-alkyl group has been replaced. The effects of N-alkyl group structure and of naphthalimide ring substituents on the course of the reaction will be discussed.

**Frank Emmert and Jeremiah Hubbard (122)**Faculty Advisor/Collaborator: **Alan Gengenbach***Enzyme and Metalloporphyrin Catalyzed Oxidation of Amine-Containing Azo Dyes*

Azo dyes are widely used as colorants and significant quantities are released into the environment each year. In the environment, these dyes slowly break down through reductive processes that lead to products more dangerous than the azo dyes themselves. Azo dyes containing phenol groups have been widely studied but there is not enough experimental evidence to propose a degradation pathway for dyes containing amine groups. Experiments have shown that several enzymes and various metalloporphyrins, which mimic the active sites of the enzymes, catalyze the oxidative degradation of various amine containing azo dyes. The goal of this research was to compare the reaction pathways and products observed for peroxidase and metalloporphyrin catalyzed oxidation of amine-containing azo dyes. We studied the oxidation of several azo dyes with hydrogen peroxide catalyzed by the enzyme Horseradish Peroxidase (HrP) and compared it to the oxidation with t-butylhydroperoxide catalyzed by the metalloporphyrin, 5,10,15,20-Tetrakis(4-sulfonatophenyl)prophyrinato iron (III), Chloride (Fe(TPPS)Cl). The products of these reactions were determined by HPLC, GC-MS, LC-MS, and UV-Vis spectroscopy. Our results show that both HrP and Fe(TPPS)Cl catalyze oxidative cleavage of the dyes and the product distributions were similar. This shows that the Fe(TPPS)Cl/t-butylhydroperoxide system is a good functional model for HrP.

**Jason Greuel and Paul Yanzer (160)**Faculty Advisor/Collaborator: **Kurt Wiegel***Thermoreversible Liquid Crystalline Networks*

A series of liquid crystalline supramolecular networks has been synthesized. These consist of a bis-benzoic acid species (5EO BBA) and a rigid bis-pyridyl (2RP), a distonic rigid bis-pyridyl separated by a flexible spacer group (4EO B2RP) and a non-rigid tetrapyridyl (network-forming agent, TPPE). These systems display liquid crystalline properties at up to 25% inclusion of TPPE in the case of the 2RP systems. The system chosen for this study also utilizes the labile hydrogen bond for the mesogen-forming event. The networking agent would prevent the formation of a mesogen. As the networking agent is also capable of forming a hydrogen bond, this creates a system capable of competition - the hydrogen bond donors can associate with either of the acceptors, meaning that either a network or a mesogen can be formed. It is conceivable that the stability of the liquid crystalline phase can allow the mesogen formation to "outcompete" the pure network formation.

**Katie Klotz (119)**Faculty Advisor/Collaborator: **Jason Halfen***Non-heme Iron Compounds Mediate the Aziridination of Alkenes and the Amidation of Alkanes*

Metal-mediated syntheses of nitrogen-containing organic compounds are the focus of continuing investigation in contemporary inorganic and organometallic chemistry. Herein we will discuss the catalyst and substrate requirements for effective iron-mediated alkene aziridination and alkane amidation reactions. Non-heme iron(II) compounds of polydentate nitrogen donor ligands are effective precatalysts for the aziridination of alkenes by PhINTs, rapidly providing aziridine products in moderate to good yields. Mechanistic studies implicate a concerted process for the formation of the two new carbon-nitrogen bonds in the aziridine product, perhaps through an azametallacyclobutane intermediate. Alkanes are also susceptible to oxidation by PhINTs in the presence of non-heme iron(II) compounds, leading to the formation of tosylamide-containing organic products. In some cases, aromatic substrates bearing aliphatic substituents are observed to undergo tosylamidation of both aliphatic and aromatic C-H bonds. Ligand and substrate electronic effects on this iron-mediated tosylamidation reaction will also be discussed.

**Gina Macek (139)**Faculty Advisor/Collaborator: **David Lewis***Is it Time to Change the Oil Yet? Monitoring Engine Wear*

N-Alkyl-4-( $\omega$ -aminoalkylamino)-1,8-naphthalimides where the aminoalkylamino group has 2 or 3 carbons respond to the presence of transition metal cations in isopropyl alcohol by exhibiting an increase in fluorescence emission intensity near 490 nm in such a way that this change can be used to quantify the metal ion concentration. One particularly useful application of this observation allows one to monitor the lubricant of automobile engines and diesel engines using a very small ( $\sim 20\mu\text{L}$ ) sample of the oil. We have used this method to monitor the levels of metal ions in oil in several different vehicles: school buses, personal automobiles, and small golf carts. The ratio of fluorescence emission intensity at 490 nm and 520 nm gives plots that show an inflection point. The results and their implications will be discussed.

**Adam Malone and Ryan Foster (162)**Faculty Advisor/Collaborator: **Fred King***The High-Speed, High-Precision Evaluation of 4-Electron Integrals*

Our research focused on the numerical approximation of one-, two-, three-, and four-electron integrals. These integrals were derived from Slater-type functions with inter-electronic dependence factors. Although numerical approximations exist, their computational efficiency is inadequate for any practical application. Therefore, our goal was to arrive at a quicker, more precise approximation; ideally a closed-form solution. We experimented with hypergeometric series transformations, convergence-accelerators, and various other series-manipulation techniques with varying degrees of success. Overall, we have made slight improvements in computational efficiency and accuracy.

**Elizabeth Raupach (121)**Faculty Advisor/Collaborator: **David Lewis***Progress Toward Tröger's Base Precursors*

Our goal is to synthesize C<sub>2</sub>-symmetric fluorescent Tröger's base derivatives bearing substituents in the bridged diazocene ring from 4-amino-1,8-naphthalimide dyes. Our attempts at direct synthesis have been unsuccessful. As a result, we have focused our attention on synthesizing a precursor 4-amino-1,8-naphthalimide with a functional group at the 3- position that would allow the dimerization of dye molecules, providing the structural framework of a Tröger's base. To date, we have completed two promising displacements of bromine at the 3- position using Ullmann and Henry type reactions. These reactions show potential for building substituted Tröger's bases.

**Daniel H. Rose and Jeremy J. Weyer (118)**Faculty Advisor/Collaborator: **Thao Yang***Synthesis and Nuclear Magnetic Resonance Studies of Mucin Peptides*

The amino acid sequence of mucin peptides is derived from the tandem repeat domain of a large glycoprotein known as MUC1 mucin. MUC1 mucin is expressed by both normal epithelial cells and cancer cells. The MUC1 mucin expressed by cancer cells is different in that its degree of glycosylation is lower. In this project we employed the Solid Phase Peptide Synthesis method to synthesize linear and cyclic MUC1 peptides. Nuclear Magnetic Resonance Spectroscopy (NMR) is used to study the structures of MUC1 peptides. Results from the synthesis and proton NMR assignments of both linear and cyclic MUC1 peptides are presented here.

**Brianne Shane and Kristina Weimer (123)**Faculty Advisor/Collaborator: **Sanchita Hati***Domain-Domain Communication for tRNA Aminoacylation: Importance of Evolutionarily Conserved and Energetically Coupled Residues*

Aminoacyl tRNA synthetases are an important family of protein enzymes that play a key role in the protein biosynthesis. ARSs catalyze the covalent attachment of amino acids to their cognate transfer RNA (tRNA). They're multi-domain proteins, with domains that have distinct roles in aminoacylation of tRNA. Various domains of an aminoacyl-tRNA synthetase perform their specific task in a highly coordinated manner. The coordination of their function, therefore, requires communication between the domains. Evidence of domain-domain communications in ARSs has been obtained by various biochemical and structural studies. However, the molecular mechanism of signal propagation from one domain to another domain in ARSs has remained poorly understood. In the present work, we investigated the molecular basis of long-range domain-domain communication in *E. coli* prolyl-tRNA synthetase (Ec ProRS). In particular, we explored if evolutionarily conserved and energetically coupled network of residues are involved in domain-domain signal transmission in Ec ProRS. In

this work, combination of bioinformatics and biochemical methods have been employed to identify networks of residues involved in the long-range communication pathway. Initial results demonstrate that sparse networks evolutionarily conserved and energetically coupled residues, located at the domain-domain interface, might have a significant role in long-range interdomain communications in Ec ProRS.

**Kirsten Strobush and Skye Doering (222)**

Faculty Advisor/Collaborator: **James Boulter**

*Low-Temperature Ammonia Ices: Structure and Interactions with Organic Adsorbates*

Ammonia, along with its hydrates and sulfides, is an important condensable species in the atmospheres of the outer giant planets. We characterize the microscale structure of pure and mixed ammonia ices using thin-film analysis techniques including Fourier-transform infrared reflection-absorption spectroscopy (FT-IRRAS), laser interferometric film thickness measurement, and temperature-programmed desorption mass spectrometry (TPD-MS). Thin films are grown on a gold mirror at temperatures from 30 to 120 K under high vacuum. The amorphous or crystalline nature of the films is characterized by their infrared spectra, collected using p-polarized, grazing angle FT-IRRAS. Films are further analyzed using ethylene or other small organic probe molecules adsorbed onto the ammonia films to determine changes in absorption features, such as peak area reductions, which are descriptive of the microscale structure. The TPD-MS desorption spectrum of the organic layer is also used to characterize the adsorbate-ammonia interaction strength as it relates to ice microstructure.

**Dylan Thomas and Benjamin Carolan (143)**

Faculty Advisor/Collaborator: **Scott Hartsel**

*Delta Thigh Project II*

Aminophylline, a molecule belonging to a family of molecules called methylxanthines, has been traditionally used as a drug for asthma therapy. Recently, studies have suggested that fatty acids are released from adipose tissue when it is exposed to aminophylline. However, no such studies have confirmed that the drug is able to cross skin tissue. A company, called MWT inc., makes and distributes a product, "Cellulean™", and claims that it is able to transport aminophylline across cutaneous tissue to the adipose tissue beneath, thus causing the supported finding. The aim of our study is to test this statement in a placebo-controlled experiment. This study is a continuation of a similar project from last year (Delta Thigh Project). In this study we had subjects apply Cellulean to one thigh, and a skin moisturizer to the other over the course of 30 days. Thigh measurements were taken weekly and subjects also noted if they were physically active or not.

**Anna Volkert (158)**

Faculty Advisor/Collaborator: **James Boulter**

*LC-MS Analysis of Biogenic Carbonyl Compounds Using Novel Derivatization Agents*

Carbonyl compounds play important roles in diverse atmospheric concerns ranging from smog formation to the carbon budgets of natural ecosystems. Many of these compounds are released into the atmosphere by plants for reasons that are incompletely understood. A common method for analyzing atmospheric carbonyls involves trapping them on cartridges containing 2,4-dinitrophenylhydrazine (DNPH) coated on a silica stationary support. The resulting hydrazones are eluted and analyzed by HPLC-UV/Vis. This method suffers from well-documented interferences and is unable to easily identify more complex carbonyl compounds. Conversely, analysis by LC-MS affords greater sensitivity, improved identification of analytes and exclusion of interferences. However, this method requires the use of alternative agents to trap carbonyls and form products that are readily ionized in an electrospray inlet. We will report the use of novel carbonyl derivatization agents such as hydrazine to form azine analytes and 4-carboxy phenyl hydrazine to form the corresponding hydrazones.

**Kristina Weimer, Brianne Shane, and Michael Brunetto (138)**

Faculty Advisors/Collaborators: **Sanchita Hati** and **Sudeep Bhattacharyay**

*Exploring Cooperative Domain Dynamics in Thermus thermophilus Leucyl-tRNA Synthetase Using Low-frequency Normal Mode Calculations and Statistical Coupling Analysis*

Leucyl-tRNA synthetases are class I synthetase that catalyze the covalent attachment of leucine to the tRNA<sup>Leu</sup>. The three-dimensional crystal structure of *Thermus thermophilus* leucyl-tRNA synthetase (Tt LeuRS) demonstrates a complex modular architecture where three flexible domains (the conserved connective polypeptide 1 domain, the leucine-specific domain, and the zinc-binding domain) are inserted into the central catalytic domain. These flexible domains undergo conformational change upon tRNA binding. These substrate induced conformational rearrangements of various structural elements of Tt LeuRS suggest that cooperative domain dynamics might play an important role in the enzyme function. In the present work, we have investigated the collective motion of various structural elements in Tt LeuRS using normal mode calculations. In addition,

statistical coupling analysis has been performed to examine if the evolutionarily coupled networks of residues have significant contributions to these concerted domain motions. Taken together, these studies demonstrate that domain motions in Tt LeuRS are indeed cooperative in nature and lead to the identification of the network of residues that propagate long-range interdomain communications in this enzyme.

#### **David Witte (141)**

Faculty Advisor/Collaborator: **Kurt Wiegel**

*Supramolecular Liquid Crystalline Polymers and Small Molecules Formed From 2-pyridone Assemblies*

A series of supramolecular mesogens have been synthesized and assembled using pyridone functionalities. These species will be analyzed to determine the formation and identity of liquid crystalline phases. It is expected that any mesophases formed from these assemblies will have significantly higher clearing temperatures than those observed in those formed through a benzoic acid/pyridine system (single hydrogen bonds). The ability of the pyridone species to self-assemble and competitively form one mesophase or another will also be examined through thermal and optical analysis. These studies will grant insight into the nature of mesophase stability and formation.

#### **Vang Yang (161)**

Faculty Advisor/Collaborator: **Sudeep Bhattacharyay**

*Theoretical Determination of the Reduction Potentials of Dihyronicotinamide Riboside (NRH): Quinone Oxidoreductase (NQO<sub>2</sub>) Using Molecular Dynamics Simulations*

Dihyronicotinamide riboside (NRH): quinone oxidoreductase (NQO<sub>2</sub>) is a cytosolic quinone reductase (QR). It catalyzes the metabolic reduction of quinones utilizing its cofactor flavin adenosine dinucleotide (FAD) as electron mediator. It promotes natural defense against oxidative and chemical stresses by protecting B-cells (Iskander et al. 2006). Furthermore, this enzyme activates anticancer prodrug molecules *in vivo* converting them to DNA-DNA cross linkers (AbyKhader et al. 2005). The core of the catalytic chemistry of QR and prodrug activation involves a reduction of its cofactor flavin adenine dinucleotide (FAD) by nicotinamide riboside (NR) leading to an unfavorable charge separation that must be stabilized by the protein matrix. The detail of the charge stabilization is experimentally inaccessible but extremely important for the binding of prodrugs or other co-substrates (e.g., harmful semiquinone radicals) and their subsequent catalytic conversions. In the current study, we are exploring the reduction process of the enzyme-bound flavin using computational methods. We are using a combined quantum mechanical/molecular mechanical potentials (Bhattacharyay et al. 2007) to compute the flavin's reduction potential. The reduction of flavin involves additions of two electrons and two protons. Herein we will present the computed free energy changes for these reduction processes as well as the pKa values for the flavin ring nitrogens.

## **Computer Science**

#### **Alexander Cobian (144)**

Faculty Advisor/Collaborator: **Daniel Stevenson**

*Implementing Auto-focus in a Stereographical Projection System*

A design for a stereographical projection system that takes into account various principles of optics to create an optimally focused dynamic image is presented. There are two separate focal systems taken into account by our design: that of the virtual cameras focusing on the virtual scene and that of the viewers' eyes focusing on the projection screen. Whenever the viewer looks at a part of the scene which the virtual cameras are not focused on, their eyes will be directed at a point either in front of or behind the projection screen. This results in non-zero parallax (a gap between the locations on the screen at which each eye is focused.) As the parallax increases, quality of the image decreases and the viewers may experience eyestrain and duplicate images. We minimize the parallax by refocusing the virtual cameras dynamically in response to modifications in the scene. We further enhance the quality of the image by ensuring that the physical set-up minimizes data crossover between the eyes.

#### **Darren Kulp (157)**

Faculty Advisor/Collaborator: **Daniel Ernst**

*ISOMER – Augmenting Software Testing Confidence by Automated Comparison with a Lightweight Model*

Non-algorithmic constraints on software development can hinder testing efforts by creating pitfalls for the programmer or by hiding data-dependent errors in complex codes. The ISOMER framework improves testing

efficacy and confidence by further automating software component and program testing. Using a familiar expression syntax to define constraints on the random stimulus generated, ISOMER subjects software interfaces to dynamically-generated test cases, adding value over time.

**Joseph Myre (230)**

Faculty Advisor/Collaborator: **Dan Ernst**

*Enhancing the Price/Performance of a Clustered Multiprocessor System*

With this poster, we will explore the design considerations of a low cost, high performance microprocessor cluster, including both hardware and software factors. The goal of the designed system is to maximize the ratio of performance to price, creating a powerful computer at very low price point. This poster will present the target capabilities of the platform, the design process used to select components and configurations, and metrics by which microprocessor clusters can be evaluated.

## Geography and Anthropology

**Nathan Christ and Korah Petrasko (221)**

Faculty Advisor/Collaborator: **Sean Hartnett**

*Aerial Tour of the Lower Chippewa River Valley*

This project involved the production of a web-based aerial tour of the Lower Chippewa River Valley. The goal of this project is to develop a set of aerial photos, videos and maps featured on an interactive web-page that in combination produces a vivid visualization of the unique fluvial landscape of the Lower Chippewa. Fieldwork for this project was undertaken at an altitude of 500 to 5,000 feet in the cockpit of a Cessna 172. In a series of flights over the 65-mile course of the Chippewa River from Eau Claire to the confluence with the Mississippi River, we took over 1,200 aerial photos and 150 minutes of DV video. There was a significant learning curve to the capturing of 'steady' pictures and video in the cramped cockpit bouncing through the air. This photo and video data was then edited and processed into a series of slide-shows and video clips formatted for web viewing. A interactive web page was then designed featuring a map of the Lower Chippewa River Valley. Users can select video clips or slideshows to play and browse a set of maps and download a Google Earth aerial tour of the Lower Chippewa River Valley.

**Pat Dryer, Jackie Ebert, Bryan Vickroy, Keith Erickson, Chris Below, Beth Ellison, Adam Rubach, and Todd Wermager (180)**

Faculty Advisors/Collaborators: **Harry Jol** and **David Nobes**, University of Canterbury

*Subsurface Imaging of South Brighton Spit, Christchurch, New Zealand Part II: Coastal Processes and Data Interpretation*

As more coastal environments are being developed around the world, the scientific community needs to provide best practices in coastal management and associated risks, such as storm-related erosion and tsunamis. Along the east coast of the South Island, New Zealand, ocean currents transport sediment from south to north. However, Banks Peninsula interrupts the northerly drift of sediment along the Canterbury coast, resulting in a back-eddy that has built South Brighton spit southward across the mouth of the Avon-Heathcote Estuary. Outflows from the estuary are continuously influenced by the coastal processes that are building the spit. Ground penetrating radar (GPR) surveys were collected along the width of South Brighton Spit at its most southerly extent. The processed GPR data provides a subsurface image of the coastal sedimentary deposits that can be correlated to the layering of the spit. Using radar stratigraphic analysis, the GPR transects show continuous to semi-continuous horizontal and slightly dipping reflection patterns. The reflection patterns are interpreted as 1) sandy beach deposits from coastal wave action that pushes sand onto the shore, and 2) aeolian sand dunes from offshore winds that blow the beach sand into dunes further inland.

**W. Patrick Dryer and Jacob McDonald (179)**

Faculty Advisors/Collaborators: **Harry M. Jol** and **Douglas Faulkner**

*Subaqueous Industrial Waste in Western Wisconsin Lakes: Reducing/Redirecting the Dredged Materials from Landfills*

Logging was an essential part of western Wisconsin's economy from the 1850s to the 1920s. The logging industry used Half Moon Lake (HML) in Eau Claire as a holding pond awaiting processing at sawmills along the lakeshore. During the logging era, industrial wastes, such as bark, sawdust, and slabs, was dumped on top of a former natural lake bottom (fluvial gravels). Although the logging industry use of HML ceased decades ago, the effects

of the logging industry on HML's water quality can still be observed today. The industrial waste has been hypothesized to be several meters thick throughout the lake. To investigate the geometry of the industrial waste, a low frequency (50 and 100 MHz) pulseEKKO ground penetrating radar (GPR) survey was undertaken. Radar stratigraphic analysis of the GPR lines allowed for areas of interest to be located and Vibra-Cored to extract sediment samples. To georeference all collected data, a Trimble proXR differential Global Positioning System (GPS) was used. Volume calculations were determined from GPR profiles to create a bathymetric and thickness map of the organic waste in HML.

**Jackie Ebert (183)**

Faculty Advisor/Collaborator: **Christina Hupy**

*Mapping Vegetation Change along the Lower Chippewa River*

The Lower Chippewa River is a dynamic and unique river system which supports a high diversity of habitat types. Despite the ecological importance of this river system and its surrounding habitat, relatively little is known about the dynamic nature of the vegetation communities on its floodplain and low terraces. The objective of this project is to contribute to a better understand of the Lower Chippewa River landscape by examining vegetation change. This research is part of a larger project investigating changes in the Lower Chippewa River and its vegetation from the 1930's to present. Here, we examine 50 years of vegetation change along the Lower Chippewa River. Vegetation maps of 1965 and 2005 were generated and compared. Aerial photographs were obtained and georeferenced (assigned earth coordinates). Then vegetation communities were interpreted from the aerial photographs and manually digitized in Arc GIS 9.2 software for each photo set of 1965 and 2005. Basic statistical comparisons were made between the years. The results indicate significant vegetation change in several classes and will be used to gain a better understanding of the temporal and spatial dynamics of the Lower Chippewa River and its floodplain vegetation.

**Beth Ellison, Todd Wermager, Chris Below, Adam Rubach, Keith Erickson, Bryan Vickroy, Jackie Ebert, and Pat Dryer (178)**

Faculty Advisors/Collaborators: **Harry Jol** and **David Nobes**, University of Canterbury

*Subsurface Imaging of South Brighton Spit, Christchurch, New Zealand Part I: Data Collection and Processing*

The South Brighton Spit is located along the east coast of the South Island, New Zealand. The spit is a beach barrier between the Avon-Heathcote Estuary and the Pacific Ocean. Due to recent erosional and progradational events that affected the local infrastructure along the spit and to better understand these coastal sedimentary deposits, ground penetrating radar (GPR) surveys were conducted in collaboration with the University of Canterbury. GPR, a geophysical method, transmits an electromagnetic pulse into the ground which is then reflected and recorded providing an image of subsurface sediments. A pulseEKKO GPR system with antennae frequency of 200 MHz and a 400 V transmitter was used. The antennae were spaced 0.8 m apart, mounted on a sled, and towed along the width of the spit. The data were collected in a free mode with markers noted every 20 m. Field notes and photo documentation were used to georeference, rubber sheet and join the collected GPR profiles and to have equal spacing for the collected traces. To provide profiles for data interpretation, the collected data were then processed using various filters (trace to trace, down trace), gains (automatic gain control) and plots (amplitude, wiggle trace).

**Phillip Larson, Jacob McDonald, Pat Dryer, and Anna Baker (198)**

Faculty Advisors/Collaborators: **Garry Running**, **Doug Faulkner**, and **Harry Jol**

*Geomorphology of Cliff-Top Parabolic Dunes within the Lower Chippewa River Valley, Upper Putnam Park, Eau Claire, Wisconsin*

Our objective is to investigate low conical hills (up to 6 m high, 50 m dia.) and ridges (up to 6 m high, 300 m long), adjacent to the Wissota Terrace scarp in upper Putnam Park, Eau Claire, Wisconsin. The study area is representative of similar locations within the Lower Chippewa River Valley. One conical hill and one ridge were investigated. Four soil profiles from each were described and sampled. Ground penetrating radar (GPR) was used to image the subsurface. Based on particle-size analysis these landforms are consistent with eolian dunes (fine-medium, well-sorted sand) and are distinguishable from underlying terrace deposits (medium-coarse, poorly sorted sand). GPR reveals high-angle reflection patterns interpreted as slip face migration overlying a continuous horizontal pattern. Orientation, size, internal structure, and proximity of the dunes to the Wissota Terrace scarp suggest the dunes: are cliff-top parabolic dunes, represent a single episode of deposition, and stabilized shortly after deposition. Weakly developed soils (A-BW-C or A-E-BW-C profiles) and variation in soil morphology across the dune landscape suggest: the dunes are considerably younger than the underlying terrace, and soils are prone to erosion. We recommend low intensity land use in such areas to control erosion.

**Phillip Larson and Lindsay Olson (197)**Faculty Advisors/Collaborators: **Garry Running, Doug Faulkner, Harry Jol, and Joe Hupy***Late Quaternary Eolian Dunes and Fluvial Terraces of the Lower Chippewa River Valley*

The Lower Chippewa River Valley (LCRV) is a geomorphically complex and relatively uninvestigated landscape in west-central Wisconsin. Seven paired terraces were previously mapped within the LCRV and eolian dunes were recognized on the highest two terraces. The age, origin, geomorphology, and paleoenvironmental significance of these terraces and dunes remain poorly understood. Project objectives are to build on previous investigations of the LCRV by mapping the distribution of terraces/dunes and testing ground penetrating radar (GPR) to explore its applicability to future investigations. This project began with collection of ~30,000 elevation points using differentially corrected GPS to improve the accuracy of the original terrace map. USGS topographic quadrangles, stereo analysis of aerial photographs, and attributes from SSURGO data, were compiled in ArcGIS to map the distribution of eolian dunes. Parabolic dunes (3-6 m high, up to 300 m long), apparently the result of cliff-top depositional processes, are concentrated adjacent to northwest-facing scarps of the highest terraces. In addition, lower, more irregular dunes are present in locations away from terrace scarps. Initial results of GPR testing in representative eolian and fluvial landforms (Pulse Ekko 100 and 1000 systems) indicate GPR will be useful for identifying and characterizing both deposits

**Jacob McDonald (164)**Faculty Advisor/Collaborator: **Robert Barth Jr.***Creating a GIS Database for Pre-Contact Archaeological Sites in the Red Cedar River Valley*

The Red Cedar River is located in western Wisconsin, flowing southward from its headwaters in Sawyer County through Washburn, Barron, and Dunn Counties until joining the Chippewa River near Dunnville. For the past 125 years, considerable archaeological research has been conducted along the Red Cedar River and its tributaries. The purpose of this project was to create a geographic information system (GIS) database in order to consolidate this archaeological data into a uniform format. GIS allows for the analysis of relationships between site location and environmental variables (e.g. hydrology and plant communities). A total of 278 sites, ranging in age from Paleo-Indian (~12,000 yrs BP) to Proto-Historic, have been digitized into this database. Future research will be greatly facilitated by the spatial analysis capabilities provided by this project.

**Jacob McDonald (163)**Faculty Advisor/Collaborator: **Harry M. Jol***Ground Penetrating Radar Aided Archaeological Survey on Har Karkom (Mt. Sinai?), Israel*

Har Karkom is located 96 km south of Mizpe Ramon within the Negev Desert, Israel. Around and on the mountain, there is evidence of sacred archaeological sites that range in age from 40,000 yrs BP up to Islamic times. The sacred nature as well as the surrounding geography has led some to believe that this is the biblical Mount Sinai. Ground penetrating radar (GPR) data was collected, in the spring of 2007, using a pulseEKKO 1000 with 225 and 450 MHz antennae. The use of geophysical techniques, such as GPR, has become an increasingly popular and effective method for imaging the subsurface, allowing archaeologists to excavate areas that show the most promise. Four sites were investigated on Har Karkom. Radar stratigraphic analysis of the datasets included GPR processing and plotting with EKKOmapper, topographic surveys, and the creation of schematic diagrams. Through the visualization of 3D cubes and planview timeslices, probable archaeological features were interpreted. These features may include walls that have collapsed as well as the dimensions and depths of prior water sources. The analysis and interpretation of the collected GPR data will be used by site archaeologists when planning future excavations.

**Amy Wichlacz and Beth Ellison (184)**Faculty Advisor/Collaborator: **Doug Faulkner***Historical Channel Change of the Lower Chippewa River in West-Central Wisconsin*

The Lower Chippewa River has a number of features on its flood plain indicating channel change over time. The objective of this research is to identify and quantify channel change from the mid-1800s to the present between the cities of Eau Claire and Durand. To do this, we georeferenced township plat maps from the Public Land Survey of 1848, and, using these as base maps in ArcMap, we digitized the 1848 channel. Then we digitized the channel using georeferenced aerial photos from 1938, 1965, 1972-73, 1992, and 2005. Subsequently, we layered the digitized channels to determine changes in channel planform. We identified many significant changes, especially along meander bends and within multi-channel (or anabranching) reaches. Along bends, the river experienced significant lateral migration, in some places well over 100 meters, undoubtedly due to cutbank erosion and point bar deposition. The greatest changes, however, occurred within anabranching reaches. In both of the anabranching reaches found in our study area, the river cut new channels and abandoned old ones;

these major channel changes were probably the result of exceptionally large floods. However, not all reaches experienced significant change, as some appear to be the same in 2005 as in 1848.

## Geology

**Anna Baker, Crystal Nickel, Bryan Hardel, and Brian Jordan (200)**

Faculty Advisor/Collaborator: **Katherine Grote**

*Vadose Zone Characterization Using Ground Penetrating Radar Groundwaves*

Soil water content is an important parameter for agricultural, environmental, and geotechnical applications. Soil water content in the vadose zone is both spatially and temporally heterogeneous, so characterizing this parameter with a limited number of point measurements is difficult. Ground penetrating radar (GPR) is a non-invasive geophysical technique that can be used to estimate the soil water content quickly and with high resolution over large areas. This research explores the potential of GPR groundwaves for creating a three-dimensional image of soil water content. In this project, multi-frequency GPR data were acquired within a large tank over a series of soil profiles with layers of contrasting water content. The groundwave travel time was analyzed for each frequency in each of the soil profiles, and preliminary results show that GPR can be used for accurate water content estimation and that the penetration depth of GPR groundwaves is frequency dependent. These results indicate that multi-frequency GPR data have potential for obtaining vertical water content profiles in field-scale applications.

**Elizabeth Balgord (201)**

Faculty Advisors/Collaborators: **J. Brian Mahoney and Robert Hooper**

*Modeling Middle Devonian Nickel Deposition in the Selwyn Basin, Northern Yukon*

A Ni-Mo-PGE sulfide deposit (NiMo) in northeastern Yukon occurs at the boundary between Ordovician-Early Devonian Road River and Middle Devonian Earn Group. The NiMo is continuous over  $>20,000 \text{ km}^2$  with an average thickness of 3-8 cm. Its areal extent, mineralogical makeup and consistent stratigraphic position suggest mineralization was an instantaneous basin wide event. There are multiple conflicting genetic models: 1) hydrothermal fluids scavenged metal rich shales and precipitated sulfides in reducing conditions on the basin floor, 2) a basin wide release of methane gas from methane hydrate generated a bacterial bloom and subsequent sulfide precipitation, or, 3) biologically controlled sulfide precipitation fueled by a catastrophic release of metal rich petroleum. These genetic models are being tested by detailed analysis of strata flanking the NiMo. Systematic geochemical analysis constrained the spatial and temporal variations in metal distribution and indicates the possibility of multiple mineralized units distinct from the NiMo deposit. The main mineral assemblages consist of vaesite ( $\text{NiS}_2$ ), bravoite [ $(\text{Fe},\text{Ni})\text{S}_2$ ], pyrrhotite ( $\text{Fe}_{1-x}\text{S}$ ), and pyrite ( $\text{FeS}_2$ ), with an average Nickel grade of 5%. The stability of bravoite shows that the maximum temperature of precipitation was  $137^\circ\text{C}$ . Electron microscopy (SEM and TEM) identified microbial structures, indicating a bacterial influence on sulfide precipitation.

**Elizabeth Balgord and Michelle Forgette (220)**

Faculty Advisors/Collaborators: **J. Brian Mahoney and Phillip Ihinger**

*Redefinition of the Precambrian Cambrian Contact in Southwestern Montana*

Throughout North America, the Sauk transgression is recognized by a profound nonconformity or angular unconformity between Cambrian clastic strata and underlying Archean or Proterozoic rocks. In southwest Montana, this boundary is defined as the contact between the Cambrian Flathead Sandstone and underlying Middle Proterozoic Belt Supergroup. Detailed mapping and stratigraphic analysis within and west of Devil's Fence Anticlinorium suggests a conformable and gradational contact between rocks mapped as the Belt Supergroup and those mapped as the Flathead Sandstone, which presents a geologic conundrum. If this contact is conformable, 1) rocks mapped as Belt Supergroup have been mis-mapped and are a much younger package of rocks, (Late Proterozoic-Cambrian?), 2) rocks mapped as Flathead Sandstone are actually Middle Proterozoic, 3) the contact is a bedding parallel disconformity separating the two packages of rocks, suggesting southwestern Montana was tectonically inactive for  $>900$  million years (1440-550 Ma). Compositionally, the Belt Supergroup is a fine grained, micaceous, locally hematite stained, coarsening upward sequence of siltstone to quartz arenite. The overlying Flathead Sandstone is a well sorted, subrounded to rounded, fine to medium grained quartz arenite that is strikingly similar to underlying lithologies. Detrital zircon analyses are being used to further constrain this stratigraphic relationship.

**Jacob Boer (185)**Faculty Advisor/Collaborator: **Phillip Ihinger***Geochemistry of The New England Lamprophyre Series: Cross-Comparison of Analytical Methods*

The New England Lamprophyre Suite comprises a series of magmatic intrusions that connects the age progressive Canadian kimberlite lineament spatially and temporally with the New England Seamounts, which track across the Atlantic ocean floor to the active Great Meteor hotspot. The geochemical fingerprint of these low-degree partial melts offers important insights into the nature of their source and the possible link of continental alkalic magmatism to a plume origin. We present trace element data on lamprophyres from Vermont, New Hampshire, and Maine using the XRF and ICPMS techniques available at UWEC. We compare our results to analyses of the same samples performed by XRAL Laboratories in Ottawa, CA, and show that the methods utilized at UWEC to measure REE, HFSE, and LILE concentrations are accurate and reproducible. The concentrations of these trace elements are consistent with the notion that the lamprophyres were derived from the same OIB source as the New England seamounts.

**Giselle Conde and Jenny Sisko (196)**Faculty Advisors/Collaborators: **Phi Ihinger** and **Ellery Frahm**, University of Minnesota*Obsidian Hydration Dating of Archeological Artifacts from the Middle East: Characterizing Compositional Variations of Potential Volcanic Sources*

Archeological artifacts from the Middle East offer important insights into the evolution of early human civilization. The geology of the region surrounding the 'fertile crescent' helped to determine the nature of the artifacts utilized by the local population. In particular, rhyolitic volcanoes in present-day Turkey, Syria, Iraq, and Azerbaijan were the source of obsidian glasses that were manufactured into spear points, scrapers, jewelry, and art objects. Obsidian has long been utilized by archeologists for the study of ancient trade networks for two important reasons: (1) the glasses can be readily sourced to a particular volcanic flow, and (2) the amount of time that has elapsed since the glass was re-worked can be determined by measuring the rim thickness associated with the diffusion of water into knapped surfaces. Here, we present FTIR measurements that document the initial water content of 96 individual flows sampled from rhyolitic volcanoes of the Middle East. As the diffusion rate of the advancing hydration rim is dependent on the initial water content, our results are required for precision dating of the many artifacts that have been recovered from the region. We correlate the observed variations in water content to variations in major and trace element geochemistry.

**Taylor Crist, Bridget Kelly, and Herald Schulz (199)**Faculty Advisor/Collaborator: **Katherine Grote***Monitoring Near-Surface Soil Water Content Using Air-Launched GPR Techniques*

Monitoring soil water content is an important component of responsible resource management. Soil water content is a critical parameter for optimizing agricultural activities, monitoring water quality, and modeling climate change. Conventional methods of measuring soil water content are inadequate to capture the spatial and temporal variability of this parameter or to gather regional-scale data. This research focuses on the potential of air-launched ground penetrating radar (GPR) techniques for rapid, high-resolution water content estimation on a regional scale. In this project, air-launched GPR data were collected over wet and dry soil in a large tank using 250-, 500-, and 1000-MHz antennas. The soil water content was estimated for each frequency using reflection coefficient theory, and the GPR-based estimates were very similar to conventional measurements of soil water content acquired within the tank. This experiment was also used to estimate the depth of penetration of air-launched GPR data, where multi-frequency GPR data were collected over thin layers of soil with contrasting water contents. Analysis of these data showed that the depth of penetration was approximately 9 cm for each of the frequencies tested.

**Michelle Forgette (219)**Faculty Advisor/Collaborator: **J. Brian Mahoney***Examining Cretaceous Strata of the Taylor Creek Group in British Columbia: Potential Connection of the Methow and Tyaughton Basins*

Cretaceous strata around the Chilcotin Plateau of south-central British Columbia are traditionally described as occupying several distinct basins, including the Nechako, Methow and Tyaughton basins. The original geometric relationships between these basins are difficult to reconstruct due to Eocene and Neogene volcanic cover and the presence of a Tertiary dextral transpressive fault system along the southern margin of the Plateau. Reconstruction of the original basin architecture is crucial for accurate assessment of the hydrocarbon potential of Nechako basin strata in the subsurface beneath the Chilcotin Plateau. If it can be demonstrated that strata on Mt. Ts'yl-os are correlative to Jackass Mountain Group (JMG) strata located in the northern synclinorium, then a

Lower Cretaceous link between the Methow and Tyaughton basins can be established. This linkage would significantly expand the known areal extent of Lower Cretaceous strata in the region, which is crucial for accurate assessment of the original basin architecture and hydrocarbon potential. Detailed sedimentologic and stratigraphic analysis are being integrated with ongoing thin section petrography, shale geochemistry (REE and isotopes), palynology, macro- and microfossil studies, and detrital zircon analyses in both these formations to test this proposed stratigraphic correlation.

#### **Lynn Galston (177)**

Faculty Advisor/Collaborator: **Karen Havholm** and **Stephen Hasiotis**, University of Kansas

*Reinterpretation of the Middle Proterozoic(?) Devils Island Sandstone, Keweenawan Rift, Northern Wisconsin*

The Devils Island Sandstone is a quartz arenite that is a late-stage Keweenawan rift-fill deposit. Both it and the stratigraphically equivalent Hinckley Sandstone were interpreted as deposits of a shallow lacustrine environment. Further study of sedimentary structures in the Hinckley Sandstone, which include adhesion structures, indicates a depositional environment ranging from fluvial to eolian dune and interdune. This revised interpretation of the Hinckley Sandstone necessitates re-evaluation of the Devils Island Sandstone. Four out of five facies identified in the Devils Island Sandstone are similar to facies within the Hinckley Sandstone: tangential cross-strata, trough cross-strata, sandy planar bedding, and convolute bedding. These suggest a similar fluvial and dune-interdune environment as the Hinckley Sandstone. The fifth facies – silt-bearing planar bedding - contains laterally continuous, thinly laminated fining upward sequences containing silt-sand couplets. This facies indicates a subaqueous environment with fluctuating energy, possibly lacustrine. At one locality trace fossils are present including 1) sinuous and Y-branching, cm-wide, meandering traces, and 2) sub-mm to mm-scale sinuous trails that overlap and cross over larger traces. Identification of trace fossils within the Devils Island Sandstone could either serve to constrain its age to Late Proterozoic, rather than Mid-Proterozoic, or provide rare evidence of Mid-Proterozoic multicellular life.

#### **Anne Gauer (216)**

Faculty Advisor/Collaborator: **Geoffrey Pignotta**

*Geochemical Correlation of Coeval Volcanic and Plutonic Rocks from the Incrementally Emplaced Jackass Lake Pluton, Sierra Nevada Batholith, CA*

The Jackass Lake Pluton (JLP) is located in the central part of the Sierra Nevada batholith, CA. U/Pb geochronology indicates that the pluton crystallized ca. 98 Ma. The JLP is characterized as a suite of intrusions that range in composition from quartz diorite to leucogranite with granodiorite the dominant composition. The suite of intrusions was emplaced as individual increments during construction of the JLP. The JLP intrudes only slightly older metamorphosed volcanic rocks also dated at ca. 99 Ma. These coeval volcanic rocks are andesitic to rhyolitic in composition. Thermobarometric data indicates the depth of emplacement for the JLP is ~3 kbars, which suggests that the metavolcanic rocks the JLP intrudes needed to be buried to depths approaching 10 km. Major and trace elemental data is used to characterize both the plutonic and volcanic suites. Trends in our geochemical data suggest that the metavolcanic suite is geochemically related to the primary JLP suite. The correlation between these plutonic and metavolcanic suites is shown through similar trends in fractional crystallization and differentiation patterns. We suggest that the sources of the metavolcanic rocks are JLP increments and rapid vertical displacement allowed JLP magmas to intrude their own volcanic cover.

#### **Alex Guy (202)**

Faculty Advisors/Collaborators: **Phillip Ihinger** and **J. Brian Mahoney**

*Geochemistry of the Elkhorn Mountains Volcanics: Insights into Late Cretaceous Magmatic Evolution of Southwestern Montana*

The Elkhorn Mountains volcanics (EMV) of southwest Montana comprise Late Cretaceous andesitic to rhyolitic tuffs and flows that are adjacent to and coeval with the Boulder batholith (Bb) and its satellite intrusions (Si). The Boulder/Elkhorn magmatic system represents a significant outpouring of calc-alkaline magmas displaced well inland of earlier arc magmatism in North America, such that placement within a traditional tectonic framework is not well understood. The magmatism is synchronous with thin-skinned deformational features that mark the initiation of a new enigmatic phase of structural evolution of North America. We have undertaken detailed mapping and geochemical studies to investigate the relationship between the deformation and magmatism of the region. EMV geochemistry is distinguishable from Bb intrusions as well as from earlier, 'classic' continental arc magmatic suites. In particular, the variations in composition are similar to Si and overlap the more restricted ranges observed within Bb. When compared to the geochemistry of the earlier North American arc suites, the Boulder/Elkhorn magmas are enriched in K<sub>2</sub>O, Rb, Ba, Pb, Ce, Zr, La, and Nb, but are depleted in Na<sub>2</sub>O compared to their western cousins, thus signifying a more prominent role for hydrous fluids and/or phlogopite in their source region.

**Brennan Kadulski, Anna Baker, Anne Gauer, Bridget Kelly, Crystal Nickel, Elizabeth Teutschmann, and Elizabeth Balgord (218)**

Faculty Advisors/Collaborators: **J. Brian Mahoney, Lori Snyder, and Robert Hooper**

*Geologic Evolution of the Argentinean Andes*

Over the past 2.1 Ga the western margin of South America has been subjected to a series of distinct orogenic events. Western Argentina is underlain by several northeast-trending terranes including , from east to west, the Sierras Pampeanas, Precordillera, Cordillera Frontal, Cordillera Principal, and the Cordillera De La Costa. The following table synthesizes the significant geologic events, style of formation, and ages of orogenesis.

Orogenesis	Significant Geological Events	Style	Age
Pampean Orogeny	Ophiolite obduction, crustal thickening and uplift, high grade metamorphism	Terrane collision	600-520 Ma
Famatinian Orogeny	Famatinian Arc, Cuyania composite terrane, and the Chillenia terrane	Terrane collision	495-470 Ma
Gondwanian Orogeny	Final amalgamation of supercontinent Gonwana extension related volcanism	Terrane collision	354-290 Ma
Mesozoic orogenesis	Continental arc volcanism, accretionary wedge	Andean Style subduction	150 Ma - present
Current Andean uplift and subduction	Fold and thrust belt, segmentation of Nazca plate	Andean style subduction	23.8 Ma – still active

Ongoing field research, including construction of detailed cross sections, will further define tectonic events and refine the evolution of the Argentinean Andes.

**Adam Krieger and Brooke Fahrenkrog (204)**

Faculty Advisor/Collaborators: **J. Brian Mahoney and Robert Hooper**

*Trace metal distribution within the fluvial levee samples in the Coeur d'Alene River, Idaho*

Extensive lead, silver, and zinc mining in the Coeur d'Alene River Valley, Idaho during the late 1800s - mid 1900s produced mine tailings that were reworked downstream by fluvial processes. Mine tailings containing lead, iron, arsenic, cadmium, silver, copper, zinc, antimony and mercury have been redistributed in levee, lacustrine and wetland environments. Environmental remediation requires accurate assessments of trace metal distribution within sediments. Our study focuses on oxidized sediments from river levees near Cataldo and Swan Lake. Sequential Extraction and Scanning Electron Microscope techniques are used to evaluate the distribution of manganese, iron, copper, zinc, silver, cadmium, antimony, lead, and arsenic. Vertical geochemical patterns suggest the levee is periodically recharged with sulfide tailings during floods. As sulfide minerals are oxidized, they release sulfuric acid and a wide range of trace metals. Preliminary results indicate manganese and iron resulting from carbonate (siderite:  $(\text{Mn,Fe})\text{CO}_3$ ) dissolution form iron and manganese oxide crusts that readily incorporate and bind other metals such as copper, zinc, cadmium, silver, and lead. These oxide crusts are fine grained and the metals are relatively bioavailable with small changes in the geochemical environment. Arsenic and antimony are bound in very resistant, coarse grained detrital minerals and have low bioavailability.

**Shane Peterson, Michelle Forgette, Bryan Hardel, Julia Potter, Phil Larson, Taylor Crist, and Heidi Stanek (217)**

Faculty Advisor/Collaborator: **J. Brian Mahoney**

*Synorogenic Basin Evolution in the Cordillera Frontal, Argentina*

The Argentinean Andes between 20° – 35° S latitude consists of a series of accreted terrains sequentially added to the western margin during the past 600 Ma. The continental margin has been substantially modified by the interaction with the strongly segmented Nazca Plate. North of 34° S, the subducting slab has a shallow dip that

produces elevated shear stress at the base of the continental crust, leading to distinctive block uplifts in the Sierra Pampeanas, referred to as the “broken foreland.” South of 34° S, the subducting slab has a steep dip (35°), resulting in a normal subduction regime with a well defined volcanic arc flanked by forearc and backarc basins. Contraction in the backarc region has led to synorogenic basin development associated with the Aconcagua Fold and Thrust Belt (AFTB). The evolution of these Miocene basins has been documented by detrital zircon suites collected throughout the Mendoza region. Detrital zircon analysis reveals a sequence of events that document the eastward propagation of the AFTB. Age constraints from these zircons illustrate the synorogenic chronology of structural deformation and basin evolution beginning in the early Miocene.

### **Julia Potter (203)**

Faculty Advisors/Collaborators: **J. Brian Mahoney, Jill Ferguson, and Lori D. Snyder**  
*Detailed Geochemical Analysis of the Valle Group Forearc Basin, Baja California, Mexico*

The Valle Group represents the forearc basin associated with the Peninsular Ranges Batholith in Baja California, Mexico. The basin is primarily composed of Aptian to Eocene deep marine sediments and can be divided into three sub-basins; the northern and southern Vizcaino Peninsula basins and a sub-basin on nearby Cedros Island. Samples have been collected from both sub-basins located on the Vizcainos Peninsula and detrital zircon analysis has linked the sediments to the plutons of the Peninsular Ranges Batholith. However, detrital grain studies fingerprint primarily coarse grained plutonic rocks. Volcanic arc systems contain volcanic, ophiolitic, and sedimentary rocks that produce fine grained detritus that may form an important component of source rock, but are invisible to single grain samples. Rare earth element (REE) and isotopic studies more accurately record the heterogeneity of provenance and assist in reconstructing the geologic evolution of an area. Preliminary Valle Group data shows a relatively homogeneous Albian to Eocene volcanic arc source (La/Yb = 6-13; LREE = 100x chondritic). However, modern sediments draining the ophiolite complex show distinctly primitive (La/Yb = 3; LREE = 10x chondritic) REE geochemistry, suggesting the ophiolite was not exposed during Cretaceous time. Further geochemical analysis will provide a more accurate assessment.

### **Heidi Stanek (205)**

Faculty Advisor/Collaborator: **Geoffrey Pignotta**  
*Geochemical Characterization of Magma Source(s) and Compositional Variation within the Incrementally Emplaced Jackass Lakes pluton, Sierra Nevada batholith, California*

Previous field research in the Jackass Lakes pluton described this ~98 Ma intrusion as being emplaced as a series of magma increments. Increments were distinguished in the field through examination of mineralogical and textural variations within mappable intrusive bodies. Compositions in the pluton vary from diorite to leucogranite. Compositional diversity and the presence of apparent hybrid magmas in incrementally emplaced systems may reflect source variability, emplacement level mixing or fractional crystallization. The degree of mixing and therefore the geochemical signature of a magma increment may reflect both end-member magma mixing and hybrid end-member interaction. This study examines a suite of 52 samples that represent all described plutonic units within the pluton. Examination of major and trace element data combined with petrographic observations characterize end-member source(s) and the role of magma mixing versus fractional crystallization in generating mapped hybrid units. Our data show that mappable end-member units have distinct geochemical signatures and hybrids typically plot between end member units. Our geochemical interpretation is analyzed using existing maps to determine any spatial relationships that exist between end member and hybrid units.

### **Emilia Teige (181)**

Faculty Advisor/Collaborator: **Bianca Pedersen**  
*Mapping of Spring Discharge into Lake Altoona*

Lake Altoona is located in the northeast section of the city of Altoona. It is approximately 800 acres in area (~3.24Km<sup>2</sup>) and has its own community surrounding it. There is also a county park located on the south side of the lake that offers a boat landing, small playground, and a beach which hosts shows for Eau Claire’s ski team. The purpose of this study is to better understand the sources of pollution into the lake. Large algae blooms serve as evidence for excess nutrients entering the lake. Though the majority of the nutrient pollution is suspected from non-point source agricultural run off entering the lake from the Eau Claire River, a portion could be attributed to domestic sources such as leaking septic systems. The septic systems would leak into the groundwater. This project focuses on the location of springs and mapping them using ArcGIS-ArcMap. Several springs have been detected and locations recorded using GPS (Trimble PRO XH). The presence of these springs going into Lake Altoona suggests that there is a connection to the groundwater.

**Andrew Thompson (182)**Faculty Advisor/Collaborator: **Kent Syverson***Evidence for a Calving Embayment in the Penobscot River Valley, Bangor, Maine*

The Penobscot River valley is in an area of coastal Maine deglaciated approximately 13,000 years ago. Sediment evidence shows sea-water depths ranging from 0 to 100 m in the valley during deglaciation. According to Lowell (1994), a calving embayment did not develop in the Penobscot valley because the deep-water area was too narrow, but this has been disputed. We mapped ice-flow indicators to seek evidence for convergent ice flow representing a former calving embayment near Bangor, Maine. We measured the orientations of 43 crag-and-tail features showing unique flow directions. Ice flowed to the south ( $175^\circ$  azimuth) during the oldest event (flow maximum) throughout the map area. West of the Penobscot River, ice flow became more easterly ( $100^\circ$  azimuth) as deglaciation proceeded. To the east, ice flow became westerly ( $280^\circ$  azimuth) into the river lowland. An area within the initial embayment should only record glacial erosion marks from the ice-flow maximum. Major changes in flow direction caused ice-flow convergence as close as 1 km east and west of the Penobscot River. Thus, it appears that a relatively narrow calving embayment (<2 km wide) must have existed in the Penobscot valley near Bangor.

## Geology and Physics and Astronomy

**Joseph Myre (176)**Faculty Advisors/Collaborators: **Philip Ihinger**, Geology, and **Paul Thomas**, Physics and Astronomy*Finite Element Modeling of Fluid and Heat Flows*

We present the results of three simulations of problems featuring the flow of fluid and heat using the finite element code Elmer. These problems represent the development of a computational capability at UW-Eau Claire that will support the experimental work of the Materials Science Center. Extensive comparisons of the numerical simulation results to analytical solutions will be shown.

## Mathematics

**Gregory Beranek (225)**Faculty Advisor/Collaborator: **James Walker***New Methods in Color Image Compression*

We develop a lossy and lossless compression method for color images based on the WDR and ASWDR methods for grey-scale images. New techniques are needed for handling the complexity of color images.

**Jacqueline Christy (224)**Faculty Advisor/Collaborator: **James S. Walker***A New Method of Cryptography*

We have developed a public encoder, and a private decoder, for encrypting messages. The new method we used is based on randomly altering wavelet transform values of the plain text message.

**Frank Emmert (117)**Faculty Advisor/Collaborator: **Mohamed Elgindi***On the Computation of Elongational Viscosity-Shear Rate Temperature Master Curves for Polymeric Liquids*

In a typical deformation, a polymer melt deforms in both shear and elongation. Material resistances to shear and elongation are known respectively as shear viscosity and elongational viscosity. The extrusion of a polymer involves significant elongational flow. In the processing of a polymer beyond extrusion, as in film casting or film blowing, elongational viscosity of the material is more dominant than shear viscosity. Therefore, the velocity, pressure and temperature fields predicted by a constitutive equation which does not take into account elongational effects can have large errors. A more accurate simulation of the flow in an extrusion die requires the use of a constitutive equation which captures the effect of the elongational viscosity as well as the shear viscosity of the extruded polymer. The purpose of this paper is to use experimental data to develop a suitable constitutive equation which captures both shear and elongational apparent viscosities of the polymer under consideration.

**Alex Larsen and Tyler Tallman (125)**Faculty Advisors/Collaborators: **Shyam Chadha** and **Veena Chadha***A Generalized Linear Fractional Program*

A linear fractional functional programming problem seeks to optimize a given ratio of two linear functions of non-negative variables over a set of linear inequalities constraints. Problems of this type are found in various business and industry contexts. Many variants of the simplex algorithm have been proposed for solving this class of problems. This project presents an algorithm for solving a linear fractional functional programming problem when the coefficients of an activity are made to satisfy a system of linear inequalities. To arrive at the desired solution, two types of problems, linear fractional programming, and linear programming problems need to be solved.

**Mitch Phillipson and Yunyun Yang (137)**Faculty Advisors/Collaborators: **Simei Tong** and **Alex Smith***Introduction to the Busemann-Petty Problem*

Posed in 1956, the Busemann-Petty problem asks the following question. Let  $K$  and  $L$  be origin-symmetric convex bodies in  $\mathbb{R}^n$  so that the  $(n-1)$ -dimensional volume of every central hyperplane section of  $K$  is smaller than the same for  $L$ . Does it follow that the  $n$ -dimensional volume of  $K$  is smaller than the  $n$ -dimensional volume of  $L$ ? In this poster we display our understanding of the analytic methods used to solve the Busemann-Petty problem and detail related open questions.

**Jessica Porath (136)**Faculty Advisor/Collaborator: **Don Reynolds***Markov Chains and Student Academic Progress*

With data obtained from enrollment records, absorbing Markov chains are used to model the academic progression of students attending the University of Wisconsin-Eau Claire over a specific period of time. Useful statistics, such as, the percentage of students who started at University of Wisconsin-Eau Claire as a freshman and ultimately graduated from University of Wisconsin-Eau Claire, and the expected amount of time it takes a student to do so, are derived from the Markov model. With this information, the university may more accurately measure the academic progress of its students, and thus better reflect on its own institutional effectiveness.

**Eric Weber, Chris DeCleene, and Mitch Phillipson (126)**Faculty Advisor/Collaborator: **Michael Penkava***Classification and Deformations of Two Dimensional Infinity Algebras*

Infinity algebras are generalizations of associative and Lie algebras. They play a role in both mathematics and mathematical physics. We study low dimensional examples of these algebras, and classify the non-isomorphic structures. Deformation theory is concerned with how one structure smoothly changes into another structure, and the object of studying the deformations is to understand how the space of all such structures is glued together. In physics, deformations arise because the algebra of quantum mechanics is a deformation of the algebra of the phase space of classical physics. In mathematics, one is interested in the structure of the space of algebras, which is called a moduli space. We present some examples of low dimensional moduli spaces of algebras, and show how the deformations give a picture of these moduli spaces.

## Mathematics and Computer Science

**Mitch Phillipson and Tanya Smeltzer (124)**Faculty Advisors/Collaborators: **Simei Tong**, Mathematics and **Mike Wick**, Computer Science*Optimal Evacuation Plan for Emergency Situations*

Having an efficient evacuation procedure is critical for saving lives in emergency situations such as floods, chemical explosions or fires. This project allows emergency management officers to better access necessary information such as minimum time, number of vehicles, which shelter and which road should be taken for evacuation in an emergency situation. Since 2005, after the Hurricane Katrina disaster, we have created a model to distributed sandbags during a flood in Dane County and an evacuation model for Owen city in Clark County. Building on previous work we enhanced our model with the use of technology to incorporate advanced mathematical algorithms. We combined shortest paths algorithm in Graph Theory and the Simplex method in Operations Research to obtain the optimal solution. Our computer software absorbed these new mathematical results and displayed them in a user-friendly interface so that emergency management officers can utilize our

findings to operate an optimal evacuation plan for emergency situations. Our result will be used in Taylor County where 21,312 rail cars carrying dangerous goods pass through the village of Gillman each year and in Jackson County where floods are constant threats. Our model is applicable to all counties in the state of Wisconsin.

## Physics and Astronomy

### **Katherine Bilty (146)**

Faculty Advisor/Collaborator: **Nathan Miller**

*Examining Chandra X-ray Images of Stellar Sources in the Carina Nebula*

As part of a collaboration formed to study the X-ray emission from hot stars, we have obtained X-ray spectra of two O-type stars (HD 93129 and HD 93250). In addition to the high-resolution spectra that were the focus of the collaboration, this data set contains a number of direct X-ray images of other hot stars in the Carina Nebula complex. It is the goal of this present study to investigate the properties of these direct images and see what can be learned from them. Each star of the two main stars were observed multiple times with different instrument orientations, so our first goal was to combine all of the images for each star into a single master image. We constructed an "exposure map" which visually describes the measured sensitivity of different regions of the cluster. We placed circular regions around all the detected stellar sources and attempted to identify which stars they corresponded to in the visual band. We then measured the properties of the photon counts within each region and compared their X-ray properties with the properties of the stellar sources in other bands, if known. We acknowledge the support for this project through a Blugold fellowship.

### **Ryan Gengler (155)**

Faculty Advisor/Collaborator: **Lyle Ford**

*Tidal Effects on the Oort Cloud*

The Oort cloud is a collection of cometary bodies orbiting far from the Sun. The cloud is large enough that a tidal force from the Milky Way could impact their orbits. We simulated an early stage solar system to see the effect of the tidal force. We then compared the results to earlier simulations that were done without tides. The results show that for accepted values of the mass distribution in the galaxy, the tidal force has very little effect on the orbits of the comets over a time of one billion years.

### **Patrese Hoffman (156)**

Faculty Advisor/Collaborator: **Lyle Ford**

*Simulations of the Interaction of a Binary System with a Third Star*

A celestial binary system was simulated to analyze how its orbit is disrupted by a third body passing through the center of the system at various angles in the x-y plane. The two initial bodies had masses that were one half and one and a half times that of the sun. The third body had a mass equal to that of the sun. The degree to which the binary system was affected by the third body was strongly dependent on the angle of approach of the third body.

### **Jonathan Jay (165)**

Faculty Advisor/Collaborator: **Kim Pierson**

*Investigation of Recently Developed Photovoltaic Material*

Experiments have been performed to investigate an inexpensive method to create photovoltaic (solar) cells. The initial technique was found by accident while performing experiments on another topic. The conditions under which the photovoltaic cell was produced are quite unique. The research project involved recreating the conditions of the accident and attempting to develop the accident into a reproducible technique that may have applications in a commercial process to produce low-cost solar cells. Results indicate that by adjusting the experimental parameters the efficiency can be altered over two orders of magnitude. This means that increases in efficiencies are possible but unfortunately, the efficiency is not yet equal to commercially available cells.

### **Andrew Johnson (135)**

Faculty Advisor/Collaborator: **Nathan Miller**

*Analyzing the Lack of X-ray Production in Wolf-Rayet Winds through Computational Modeling*

Using the Spect3D program developed by Prism Corporation, we have developed spherically symmetric, non-local thermodynamic equilibrium models of time independent wind flows to analyze the weak X-ray production in Wolf-Rayet stellar winds. Shock formation in the wind, and its known contribution to the production of X-rays in

the spectrum of massive stars, is incorporated into our models as the X-ray producing mechanism. The Wolf-Rayet models are compared to models of non-evolved OB stars in which we draw the conclusion that Wolf-Rayet winds possess significantly higher opacities in the X-ray band. Through our conclusion, we suggest that X-ray production is still likely in Wolf-Rayet winds, but high mass loss rates of the star prevent appreciable escape probability for X-rays.

**Kayla Lorenzen and Sarah Ulrich (145)**

Faculty Advisor/Collaborators: **Lyle Ford** and **George Stecher**

*Rotational Periods of Asteroids 2167 Erin and 1084 Tamariwa*

Using data gathered on 20 March 2007, 3 August 2007 and 4 August 2007 from a 0.6-m telescope located at Hobbs Observatory near Fall Creek, Wisconsin, the rotational periods of asteroids 2167 Erin and 1082 Tamariwa were found. Measurements were made in R and V filters and Landolt standard stars were used to find transforms, first order extinction coefficients and nightly zero point values. The standardized magnitudes of the asteroids were then determined. Our measurements indicate a period of  $6.22 \pm 0.03$  hours for 1082 Tamariwa. When our measurements were combined with those of another group a period of  $5.7186 \pm 0.0001$  hours was determined for 2167 Erin.

**Andres Santiago Padron (166)**

Faculty Advisor/Collaborator: **Kim Pierson**

*Multi-Parameter Investigation of Ar<sup>+</sup> Ion Bombardment of Ag/Cu Alloys*

This project fits into the general area of low-energy ion bombardment modification of the surface structure of bulk metals and metallic alloys. The results have fundamental science and engineering technology applications. Low energy argon ion bombardment (100 to 1500eV Ar<sup>+</sup>) of Ag/Cu alloys as a function of component composition, sample temperature, ion current density, ion dose, and ion energy has been completed. Results indicate that the surface topography development is a strong function of temperature and depends to a lesser extent on ion energy, ion dose and ion current density. The surface at low temperature, low ion dose and/or low ion current density is flat and faceted with widely dispersed large conical structures. As the temperature is raised, the rate of surface diffusion of Ag increases faster than that of Cu and Ag begins to coat the Cu grains, thereby decreasing the subsequent erosion of the Cu. The surface erosion rate is related to the growth of surface topography and the recapture of ejected material onto the sides of surface features. A method of increasing the thermal conductivity between the sample and holder using graphite colloid was found to affect the surface topography growth and Auger electron spectroscopy profiles.

## **Physics and Astronomy and Computer Science**

**Colin Karpfinger (223)**

Faculty Advisors/Collaborators: **George Stecher**, Physics and Astronomy, and **Daniel Stevenson**, Computer Science

*Computer Vision + Paintball: A Real-Time Autonomous Sentry Gun*

Real time image processing is computationally intensive, which has limited its use in the past. However, with the advent of fast small efficient processors, computer vision has emerged as an effective method in many applications, especially in areas requiring real-time response. Our product is a self-contained autonomous sentry that can effectively track and fire upon targets in the game of paintball. The software includes motion and color tracking methods, as well as path prediction algorithms. Notable achievements include accurate system calibration (despite wide angle lens distortion, and non-linearly scaling motors) and the fast response time of the system. Software is written in C++ using Intel's OpenCV computer vision library, and was developed for Linux platforms.

## Public Health Professions and Biology

### Jay Nielsen (101)

Faculty Advisors/Collaborators: **Crispin Pierce**, Public Health Professions, and **Sasha Showsh**, Biology  
*Antibiotic Resistance in Agricultural Soils Treated with Septic Effluent*

Antibiotics are widely found in wastewater, and recent studies have found bacteria that consume antibiotics as a nutritional source. This work aimed to determine whether soil bacteria develop antibiotic resistance as a result of septic effluent treatment ("land spreading"). Thirty samples each from control and treated sites were assessed for resistance to tetracycline, erythromycin, ampicillin, and chloramphenicol.

## Public Health Professions and Geology

### Jay Nielsen, Celina Cooper, Patricia Krug, and Amy Zagar (120)

Faculty Advisors/Collaborators: **Crispin Pierce**, Public Health Professions, and **Jill Ferguson**, Geology  
*Measurement and Causes of Heavy Metals in Children's Hair*

Measurement of chromium, arsenic, lead, and mercury in children's hair provides a non-invasive approach to limiting exposure to these toxic substances. This work compares levels of these metals in 27 hair samples taken in an urban setting to 40 samples from a rural community. Individual sample measurements are related to housing conditions, diet, and hobbies and other activities.

## GRADUATE STUDENTS

### Biology

#### William Hintz, Matthew Faust, and Mitch Banach (149)

Faculty Advisor/Collaborator: **David Lonzarich**

*The Effects of Group Size and Microhabitat on the Behavior of Juvenile Coho Salmon*

Coho salmon *Oncorhynchus kisutch* are native to the Pacific coast region but were introduced into the Lake Superior drainage in the late 1960s and established natural reproductive populations by 1970. Little is known about the behavioral differences between introduced and native range populations. In the summer of 2007 we conducted a field study on the Onion River in Bayfield County, Wisconsin to determine the effect of group size on foraging behavior and aggression. We also examined microhabitat use as a function of coho ontogeny throughout the summer. We found individuals in intermediary group sizes fed on average 1.3 times/min. more than conspecifics in other group sizes. No relationship was found with regard to aggression. Over the course of the study microhabitat analysis suggests as fish age the distance to cover (DTC) correlated positively to group size. We also found a positive relationship between group size and depth. Velocity, substrate, and distance to bank did not have any significant effects on the distributions of group sizes. We are confident our results will contribute significantly to the ongoing need to document the behavior of introduced populations of coho salmon in the Lake Superior drainage.

## Geology

### **David Fairbairn (150)**

Faculty Advisor/Collaborator: **Bianca Pedersen**

*Investigation of Trace Metals for Distinction of Pollution Sources to Lake Altoona, West-Central Wisconsin.*

This research is investigating the use of trace metal analysis in determination of relative inputs to surface water from agricultural and domestic sources. Trace metal analysis using HR-ICPMS is being conducted on water samples from Lake Altoona, spring inflows to Lake Altoona, and sites up and downstream from Lake Altoona on the Eau Claire River. The hypothesis is that analysis will show differences in metal concentrations among the samples. If results show that this is the case, examination of differences may reveal the influence of domestic wastewater and/or agricultural runoff as factors influential in this variation, suggesting the potential validity of the use of trace metal analysis for the characterization of surface water inputs. Septic system effluent that does not meet recommended standards of treatment can be an important source of input of nutrients, detergents, and other chemicals of environmental health concern. Understanding these types of inputs is a key factor in understanding lake health and water composition from both ecological and environmental health standpoints.

## History

### **Mathew Foss (110)**

Faculty Advisor/Collaborator: **Jim Oberly**

*Between Fences in Northwest Wisconsin: from left to right and deep to center*

In researching the area of northwest Wisconsin for the Wisconsin Humanities Council in conjunction with the Clear Lake Historical Society for their hosting of the Smithsonian's traveling exhibit entitled "Between Fences" I learned something interesting about the region. This vast but lightly populated area boasts three successful professional baseball players. Burleigh Grimes, Andy Pafo, and Jarrod Washburn have all made a name for themselves in the sport of baseball, but also lend something to the topic of "between fences." Between Fences is an exhibit about the use of land over time in America. What's a better way to use land in America than to play baseball? Not only do these three men's talents and fame represent the good people of northwest Wisconsin, but they also represent the use and enjoyment of the land they come from.

## Human Development Center

### **Sara Hoffman (130)**

Faculty Advisor/Collaborator: **William Frankenger**

*Special Education Teachers' Perceptions and Familiarity of Response to Intervention*

The traditional IQ-achievement discrepancy model is soon to be replaced by a new model, known as Response to Intervention (RtI). With this change in our educational framework will also come a change in the role and function of all teachers. Of particular interest are the perceptions special education teachers hold towards the implementation of RtI. The purpose of this study was to gather data regarding how elementary level special education teachers in Wisconsin view the RtI model. Three specific areas of interest in this study focused on (1) determining the impact of the changing role and function of special education teachers in the wake of RtI, (2) identifying special education teachers' attitudes and perceptions towards RtI implementation, and (3) determining special education teachers' assessment of whether special education students will be served more or less effectively under RtI.

### **Andrea Privratsky (129)**

Faculty Advisor/Collaborator: **William Frankenger**

*Teacher Attitudes on the Use of the Responsive Classroom Approach*

This study examined the effectiveness of the use of the Responsive Classroom (RC) approach at a Northern Minnesota School District. Assessment of effectiveness was based on rates of attendance, academic achievement, and referrals for problem. The study also examined teacher knowledge and attitudes related to the

use of the RC approach in the areas of frequency, utility and effectiveness. Current research has focused on the use of the Responsive Classroom approach within primarily urban populations. The current study examined the use of the Responsive Classroom approach within a rural school comprised of a 90% or greater American Indian population.

## Information Systems

### **Piyush Gupta (112)**

Faculty Advisor/Collaborator: **Bruce Lo**

*Consumer Preferences in Cyberspace - A Comparison of Top Ranking E-Commerce Websites in Nine Countries*

The objective of this research is to provide global advertisers a comparison of the top 100 website ranking lists across the globe to assist them in finding out how to maximize the appeal of their global e-business to consumers in cyberspace. To achieve this we have attempted to analyze the commonality and differences among these country-based website ranking lists. A critical issue faced by the e-advertisers and e-business professionals is which websites offer highest reach to target audience and maximize sponsors' benefits. However, website rankings of various countries usually have a large number of country-specific websites. The global ranking also offers order of various websites worldwide; however it might not be the same for a particular nation. With this objective, we have statistically analyzed ranking of websites globally and compared it with ranking across a pool of diverse nations. The countries considered for analysis included USA, Mexico, United Kingdom, Germany, France, India, Pakistan, Indonesia, Japan and China. This research focuses on three specific metrics, membership concordance, rank correlation, and rank discordance.

## Nursing

### **Katherine German (131)**

Faculty Advisors/Collaborators: **Lee-Ellen Kirkhorn** and **Susan Moch**

*The Power of Thinking Without Even Thinking: An Examination of Prejudice Among Registered Practicing Nurses*

While much of nursing practice emphasizes the process and possible outcomes of care, there is a dearth of research about the agent who is administering that care - the personal response of the registered nurse to various alterations in health. The concept of prejudice is examined from the perspective of the registered professional nurse. Although a knee-jerk reaction to a host of public health problems may run the gamut of emotional response from moral repugnance to glee depending upon the situation, graduate students at the University of Wisconsin-Eau Claire participate in a nursing course designed to evoke critical thinking about their own human responses to a vast array of human conditions. Students are asked to apply theory to understand their personal responses to the suffering of others. Using examples drawn from personal experience in nursing, graduate students are asked to think about their own biases. Some examples, such as community response to new immigrants, reveal almost no research into the impact of social prejudice upon care. The educational strategy and evidence base we have used in our course, the IAT, examples of student presentations, and implications for nursing practice and research will be presented.

## Psychology

### **Amy Nylund (132)**

Faculty Advisor/Collaborator: **Marie Crothers**

*An Evaluation of Transition Planning for High School Students with Emotional and/or Behavioral Disorders*

This study examined the views of high school students with Emotional and/or Behavioral Disorders (EBD) regarding the effectiveness of services provided by their school to help them prepare to transition from the school environment to post-school life, and their self-reported readiness for this transition. Thirty-four participants completed the Transition Planning Inventory (Clark & Patton, 1997) and answered questions about school services and plans after high school. Students reported high levels of competency across nine skill areas. One in five students indicated that more college preparation and greater class selection to match with individual interests would improve school transitioning services.

# Special Education

**Laura Johnson (111)**

Faculty Advisor/Collaborator: **Rose Battalio**

*Expanding Boundaries: The Impact of the Special Education in Scotland Program*

Special Education (SPED) in Scotland was a six-week study abroad program where pre-service special education teachers lived with host families and observed in Scottish schools in the area of special education. The program included taking a class in the area of Emotional Behavioral Disabilities and traveling. This study sought to determine the impact of SPED in Scotland on students' intercultural awareness, self-efficacy in educational practices, and awareness of global interconnectedness. Participants took the Intercultural Development Inventory (IDI) before departure and after their return from Scotland. Most participants remained at the same level of intercultural sensitivity after the program. Three participants moved to a more culturally sensitive view of cultures. In addition, participants reflected using weekly journal prompts which were analyzed using Grounded Theory approach. Three stages emerged from the data: (a) observation, (b) reflective awareness, and (c) life change. These stages were present across four domains: culture, education, homestays, and travel. Prior experiences and personal characteristics appeared to impact a person's movement through the stages. Emotional expressions at times of program transitions were also found throughout the weekly entries. A follow-up focus group determined that many reflective awarenesses and life changes were still present in the students' lives.

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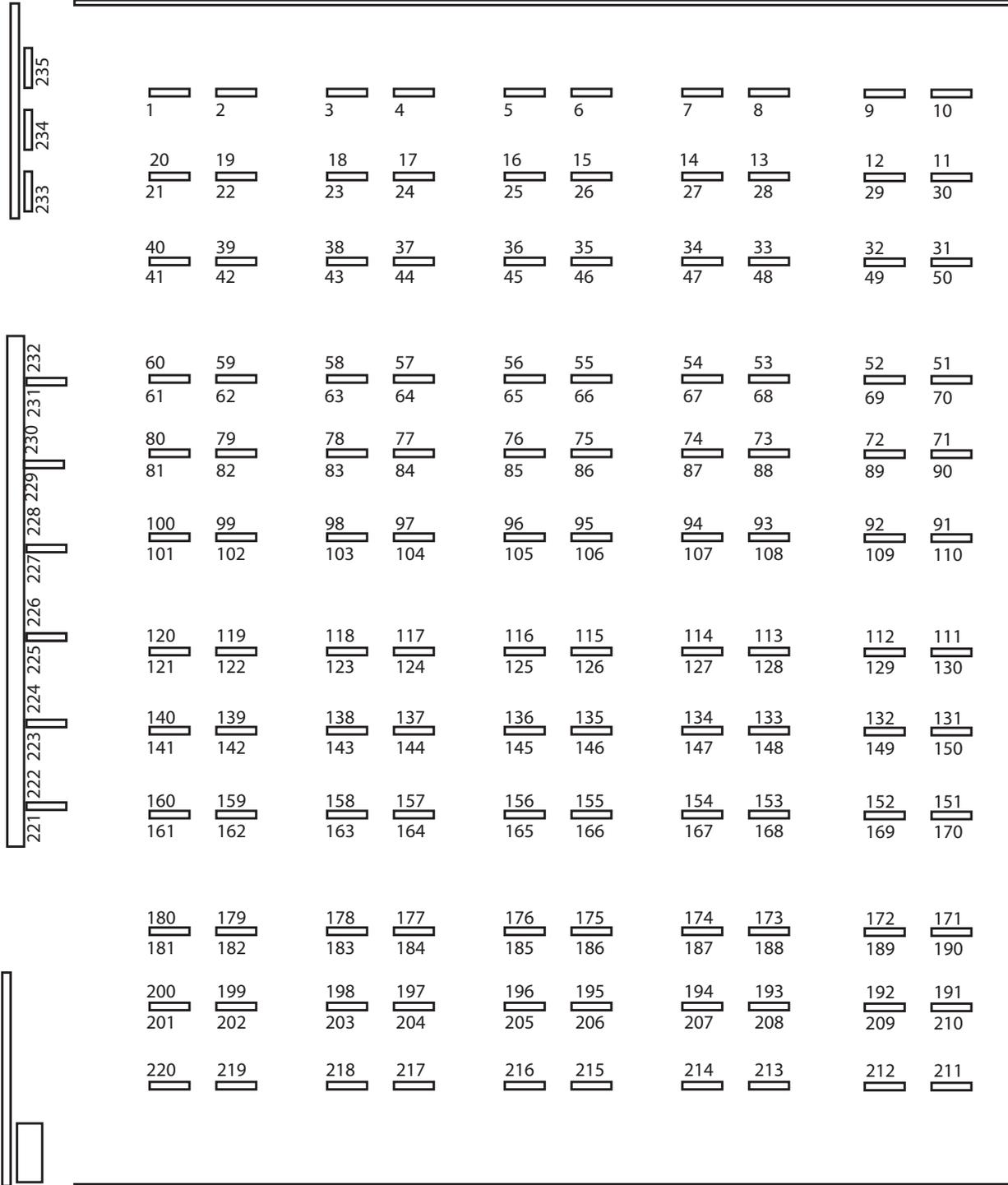
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# Map of Zorn Arena

To Footbridge



Parking Lot and Campus Mall



Brewer Hall



Garfield Ave

Hibbard Hall