19th Annual

Celebration

Of Student Research, Creative Works
And Academic Service Learning

Thursday, April 10, 2014
Learning Resources Center

Northern Michigan University

Sponsored by the Offices of Academic Affairs and
Graduate Education and Research
Welcome to the 19th Annual Celebration of Student Research, Creative Works and Academic Service Learning. This symposium celebrates the scholarship and creativity of both undergraduate and graduate students. All students are welcome to participate and showcase their work. In this program, entries are listed in alphabetical order by last name of the submitter in group (more than one student) and individual categories. Posters and art will be on display in the concourse and presentations will be held in Room 235B. Thank you for supporting the exceptional work of these students and their advisors with your attendance and participation in this event.

9 a.m. Opening Ceremony
LRC Room 235B

Welcome
Brian D. Cherry, Assistant Provost of Graduate Education and Research
David S. Haynes, President

Technology Innovation Award for Students Winners
Michael Kowalczyk, Assistant Professor, Mathematics and Computer Science
Chair of Educational Technology Resources and Policy Committee

Charles Morey – Aviation Maintenance Technology
Project Title: Aircraft Engine Overhaul
Faculty Advisor: Keith Norton

Sophia Thomas – Art and Design/Human Centered Design
Project Title: Formalist Study of the Abstractions of Communication and Language
Faculty Advisor: Brian Kakas

Celebration of Student Research, Creative Works and Academic Service Learning
Recognition of First Place Poster Display Winners

Posters were judged on Wednesday, April 9
First, Second and Third place ribbons were awarded in each category:

- Undergraduate students
- Graduate students
- Group (more than 1 student)
9:30 a.m.  Using Object Oriented Program Design in a Monte Carlo Particle Simulation  
Matthew Trefilek, Freshman, Physics - Computer Science  

9:45 a.m.  Impact of a Diversity Conference on University Curriculum, Recruitment, and Accreditation Efforts  
Christine Wilson, Freshman, Education, Leadership, and Public Service - Elementary Education  
Autumn Palmer, Freshman, Psychology - Behavior Analysis  

10 a.m.  Kinesthetic Memory Adaptation in Flute Players  
Andrea Savord, Graduate Student, Psychology – General Psychology  

10:45 a.m.  Conservation Genetics of the Rare Species *Delphinium exaltatum* (RANUNCULACEAE) of the Appalachian Mountains and the Ozark Highlands of Missouri  
Kelsey Huisman, Senior, Biology - Ecology/Spanish  

11 a.m.  Diet of Four Lake Trout Morphotypes at Isle Royale  
Elizabeth Wolak, Senior, Biology - Zoology  

11:15 a.m.  Effectiveness of Simulating Solar Water Disinfection on Fecal Choliform Levels  
Carlene Stovall, Freshman, Nursing - Pre-Nursing  
Holly Stein, Post-Baccalaureate, Biology - Physiology  
Barbara Konku, Senior, Chemistry - Biochemistry  

11:30 a.m.  Comparison of Kinematics and Accuracy of Overhand American Football Throwing  
Cale Anderson, Graduate Student, Health and Human Performance - Exercise Science  

12 p.m.  Selection from "Where I Belong"  
Joy Weitzel, Graduate Student, English - English/Writing  

12:15 p.m.  International Health Issues - Eradicating Honor Killings  
Jamie Frederickson, Senior, Health and Human Performance - Community Health Education  
Kelly Busch, Senior, Health and Human Performance - Community Health Education  
Kent Hay, Senior, Chemistry - Chemistry  
Katie Bedenis, Senior, Nursing - Nursing  
Rachel Nicholas, Junior, Clinical Sciences - Pre-Radiography  

12:30 p.m.  Characterization of Tumor-Derived Exosomes from Glioblastoma Cells  
Nicholas Bohn, Senior, Biology - Biology/Physiology
12:45 p.m. Identification of Transmission Band Shifts for Liquid-Filled, Hollow Core Photonic Crystal Fibers due to Refractive Index Scaling
   Cassandra Hastings, Senior, Physics – Physics
   Aaron Laursen, Senior, Non-NMU student

1 p.m. Post-polio Syndrome: How the Return of Polio Symptoms are affecting Polio Survivors and the Health Field Today
   Cassandra Hastings, Senior, Physics – Physics

1:15 p.m. The Mother and the Mist and the Man in her Head
   Christine Hansen, Senior, English - Writing

1:30 p.m. Out of Place: A Learning Experiment in Environmental Education
   Melissa Orzechowski, Sophomore, Communication and Performance Studies – Communication Studies and Environmental Studies and Sustainability

1:45 p.m. Haptic and Exoskeleton Devices for Neurorehabilitation of Upper Limb Paralysis: A State of Art and a Night Landing Task
   Samantha Wagner, Graduate Student, Psychology - Experimental Psychology

2 p.m. Anti-depressant Effects of the Neurotensin Analog Drugs
   Lawrence Carey IV, Graduate Student, Psychology - Psychology

2:15 p.m. The Inadequacy of Funding From Our Federal Government for Our Returning Veterans
   Harlee Alexander, Senior, Political Science - Political Science/Pre-Law

2:30 p.m. Brook Trout Respirometry-Determining Metabolic Rates of Individual Fish
   Chandler Countryman, Junior, Biology - Biology

2:45 p.m. Successive Study of Diversity Conference Evaluations of Presenters by Race, Gender, Sexual Orientation, and Disability
   Autumn Palmer, Freshman, Psychology - Behavior Analysis
   Christine Wilson, Freshman, Education - Elementary Education

3 p.m. Effects of Timber Harvest on American Black Bear Space Use
   Donald Norton, Graduate Student, Biology - Biology

3:15 p.m. Exploring Potato Tuber Endophytes
   Erica Fraley, Senior, Biology - Biology

3:30 p.m. Habitat Selection by Longnose Dace (*Rhinichthys cataractae*) in an Artificial Stream Setting
   Justin Cribley, Senior, Biology - Biology/Math

3:45 p.m. Seaborg Center College For Kids Summer Survey Reconstruction
   Molly Smith, Sophomore, Education, Leadership, and Public Service - Special Education

4 p.m. Diet Analysis of Burbot from Eastern Lake Michigan: 1999 - 2012
   Casey Hares, Graduate Student, Biology - Biology
**Group Projects**  
*(in alphabetical order by submitter’s last name)*

**Quantum Yield Determination of 1,3-Diethynylbicyclo[1.1.1]pentane Derivatives**

Amy Beauchamp, Senior, Chemistry - Biochemistry  
Anthony Mattioli, Senior, Chemistry - Chemistry  
Jeff Van Raden, Fall 2013 Graduate, B.S. - Chemistry/ACS Certified  

Poster  

A novel class of donor/acceptor molecules based on 1,3-diethynylbicyclo[1.1.1]pentane spacers has been developed at NMU. These molecules may have interesting electronic properties that could be applicable in non-linear optics, communications, and data and energy storage. The electronic properties can be altered by utilizing different combinations of donor/acceptor groups bound to the 1,3-diethynylbicyclo[1.1.1]pentane spacer. The electronic properties of these molecules are being studied using ultraviolet-visible and fluorescence spectroscopy to gauge the extent of charge transfer through the spacer. We will report the fluorescence quantum yield for one of the derivatives and discuss the effect of solvent polarity on the absorption spectra and fluorescence emission.

**Exploring the Outcomes of Peer Mentorship Through Simulation**

Kurt Benckendorf, Post-Baccalaureate, Nursing - Nursing  
Katie Kerber, Freshman, Nursing - Nursing  

Poster  

The purpose of this study is to describe the benefits of peer mentorship through simulation. This mixed methods study involved students in the first semester of the nursing curriculum (NU212) and students in the second semester of the nursing curriculum (NU302). NU302 students served as mentors by creating and guiding NU212 students through several patient scenarios focused on acute care nursing. The NU302 students (mentors) participated in a focus group interview after the simulation experience. NU212 students completed a quantitative survey and participated in a focus group interview prior to and after the simulation experience. There was a statistically significant increase in NU212 students’ feelings of preparedness to care for hospitalized patients, confidence in obtaining focused assessments, and confidence in identifying and utilizing nursing interventions to treat the most pertinent clinical problems. Analysis of the qualitative data obtained through focus groups is ongoing.

**Motivational Factors in the Behavioral Profile of Neurotensin-1 agonist PD149163**

Cecilia Brown, Senior, Psychology - Graduate Preparation  
Elizabeth Ridge, Freshman, Psychology - General Psychology  
Rachel Kirkendall, Junior, Psychology - Graduate Preparation  

Poster  

Neurotensin receptor agonists have been studied as novel treatments for cognitive disorders, drug addiction, and schizophrenia. However, behaviorally effective doses of these compounds tend to suppress general activity, precluding a more thorough evaluation of these compounds and the potential utility of these compounds for treating mental disorders. The behavioral suppression observed with these compounds may be directly related to the motivational factors used in a behavioral model. To evaluate this, we conducted a study to compare rates of lever pressing in hungry rats who were responding to earn food rewards to rats trained to respond to avoid an intermittent mild aversive stimulation. After training, rats were treated with the neurotensin receptor agonist PD149163 and two other compounds from different drug classes for comparison: the dopamine D2/3 receptor agonist raclopride and the dopamine receptor agonist apomorphine. Response rates were unchanged in the aversive motivation group at doses that were completely rate suppressive in the food motivation group. Differences in response rates between these groups were less substantial for raclopride and apomorphine. These findings suggest that researchers can expand the preclinical study of neurotensin compounds by considering other motivation factors, such as avoidance of aversive stimulation.
The Diagnostic and Statistical Manual: A Short History

Cecilia Brown, Senior, Psychology - Graduate Preparation
Emily DePetro, Fall 2013 Graduate, B.S. - General Psychology
Poster
Faculty Advisor: Harry Whitaker

A variety of social, political and economic factors influenced the creation of the first Diagnostic and Statistical Manual of Mental Disorders (DSM) in 1952. Subsequent to DSM-1, we traced the cultural, medical and economic factors that shaped each successive version of the DSM, discussing some of the more prominent controversies these editions have generated. Publication of the DSM 5 in May 2013 has sparked a new round of debates concerning the possible impact on patients and society as a whole.

Low-Tech Histological Teaching Tools

Jordyn David, Senior, Biology - Biology
Amanda Wigand, Senior, Biology - Biology
Poster
Faculty Advisor: Robert Belton

This project was designed to enhance our histological techniques while developing a teaching tool for students pertaining to the studies of various tissues. Throughout the duration of this experiment, we used a low-tech approach to our methods to show how today’s technology mixes well with old machinery in inexpensive ways. The materials used to assist in this goal were a microtome, stains, counter-stains, foam, iPhones, hot water baths, paint brushes, a slide warmer, and a compound microscope. A variety of tissues were obtained, fixed, sectioned and stained to observe the various cell and tissue types. After observing our various tissues, we used our iPhones to reproduce images that we were thus able to compare with pre-made tissue samples. Our images were then transferred to a poster that we created for teaching purposes by students and teachers alike.

International Health Issues - Eradicating Honor Killings

Jamie Frederickson, Senior, Health and Human Performance - Community Health Education
Kelly Busch, Senior, Health and Human Performance - Community Health Education
Kent Hay, Senior, Chemistry - Chemistry
Katie Bedenis, Senior, Nursing - Nursing
Rachel Nicholas, Junior, Clinical Sciences - Pre-Radiography
Presentation - LRC 235B at 12 p.m.
Faculty Advisor: Breanne Carlson

According to the Honor Based Violence Awareness Network, there are 5,000 honor killings that happen every year internationally. A group of Northern Michigan University students created a website in HL322 International Health Issues to seek the total eradication of honor killings throughout the world, with no culture, religion or creed advocating the use of violence, torture or murder to preserve family or societal honor. The class was an academic service learning course that allowed us to bring our studies from the classroom into the community. This encouraged us to gain a further understanding of our course content, and enhanced personal values and civic responsibility. In the Summer of 2013 we organized a campaign called "Draw the Line with Daisies" in which we sold daisy seeds at $5.00 per packet in order to further educate our community and raise funds for efforts against honor killings. All proceeds were given to the United Nations Development Fund for Women.

Lifespan ImpACT test

Janice Hamachek, Freshman, Health and Human Performance - Athletic Training
Benjamin Murphy, Graduate Student, Psychology - Training and Human Performance Improvement
David Seramur, Senior, Health and Human Performance - Athletic Training
Presentation - LRC 235B at 11:30 a.m.

Faculty Advisor: Maggy Moore

The Lifespan ImpACT testing is for youth hockey players ages 5-12 from around the Upper Peninsula. We are testing the reliability of the Lifespan ImpACT test in this population to use as a tool for return-to-play decisions for youth athletes. In the early stages of the research, the child performed the test three times.
times, two weeks in a row with one week off, then a final test. Each test took about ten minutes, and measured attention, memory, visual motor speed and reaction time, all which may be affected with a mild traumatic brain injury. Later on, children took the test one time, but answered questions about demographics to develop normative values in children with similar demographics. I assisted in proctoring the test, and recruiting volunteers to assist in our research.

I also am involved in writing the research article and creating a website to assist in making the research available to the public. The website covers basic information of a concussion, myths and facts about concussions, and concussions in the news. I was involved in writing the introduction of the article, which included extensive reading and determining that previous research was relevant to our research.

Identification of Transmission Band Shifts for Liquid-Filled, Hollow Core Photonic Crystal Fibers due to Refractive Index Scaling

Cassandra Hastings, Senior, Physics - Physics
Advisor: Philippe Delaye Institut D’Optique
Aaron Laursen, Senior, Non-NMU student
Poster and Presentation - LRC 235B at 12:45 p.m.

Hollow core photonic crystal fibers have led to numerous developments in fiber technologies. These fibers have demonstrated possibility in optimizing numerous non-linear devices. Specifically, transmission bands produced by these fibers when filled with liquid can be used to favor or prevent certain non-linear mechanisms. The identification of these bands have been used to validate the derived scaling laws that describe the shift in bandgap location as the refractive index of the liquid is altered. To identify these bands, liquids of varying refractive index were made through different mixtures of dimethyl sulfoxide (DMSO) and water (H2O). By filling the hollow core fibers with the various liquid mixtures, transmission bands were identified through use of a supercontinuum white light source as well as an optical spectrum analyzer. The results of the transmission band locations for each liquid mixture were analyzed, leading to the conclusion that the shifts in the transmission bands follow the refractive index scaling laws more closely in the infrared region of the electromagnetic spectrum, while varying from the laws as transmission band locations approach ultraviolet wavelength.

A Meta-analysis Evaluating the Treatment Success of Oxytocin Administration on the Core Symptoms of Autism Spectrum Disorders

Kaylagh Hollen, Senior, Biology - Biology
Faculty Advisor: John Lawrence
Jonathan Slattery, Senior, Biology - Biology
Poster

Autism spectrum disorders (ASDs) are a group of neurodevelopmental disabilities characterized by impairments in social cognition, communication, and behavior. Currently affecting 1 in 88 children, ASD has limited medications and costly therapies that fail to target the core symptoms of the disorder. Oxytocin is linked to regions of the brain that are associated with the core symptoms of ASDs giving it treatment potential for these disorders. We hypothesize that oxytocin administration will display significant improvements in the core symptoms of ASDs. PubMed, Google Scholar, and the Olson Library Database were searched for a final inclusion of 13 articles containing 31 outcomes for data extraction. ANOVA (one way) tests were conducted to determine if the treatments had significant improvements on the three core symptoms separately. The association between oxytocin and ASDs appears to have significant effects on the core symptom of social cognition with a p-value of 0.002. However, there was no significant drug effect for communication and repetitive behavior. From this meta-analysis, oxytocin administration significantly improved social cognition, giving evidence for social cognition treatment in ASDs. A larger subject pool should be used to further investigate the effect of oxytocin on communication and repetitive behaviors.

Laser-Based Rapid Identification of Bacterial Pathogens

Kaylagh Hollen, Senior, Biology - Biology
Faculty Advisor: Josh Sharp
Tony Treloar, Junior, Biology - Molecular Biology
Poster
With rising healthcare costs, pathogen identification methods that are fast, accurate, and cost effective are needed. Micro Identification Technologies (MIT) has developed a novel technology that analyzes the laser light scattering patterns that specific species of bacteria exhibit to rapidly (and cheaply) identify bacteria and other pathogens. The Sharp laboratory at Northern Michigan University will be collaborating with MIT to expand their technology to identify and differentiate Staphylococcus aureus, and methicillin resistant Staphylococcus aureus (MRSA). Our goals are to determine the light scattering patterns for S. aureus and MRSA, and then utilize that data to identify these pathogens in clinical samples. S. aureus and MRSA represent a continuing healthcare threat that result in roughly 500,000 hospitalizations per year in the United States. Moreover, MRSA can be difficult to treat because of its resistance to many antibiotic therapies. Being able to quickly identify if a patient has S. aureus infection or MRSA would be extremely useful in dictating the proper course of treatment for that patient, and ultimately increase the likelihood of a successful patient outcome. Here we describe the basics of the laser light scattering technology, and how it can be utilized to identify specific bacteria species.

Oral Health Literacy Project

Andrew Johns, Senior, Nursing - Nursing
Bethany Cunningham, Senior, Nursing - Nursing

Poster

This presentation describes a collaborative service learning project between NMU nursing, the Alger Marquette Community Action Board (AMCAB), and pediatric dentist Erika Tyler designed to provide an oral health literacy program to local Marquette Head Start families. This program was made possible through a grant from the NMU Center for Rural Community and Economic Development. The purpose of this pilot project was to assess oral health literacy levels of families using early childhood programs (Head Start, Early Head Start) in Marquette with the goal of increasing oral health literacy for participants. Poor oral health has been linked to other health problems such as: dental pain, oral cancers, cardiovascular disease, stroke, diabetes, inflammatory disorders, preterm and low-birth weight babies (The American Dental Association, 2006). Low oral health literacy is linked with increased levels of dental caries (Horowitz, Wang, Dushanka, 2013) and adults with low health literacy levels are less likely to seek preventative dental care. This project involved program planning, implementation, and evaluation through a pre/post survey process. Twelve adults and eighteen children participated in the event. Adult survey responses indicate increased levels of oral health literacy. This poster presents steps of program planning, survey results, and recommendations for future programs.

Comparative Response Rates in an Operant Responding Task

Katelin Matazel, Graduate Student, Psychology - Psychology
Remington Rice, Senior, Psychology - Psychology

Poster

Animal models are commonly used to study many areas of neuroscience and behavioral pharmacology. The purpose of this study was to understand how two differing types of reinforcement can impact rodent response rates in an operant responding task. Six Sprague Dawley rats were trained on a variable interval of 60-second tasks using a rodent operant chamber. Initially, animals received reinforcement in the form of sucrose pellets for completing lever presses. After response rates stabilized, the animals then completed motivational tests after set delay intervals during a 24 hour period. The same procedure was repeated with grain reinforcement. From this comparison, results showed that there is greater variability in rodent response rates when they receive grain reinforcement compared to sucrose reinforcement. These results will contribute to a broader experiment that will seek to understand the role of motivation in the treatment of depression.

Reduced Medial Prefrontal Cortical Volumes Associated with Depressive Traits in Healthy Individuals

Joshua Maxwell, Senior, Psychology - Graduate Preparation
Emily Depetro, Fall 2013 Graduate, B.S. - General Psychology

Poster

Research has shown that patients diagnosed with Major Depressive Disorder have reduced gray matter volume in a variety of brain regions including the hippocampus, basal ganglia, and medial prefrontal
It is unclear as to whether variability in normative levels of non-clinical depression is related to variability in medial prefrontal cortex gray matter volume. Therefore, the aim of this study was to examine whether non-clinical levels of depression were related to medial prefrontal cortical volumes. In a sample of 42 normative individuals, we used T1-weighted magnetic resonance imaging to measure brain volume and assessed participants' level of depression via a self-report questionnaire. Voxel-based morphometry was used to identify voxels which correlated with depressive symptoms. We found a cluster within the medial prefrontal cortex where greater levels of depression were associated with lower gray matter volumes. This relationship with the medial prefrontal cortex was not observed for measures of anxiety and stress--suggesting a unique association between medial prefrontal gray matter volume and depression. The results of this experiment support the hypothesis, that even within a non-clinical sample, individuals who have higher levels of depressive traits tend to have lower levels of gray matter volume in the medial prefrontal cortex.

What's in a Grade?: Pre-service Teachers' Assessment of 7th Grade Student Learning

Andrew Mills, Graduate Student, Education, Leadership, and Public Service - Learning Disabilities
Holly Mathys, Graduate Student, Education, Leadership, and Public Service - Learning Disabilities

The purpose of this study was to examine how 52 PSTs assessed 7th-grade students' learning of a social studies lesson they planned and taught. Assessment of students has, perhaps, never been more prominent in the United States. A major concept in education, assessment incorporates a variety of actions and mechanisms for determining what students know and are able to do, with the ultimate purpose of improving teaching and learning. Using PSTs’ lesson plans, materials, and post-lesson reflections, as well as student work and classroom observation, we investigated how PSTs assessed learning, assigned grades, and compared student performance with their expectations. With over 400 comments on student work, 56% (n= 240) related directly to students' social studies achievement, 33% (n= 141) related to non-achievement factors, and 11% (n= 48) related to achievement factors not related to social studies. The vast majority of published research focuses on teachers' knowledge and beliefs, not their actual practices. Nonetheless, “There is still relatively little research devoted to understanding the assessment literacy of classroom teachers.” (Volante & Fazio, 2007).

How do Reintroduction Programs Play a Role in the Outcome of Re-establishing Captive-reared Avian Populations: A Meta-analysis

Rachel Owens, Senior, Biology - Biology
Rachel Paull, Senior, Biology - Biology
Robert Kennedy, Senior, Biology - Biology
Mike Neilio, Senior, Biology-Biology
Kacie Roth, Senior, Biology-Biology

Many bird species have been extirpated or have come close to extinction in the last few decades. This could be from habitat loss, predation, hunting, climate, or possibly a combination of all. Birds are important economically, in biological control, as agents of dispersal, and as bio-indicators. Reintroduction efforts have been widely used, but in many cases have failed to reestablish a sustainable population of species. Successful release programs are those that have pre-release training, limited human contact, follow the 50/500 rule, monitor for disease, look at genetics, post-release monitoring, monitor reproduction, and have post-release management (Armstrong and Seddon, 2007; Primack 2006). The studies that were analyzed were pulled from Google Scholar and NMU Olsen Library. Through abstract viewing, articles were screened to exclude those that were not based on birds and to include those that were based on captive-reared birds and had mentioned the breeding success. Each study was given a score based on which criteria they had met and a chi-squared was performed to determine the significance of the criteria met between studies determined successful and unsuccessful.
Successive Study of Diversity Conference Evaluations of Presenters by Race, Gender, Sexual Orientation, and Disability

Autumn Palmer, Freshman, Psychology - Behavior Analysis
Christine Wilson, Freshman, Education - Elementary Education
Presentation - LRC 235B at 2:45 p.m.

In modern societies, humans may occupy a number of social groups in the same social/political public space. How individuals and their social groups are perceived might produce differences in evaluations of quality and performance. Using a successive independent samples design of conference evaluations, our research sought to answer the question, “How does a conference presenter’s race, gender, sexual orientation, and ability/disability affect participant responses on conference evaluations?” Northern Michigan University hosts an annual diversity conference, UNITED (Uniting Neighbors in the Experience of Diversity), that has grown from 1,200 to 2,700 attendees annually. Our 8-year comparative study of conference evaluations examined race, gender, sexual orientation, and ability/disability of conference presenters using content analysis of over 4,000 evaluations from 2006 through 2013. Findings revealed differences in underlying themes of entertainment, information, and presentation style in attendees’ general comments. A review of the educational research literature determined that our research represents the largest and longest empirical study of a higher education diversity conference in the United States.

Creating an Open-Source History of Psychology e-textbook

Casey Pernaski, Graduate Student, Psychology - Psychology
Cecilia Brown, Senior, Psychology - Psychology
Emily DePetro, Fall 2013 Graduate, B.S. - General Psychology
Nicoletta Fraire, Senior, Psychology-Psychology
Samantha Wagner, Graduate Student, Psychology-Psychology
Harry Whitaker, Professor-Psychology
Poster

In the Fall of 2012, Whitaker proposed to his graduate seminar in the History of Psychology that “we” write the textbook for the undergraduate, senior-level, History of Psychology class; the proposition was “all in or we don’t do it” and “open-source”. Now in its 2nd edition, Approaches is 414 pages and used as the textbook for PY400.

Open-source textbooks are beginning to appear in several fields, including at least two Introduction to Psychology texts, one of which is forthcoming from OpenStax (Rice University). To our knowledge, Approaches to a History of Western Psychology is the first open-source history of Psychology textbook and the first co-authored by both undergraduate and graduate students. It takes advantage of both internal and external hyperlinks, and there are movies illustrating the Gestalt principles of visual illusions, which can be incorporated into alternate versions of the text; we have already incorporated the 2012 feature story from The Manchester Guardian, on R.D. Laing’s experimental home for the mentally ill; we incorporated a Radio Show broadcast discussing the contribution of Giovanni Battista Morgagni. All of these are used with the gracious permissions of the copyright holders, in part because the text is and will remain, open-source.

Phytoremediation of BPA by Little Bluestem Seeds

Katelyn Pershinske, Freshman, Chemistry - Biochemistry
Sara Stafford, Senior, Chemistry - Biochemistry
Cody Bogner, Senior, Chemistry - Biochemistry
Poster

Bisphenol-A (BPA) is a compound used to produce epoxy resins and polycarbonate plastics. The hormone-like structure of BPA acts as an endocrine disruptor, interfering with reproduction and metabolism. Not only is BPA leaching from food related packaging and adhesives, but is also finding its way into fresh and sea water due to agricultural practices and industrial runoff. Phytoremediation has been recognized as a possible solution, using plants to decontaminate the environment. Germinating Little Bluestem seeds have been proven to significantly decrease BPA concentrations. The seeds were
germinated in the presence of 46 mg/L BPA, and after 6 days, 65% of the BPA was degraded. The seeds were soaked in water to produce a seed exudate that was incubated with BPA for 5 days. This resulted in a 74% decrease in the concentration of BPA, indicating that something exuded from the seeds, allowing degradation of BPA. Boiling this substance destroyed its ability to degrade BPA, suggesting that it may be an enzyme. Attempts to purify the enzyme by separation on Sephadex G-75 produced two distinct fractions, but neither of them alone was able to degrade BPA. SDS-PAGE of the protein fraction showed bands in the molecular weight range of 18-90 kD.

No Two Can Be Alike; Adventures in Asymmetry and Uniqueness

Leah Piggott, Senior, Psychology - Psychology
Nicoletta Fraire, Senior, Psychology - General Psychology
Emily DePetro, Fall 2013 Graduate, B.S. - General Psychology
Casey Pernaski, Graduate Student, Psychology - General Psychology
Kristopher Phillips, Instructor - Philosophy
Harry Whitaker, Professor - Psychology
Poster

2nd Edition Authors: Leah Piggott, Nicoletta Fraire, Kris Phillips, Emily DePetro, Casey Pernaski and Harry Whitaker

If someone were to randomly take two individuals from a crowd, would they be able to list all the ways in which they were different? This new psychology text, ‘No Two Can Be Alike’, takes on the monumental task of documenting the ways in which any two people differ, the ways in which siblings or even identical twins differ, including how the left half and the right half of the body differs. Beginning with a brief history of Individual Differences as a science, our book delves into the topics of body structure and handedness, the brain and nervous system, normal and abnormal human behaviour, and the human differences in sex and gender. The Second Edition of ‘No Two Can Be Alike’ is authored by three NMU undergraduates, a graduate student and two faculty members. The First Edition was authored by 8 former NMU undergraduate students and one faculty member.

Biocide and Pathologic Effects on Western Honey Bees (Apis mellifera): Implications for Widespread Population Decline

David Poll, Senior, Biology - Biology
Brian McKee, Senior, Biology - Biology
Emily Schuyler, Senior, Biology - Biology
Poster

Recent declines in Apis mellifera (western honey bee) populations may threaten the production of major crops within the United States. Colony Collapse Disorder (CCD) is the title of the phenomenon noted by the rapid loss of worker bees, lack of dead worker bees, and delayed invasion of hive pests and kleptoparasites. This disorder poses to cover all conditions of honey bee population decline. Though myriad surveys have attempted to determine a primary cause for these observations, none yet reveal a single causative factor for CCD. This meta-analysis elucidates the major pathological and biocidal effects on Apis mellifera, as well as some synergistic effects between the agent groups. We hypothesized that there exists a direct correlation between both biocide abundance and pathogen abundance on bee mortality. Thousands of bees were sampled throughout the studies. Dose-response characteristics and pathogen presence counts were compiled in order to compare and contrast lethal and sublethal effects. Results display diverse relationships due to the differing methodology used across the studies. Nevertheless, it is clear that ill-effects vary widely between numerous agents while synergistic effects are further known to occur.

Effectiveness of Simulating Solar Water Disinfection on Fecal Choliform Levels

Carlene Stovall, Freshman, Nursing - Pre-Nursing
Holly Stein, Post-Baccalaureate, Biology - Physiology
Barbara Konku, Senior, Chemistry - Biochemistry
Poster and Presentation - LRC 235B at 11 a.m.

Faculty Advisors: Susanna Braman, Josh Sharp, Jennifer Myers
Fecal choliform is one of the most common bacteria identified in unchlorinated and unfiltered water sources in the world, in particular, in third world countries. When water is consumed or utilized for cooking before any type of a purification process, the bacteria (e-coi) can cause diseases and increased health risks especially for infants, elderly, and those with chronic health conditions. When the majority of a community consumes contaminated water daily, all members of the population are susceptible to contracting diseases and to a poorer quality of life. This simulated research was conducted to demonstrate the effectiveness of solar water disinfection using ultra-violet light to destroy e-coi in timed trials.

**Glioblastoma Microvesicles Alter Normal Tissue Function**

Jacob Studt, Senior, Biology - Biology
Allison Mitchell, Senior, Biology - Biology
Aaron Mellesmoen, Senior, Biology - Biology

**Faculty Advisor:** Robert Belton

**Poster**

According to the World Health Organization, Glioblastoma Multiforme (GBM) is the most common and most aggressive type of brain tumor. Current standard of treatment involves surgical resection, radiation, and chemotherapy and yields a median survival rate of merely 15 months. The poor prognosis associated with GBM’s highly aggressive behavior indicates significant necessity for new therapeutic treatments. Cells throughout the body have employed a mechanism of communicating with surrounding tissues using membrane bound vesicles called microvesicles. In other tumor types a surface protein called basigin has been released from the tumor within these microvesicles. Basigin protein stimulates other cell types to support tumor growth by inducing the expression of proteins that allow for tumor metastasis. We hypothesize that basigin is found in GBM microvesicles and released to alter normal tissue function. To test our hypothesis, microvesicles from the GBM cell line LN229 will be collected and then added to cultures of the normal fibroblast cell line MSU 1.1. A technique called zymography will be used to measure changes in the activity of a class of enzymes called Matrix Metalloproteinases in the fibroblasts. The results of this project may aid in new therapies to treat glioblastomas.

**Northern Michigan University Student Experience Survey**

Jane Taylor, Junior, Social Work - Social Work
Jamie Ray, Senior, Social Work - Social Work
Nicole Carr, Junior, Social Work - Social Work
Cassie Hodge, Junior, Social Work - Social Work
JeQuan Russell, Junior, Social Work - Social Work
Robert Tracy, Junior, Social Work - Social Work
Marissa Brower, Senior, Social Work - Social Work
Krista Strenski, Sophomore, Social Work - Social Work

**Faculty Advisor:** Yan Ciupak

**Poster**

Methods of Social Research 2 students collaboratively researched the overall experience of students currently attending Northern Michigan University. Research was conducted by means of surveys. Surveys were administered by paper and electronic means. The outcome was gaining a better understanding of the opinions of Northern Michigan University students.

**Attending to the Eyes Behind the Mask**

Michelle Vander Hyde, Freshman, Psychology - Speech Language and Hearing Sciences
Robert Torrence, Graduate Student, Psychology - General Psychology

**Faculty Advisor:** Joshua Carlson

**Poster**

From previous studies we know that people consciously and nonconsciously attend to fearful faces. We also know that consciously processed fearful eyes alone are sufficient to capture a person’s attention. Our study intended to determine if the same is true for nonconsciously processed fearful eyes. In two dot probe experiments, one masked (nonconscious) and one unmasked (conscious), we projected fearful eyes and neutral eyes on either side of a screen. In the nonconscious experiment, the participants only viewed eye stimuli for a short period of time, then it was masked by two neutral faces. In the conscious experiment they viewed only the unmasked eye stimuli. A target dot then appeared on
one side of the screen. When the dot appears on the same side as the fearful eyes the congruency should produce quick reaction times. Conversely, when the dot appears on the opposite side, the incongruence should cause the reaction time to be longer. After concluding the study, we analyzed these reaction times and found that the congruent trials were quicker than the incongruent for both the unmasked and masked experiments. Our results suggest that nonconsciously processed fearful eyes produce an attentional bias similar to consciously processed fearful eyes.

**Time Course for the Capture and Hold of Attention by Fearful Faces**

Karmen Whitham, Senior, Psychology - Exercise Science
Ron Parrish, Sophomore, Psychology - Psychology
Keara Kangas, Junior, Psychology - Psychology
Michelle Vander Hyde, Freshman, Clinical Sciences - Speech Pathology
Joshua Maxwell, Senior, Psychology - Psychology
Robert Torrence, Graduate Student, Psychology - Psychology

Poster

Nonverbal social cues, such as fearful faces, capture observers’ attention. However, attention is held by a fearful expression for only a particular period of time until it is no longer significant and attention is released. In this study we used a dot-probe task to test our hypothesis that as time continues, a fearful face cue becomes less salient and holds attention for a decreased amount of time. Each trial begins with a fixation-cue located in the center of a black screen. Next, two faces are simultaneously presented on either side of the screen for a brief moment (133ms) followed by a target-stimulus which is displayed at either 0ms, 133ms or 399ms after the fearful face disappears. The participants were asked to indicate the location of the target-stimulus by pressing a corresponding button using their right hand. A target-stimulus presented on the same side as the fearful face is indicative of congruence. Conversely when the fearful face is opposite the target-stimulus, it is incongruent. Two neutral faces were also used to establish a baseline. The results suggest the most effective response when the face is congruent, least when incongruent with baseline falling in-between, at the 0ms and 133ms delays, attention disengages by 399ms.

**Impact of a Diversity Conference on University Curriculum, Recruitment, and Accreditation Efforts**

Christine Wilson, Freshman, Education, Leadership, and Public Service - Elementary Education
Autumn Palmer, Freshman, Psychology - Behavior Analysis

Presentation - LRC 235B at 9:45 a.m.

Diversity of students, faculty, administrative staff, community, and curriculum is an asset thought to strengthen and enrich students’ academic experiences. Responding to a charge from a Northern Michigan University president to place diversity at the center of a University Strategic Plan, members of a diversity advisory council proposed a plan to prepare the university and its students for a future in an increasingly diverse and globalized society. Integral to this plan was a diversity conference, UNITED (Uniting Neighbors in the Experience of Diversity), which went from an annual September event to an integral part of the university’s academic fabric. Our research describes an eight-year history of the diversity conference, which has hosted more than 12,000 participants and has become a vital component in the curriculum of the university. The research assists in outcomes assessment efforts to determine whether the diversity conference has lived up to its original purpose and perceived importance in the curriculum, recruitment of students, and program accreditation efforts.

**Dinuclear Co(III)-salen Catalyst Assembled Through Aromatic Donor-acceptor Interaction and Its Application in Hydrolytic Kinetic Resolution of Epoxides**

Matthew Woodhouse, Senior, Chemistry - Chemistry
Eric Heim, Senior, Earth, Environmental and Geographical Sciences - Environmental Science

Poster

Hydrolytic kinetic resolution (HKR) of epoxides catalyzed by Co(III)-salen complex follows a bimetallic mechanism: two Co(III)-salen complexes need to be in close proximity to work in a cooperative way. We
developed a dinuclear Co(III)-salen supramolecular catalyst assembled through an aromatic donor-acceptor interaction. In our design, the Co(III)-salen complex is flanked by two electron-deficient aromatic moieties. The introduction of the electron-rich aromatic compound enables the assembly of the dinuclear Co(III)-salen supramolecular catalyst, resulting in a rate enhancement for HKR of epoxides. Catalysts assembled through only the aromatic donor-acceptor interaction have not been reported. We have synthesized two different Co(III)-salen complexes. Naphthalene diimide and pyromellitic diimide are incorporated as the electron-deficient aromatic unit, respectively. Currently, the binding study and catalytic property study are underway. We hope that this research can pave a pathway for a new strategy to assemble supramolecular catalysts.

Monozygotic Female Twins Concordant for Breast Cancer: A Study of Genetic Similarity in DNA among Twin Pairs

Daniel Wulffe, Senior, Biology - Biology
Victoria Arnold, Senior, Biology - Biology
Kristine Bush, Senior, Biology - Biology
Diana Lee, Senior, Biology-Biology
Joshua Robinson, Senior, Biology-Biology
Poster

Breast cancer affects one in eight women in the U.S., with a significantly higher rate of occurrence in female twins. Tumor suppressor gene (TSG) mutations account for a high percentage of these cases. We analyzed monozygotic (MZ) twins with breast cancer, comparing DNA for mutations. We believe that MZ twin pairs with breast cancer will show the exact same DNA after mutations over 70% of the time. A systematic review was performed using scholarly search engines on the gene(s) BRCA1, BRCA2, p53, and/or HER-2/neu in MZ twins. The data was statistically analyzed using LOH analyses and microsatellite assays, and a paired t-test was carried out. Results from nine articles were compiled and a total of 81 MZ female twins were examined; these twins differed in locations and type of mutations. The mean values for the t-test were 5.5 for same DNA and 4.6 for not the same, displaying a higher mean for twins with genetically identical DNA. The results show that MZ twins with breast cancer share identical DNA 56% of cases, which is lower than expected. The t-test indicated a higher rate of concordant mutations. Future outlooks should include TSG biomarkers DOK7 and TP73.
Individual Projects
(in alphabetical order by submitter's last name)

The Inadequacy of Funding From Our Federal Government for Our Returning Veterans
Harlee Alexander, Senior, Political Science - Political Science/Pre-Law
Presentation - LRC 235B at 2:15 p.m.
Faculty Advisor: Ruth Watry

A number of individuals currently feel like our returning soldiers are not adequately given the necessary care or benefits they need. Primary health insurance, TRICARE, is currently being cut and funding will slowly decline as well. Soldiers are not given the care needed and with that a high level of concern is gaining attention.

Comparison of Kinematics and Accuracy of Overhand American Football Throwing
Cale Anderson, Graduate Student, Health and Human Performance - Exercise Science
Presentation - LRC 235B at 11:15 a.m.
Faculty Advisor: Randall Jensen

This study examined elbow angle, wrist velocity and throwing accuracy during American football throws. Six repetitions of three types of throws: Self-selected pass (SS), Lob pass (L), and a Bullet pass (B); were performed to hit a point scaled target from 10.97 m. Independent variables were frontal plane shoulder angle (more or less than 90º) and throw type; dependent variables were elbow angle in the sagittal plane, wrist velocity at ball release, and accuracy. There were no differences for shoulder angle for any variable; while throw types differed only for wrist speed (highest to lowest B, SS, and L). Significant interactions occurred for all variables. These findings suggest that recommendations for American football throwing technique are complicated by the combination of throw type and shoulder angle and without restrictions, subjects will throw with more accuracy.

Base Hydrolysis of Co(III) Complexes Coordinated by Thioether Ligands
Leslie Banton, Freshman, Chemistry - Chemistry
Poster
Faculty Advisor: Lee Roecker

The base hydrolysis of seven Co(III) complexes coordinated by substituted phenylthioether ligands has been studied. Unlike the benzyl analogs that exhibit a complicated reactivity in basic solution, the base hydrolysis of the title complexes undergo only Co-S cleavage. Electron donating groups slow the reaction rate while electron withdrawing groups increase the reaction rate. A Hammett Plot is linear with slope of 2.5. The preparation, characterization, and hydrolysis of these complexes will be described.

Characterization of Tumor-Derived Exosomes from Glioblastoma Cells
Nicholas Bohn, Senior, Biology - Biology/Physiology
Poster and Presentation - LRC 235B at 12:30 p.m.
Faculty Advisor: Robert Belton

Glioblastoma Multiforme (GBM) is the most common and malignant form of brain tumor in humans and has an average survival rate of 15 months after diagnosis. GBM’s remarkable malignancy is due in part to its ability to subdue the patient’s immune system by suppressing the body’s T-cells. Recent research has focused on utilizing immune-based therapies in order to combat the devastating effects of GBM tumors. In order to improve the effectiveness of immune-based therapies it is vital to understand the mechanisms utilized by tumors to suppress the immune system. It has been proposed that the tumor may do this through the release of microvesicles known as exosomes. Previous work in the Upper Michigan Brain Tumor Center has shown that tumor-derived exosomes reduce the viability of T-cells by inducing apoptosis (programmed cell death) in an extrinsic manner that is trademark of Fas signaling. To elaborate on this finding we characterized GBM tumor-derived exosomes. Through immunoblot analysis we have shown that Fas Ligand (FasL) is present in exosomes derived from GBM tumors. This work suggests that tumors may utilize exosomes in order to deliver FasL to the Fas Receptor of T-cells and effectively induce apoptosis. The identification of FasL on exosomes may provide future experimental approaches to potentially prevent immune suppression by the glioblastoma tumor. This could allow future research to target the inhibition of FasL or tumor-derived exosomes as a whole.
Anti-depressant Effects of the Neurotensin Analog Drugs

Lawrence Carey IV, Graduate Student, Psychology - Psychology
Poster and Presentation - LRC 235B at 2 p.m.
Faculty Advisor: Adam Prus

Neurotensin is a neuropeptide that is hypothesized to influence monoaminergic neurotransmission in areas of the brain of interest to the pathophysiology of depression. The forced swim test is a commonly used screening model for putative antidepressant medications, in which animals are forced to swim in an inescapable glass cylinder and rapidly develop an immobile posture. Drugs that have antidepressant effects in humans reliably decrease the time animals spend in this immobile posture without increasing general locomotor activity as measured in an open field test. Previous studies have shown that neurotensin modulating drugs may be effective in the treatment of a variety of psychiatric disorders, including depression. The present study sought to examine the effects of the systemically administrable neurotensin receptor 1 agonist PD149163 on mouse behavior displayed in the forced swim test and open field test. PD149163 decreased the total time spent immobile, without increasing overall locomotor behavior in the open field test. These results indicate that since drugs that target the neurotensin system display antidepressant properties in rodent models of depression, they may represent a novel mechanism for the treatment of depressive symptoms in humans.

Reactivity of 2-acetylpyridine Thiosemicarbazones With [(en)2Co(OSO2CF3)+

Maddy Clevenger, Senior, Chemistry - Chemistry
Poster
Faculty Advisor: Lee Roecker

2-acetylpyridine thiosemicarbazones are interesting ligands since they can bind to transition metals in a tridentate manner or through several bidentate arrangements. These ligands have previously been demonstrated to be effective iron chelators and the iron chelates exhibit antitumor activity. We have studied the reaction of two thiosemicarbazones with [(en)2Co(OSO2CF3)2]+ in hopes of understanding the various binding modes. The ligands are so effective at binding, however, that a single complex is produced in which the original ligands have been replaced by two tridentate thiosemicarbazone ligands. The synthesis and characterization of these complexes will be described.

Using iPod Touch Devices to Assess Quality of Life among Patients with Primary Brain Tumors

Samantha Conklin, Graduate Student, Nursing - Family Nurse Practitioner
Poster
Faculty Advisor: Nanci Gasiewicz

Quality of life (QOL) among people with brain tumors is a growing area of concern for patients, their caregivers, and their health care providers. Symptoms experienced by patients with brain tumors can make self-reporting difficult. Consequently, need exists for user-friendly, effective methods for people living with brain tumors to measure and report QOL. Such methods of assessing QOL include computerized surveys.

This poster presentation focuses on use of the iPod Touch, a hand-held, touch-screen device, to collect QOL data from patients with brain tumors as part of a collaborative research project between Northern Michigan University and the Upper Michigan Brain Tumor Center of Marquette General Hospital. Findings from this study indicate the majority of participants liked taking surveys on the iPod Touch, preferred the iPod Touch to a pencil and paper survey, and thought the device was easy to use. This in turn supports integration of hand-held, touch-screen devices for assessing QOL in patients with brain tumors. Nurses assessing patients from a holistic perspective have an inherent interest in QOL. The iPod Touch devices for QOL assessment are useful tools for ensuring optimal understanding of QOL needs in patients living with brain tumors.
Brook Trout Respirometry-Determining Metabolic Rates of Individual Fish
Chandler Countryman, Junior, Biology - Biology
Presentation - LRC 235B at 2:30 p.m.
Faculty Advisor: Jill Leonard

This project uses a respirometry system to determine the metabolic rates of individual brook trout. Metabolic rates effect how a fish performs on a daily basis and knowing a fish’s metabolic rate can help explain why it is more or less active than others in the population.

Habitat Selection by Longnose Dace (*Rhinichthys cataractae*) in an Artificial Stream Setting
Justin Cribley, Senior, Biology - Biology/Math
Presentation - LRC 235B at 3:30 p.m.
Faculty Advisor: Jill Leonard

With our increasing appreciation of the importance of aquatic community complexity, it is obvious that studying understudied fish community members is important for understanding ecosystem functioning. Longnose dace (*Rhinichthys cataractae*) are riffle-dwelling, coldwater stream fish native to southern Canada and northern U.S. Individuals are usually found in fast-flowing riffles with rocky substrate. They have been shown to avoid slow current and abundant sand, silt, and debris. Although we know what general habitat these fish tend to select, specific characteristics driving these choices are unclear. Dace (N=26) were implanted with 22mm RFID PIT tags and placed in an artificial stream where movements among pools and riffles as well as high and low velocity areas were monitored under varying photoperiod and temperature conditions. Activity of dace was greatest during dawn/dusk as well as evening hours with little daytime activity, regardless of photoperiod regime, fish were more active at 15°C than 5°C. When given the opportunity, fish were more common in fast flowing riffles with rocky substrate; however, rocky substrate was more highly selected than water velocity. Our data reinforce the diurnal/nocturnal behavior patterns of this species and highlight its preference for substrate over velocity.

From Worst to First: A Phenomenological Study of One School’s Story of Change
Elizabeth Dow, Sophomore, Education, Leadership, and Public Service - Elementary Education
Poster
Faculty Advisor: Bethney Bergh

The Top-to-Bottom list is part of Michigan’s school accountability system that ranks schools on their student performance in mathematics, reading, writing, science, social studies and graduation rate data. School performance components include student achievement, improvement and achievement gaps between the highest and lowest scoring 30 percent of students in each school.

- Reward Schools are based on the top 5% of schools in the ranking as well as the schools with the highest improvement values of schools on the list.
- Priority Schools are based on the bottom 5% of schools on the list.

The purpose of this study was to gain an understanding of the strategies used in a Michigan school which was identified as a Priority School in 2009-2010 and then a Reward School in 2012-2013. Using a phenomenological approach, the researchers sought to recognize the lived experiences and changes as they related to school culture, educational atmosphere, leadership, instructional practices, educational programming and student-teacher relationships. This research examined the impact of these elements on student achievement and ranking at the state level. Teachers, administrators and parents were interviewed to determine how the school changed their ranking in a two-year time period.

Exploring Potato Tuber Endophytes
Erica Fraley, Senior, Biology - Biology
Poster and Presentation - LRC 235B at 3:15 p.m.
Faculty Advisor: Donna Becker

Potatoes are a key ingredient in many of the foods we eat. Unfortunately, as such a rich source of starches and vitamins, pathogens enjoy potato tubers as much as humans do. A potential source of
biological control for these pathogens is *Streptomycetes* spp. bacteria. These bacteria live underneath the skin of the potato without causing disease, and they may possibly have the ability to prevent pathogen attack. The University of Minnesota recently conducted an experiment where they inoculated the soil around plots of potatoes with different strains of *Streptomycetes* sp. These experimental potatoes were used in the experiment. To begin, each potato was surface sterilized. Two approaches were then used to isolate *Streptomycetes* spp., a slice technique and maceration. The resulting slice/slurry was plated oatmeal agar with antibiotics. These plates were then inspected under a dissecting microscope for *Streptomycetes* growth.

**Management Suggestions to Improve the Function of a Stormwater Basin**

Marissa Gillett-Behrens, Freshman, Freshman Fellowship - Environmental Science

Faculty Advisor: Susy Ziegler

I studied the rainwater detention basin on the site of NMU's Ripley Heating Plant, the biomass burning facility, in Marquette, Michigan. The goal was to study the basin and collect data to determine whether it was functioning properly and suggest ways to improve the basin’s function. The basin was established in the spring of 2013, and I collected data from October 2013 to December 2013. Rainfall, water level, and basin dimensions seem to be correlated. After a heavy rain, water level and dimensions increased. Between heavy rains or during light precipitation events, the water level and dimensions decreased as the water infiltrated into the soil. The basin never drained completely, which is uncharacteristic of a detention basin. In fall 2013 the basin served more as a retention pond possibly because of the sod layer and topsoil on the bottom of the basin may have lowered percolation rates, or because the wet autumn season. Some additional concerns include the potential for water contamination by hydraulic fluid from the delivery trucks, woodchip and ash pollution in the basin area, overflow during snowmelt due to mounds of snow plowed toward the basin area, and possible cattail encroachment in the future. I propose that the current functioning of the basin is not ideal for allowing rainwater to infiltrate over time. To enhance the retention basin, I recommend planting certain wetland grasses, sedges, and shrubs in their designated wetland zones to aid water filtration and other ecosystem services. To turn the area into a true detention basin, I suggest removing the sod layer to increase percolation into the sand layer, and planting native wetland trees to aid in water drainage from the basin.

**The Mother and the Mist and the Man in her Head**

Christine Hansen, Senior, English - Writing

Faculty Advisor: Matt Bell

This is a short story I wrote for my narrative writing course. It is a modern fairy tale using elements from classics. This oral presentation will be a brief reading from the story.

**Diet Analysis of Burbot from Eastern Lake Michigan: 1999 - 2012**

Casey Hares, Graduate Student, Biology - Biology

Faculty Advisor: Jill Leonard

The Lake Michigan fish community has undergone many changes due to introduction of non-native species. Managers need to understand the time course of these alterations, including the time-frame of impact on the food web in the lake. Burbot (*Lota lota*) is a species that most agencies neglect to include in any management plans, despite their status as a top level, native-predator in the Great Lakes. I used a collection (1999-2012) of diet samples from burbot from eastern Lake Michigan to evaluate temporal alterations in burbot diet with particular attention to non-native vs. native forage prey. The collective contribution of sculpin (*Cottus*), alewife (*Alosa pseudoharengus*), and ninespine stickleback (*Pungitius pungitius*) to burbot diet decreased from ~80% before 2006 to ~15% in 2012. During the same time span, round goby contribution to burbot diet increased from ~0% before 2006 to greater than 60% in 2012, implying nearly a complete diet shift of burbot in just six years. This diet shift suggests a change in feeding behavior from partially pelagic/benthic to almost entirely benthic, and a change in prey consumption from alewife/cottid sculpin to round goby.
Post-polio Syndrome: How the Return of Polio Symptoms are affecting Polio Survivors and the Health Field Today

Cassandra Hastings, Senior, Physics - Physics  
Faculty Advisor: Robert Belton
Poster and Presentation - LRC 235B at 1 p.m.

In the 1950s, the United States experienced an epidemic whose effects would prove to last for many years. Poliomyelitis, more commonly known as polio, swept through the nation, affecting people with varying severity. While no age group was immune to the effects of the virus, the greatest effects of polio were seen in children under the age of ten. Now, years later, these polio survivors are encountering the same symptoms that plagued them as children, yet the cause of these symptoms is unknown. Three theories regarding the return of polio symptoms to these patients are investigated, with a closer look at the most common theory behind the cause of post-polio: enlarged motor units leading to a gradual deterioration of the neuron. In addition, the effects the symptom return will have on medical professionals in diagnosing post-polio syndrome is explored.

Flow in Gold and Blue

Katherine Hertler, Senior, Art and Design - Drawing and Painting  
Faculty Advisor: John Hubbard
Art Display
Oil Paint on Canvas - An ostentatious landscape that excites the viewers senses and stimulates imagination.

Detection of mRNA via Fluorescent In-Situ Hybridization

Rozemary Howard, Senior, Biology - Zoology  
Faculty Advisor: Erich Ottem
Poster

The purpose of my study is to develop a new method to perform in situ hybridization (ISH) to visualize mRNA in dendrites and neural cell bodies by using a combination of protocols from a PerkinElmerTM ISH kit under the supervision of Dr. Erich Ottem. The necessity for a new protocol is due to a loss of an emulsion sold by Kodak Inc. that, when used with standard in situ hybridization protocols, resulted in a clear image of mRNA within dendrites and soma. This emulsion was called NTB3, and it allowed researchers to label endogenous mRNA targets with cRNA probes labeled with 33-Phosphorus (33P) and 35-Sulfur (35S). It is important to perfect a new method for labeling cRNA probes in order to visualize the mRNA in dendrites and soma clearly again, and be able to quantify expression levels. The protocol we created utilizes Fluorescent In-Situ Hybridization, and it employs a confocal microscope for detection of the probe. Our protocol will aid individuals performing this type of research, because no one has access to the NTB3 emulsion to date.

Comparison of Time Gaps in Distance Cross Country Ski Races: Do Women or Men Finish with Closer Time Gaps?

Benjamin Hugus, Senior, Education, Leadership, and Public Service - Secondary Education/Biology  
Faculty Advisor: Carl Wozniak
Poster

The purpose of this research study was to compare distance cross country ski races in order to determine if men or women finish with closer time gaps. The distance cross country ski races analyzed were from championship events ranging from NCAA Regional Championships to the Olympics. Due to time constraints, only races from 2014 and 2013 were used. The races were analyzed by creating an index value for each race. These index values were calculated by averaging the time gap from the leader to the top twenty finishers in each race and then dividing that average by the number of kilometers raced. Both mass start and individual start races were analyzed. The sample size from this study did not allow great reliability in the findings, but it presents an interesting question worth investigating further with more data. The preliminary findings suggest that mass start women’s races have the greatest time gaps, index value of 0.1550, and men’s mass start races have the smallest time gaps, index value of 0.0368. This study did not analyze the causes of the discrepancy in time gaps, it only investigated if they...
exist. With more time for collecting data the trends seen in this preliminary study could become more concrete and could present interesting questions for the future.

**Conservation Genetics of the Rare Species *Delphinium exaltatum* (RANUNCULACEAE) of the Appalachian Mountains and the Ozark Highlands of Missouri**

Kelsey Huisman, Senior, Biology - Ecology/Spanish  
Poster and Presentation - LRC 235B at 10:15 a.m.  
Advisor: David Bogler  
Missouri Botanical Garden

Plant conservation genetics is important for the preservation of rare plant species, which are threatened by extinction due to reduced population size. These reductions can be caused by isolation, habitat loss, introduced species, and numerous other factors. Genetic diversity is important for rare plant populations to evolve with environmental change, and loss of gene flow can reduce genetic variation and promote inbreeding, which decreases the fitness of individuals. *Delphinium exaltatum* is a rare perennial plant species found in the Appalachian Mountains and the Ozark Highlands of Missouri (these regions are disjunct by more than 600 km). This study examined the genetic variation within and among populations of *D. exaltatum* from the Appalachian Mountains and the Ozark Highlands in order to assess the effects of geographic isolation. The phosphoenol-pyruvate carboxyl (PepC) 4th intron was amplified and successfully sequenced from 26 individuals. Aligned sequences displayed variable bases shared among several populations, and then UPGMA analysis was used to show relationships of each sample. The data suggested populations of the Appalachian Mountains and the Ozark Highlands contain shared variation, consistent with a single *D. exaltatum* species.

**Induction of Apoptosis in MCF-7 Cell Line with Etoposide Treatment**

Marissa Kane, Senior, Biology - Biology/Physiology  
Poster  
Faculty Advisor: John Rebers

Cancer is a disease that kills millions of people annually. It is a highly evolved and is a very difficult disease to treat. The mechanism that some cancer treatments try to use is by inducing apoptosis. Apoptosis is the process by which a cell self-destructs in response to internal signals. In this experiment, etoposide was used to induce apoptosis in the MCF-7, breast adenocarcinoma cell line. Etoposide is a topoisomerase II enzyme inhibitor; cells that divide rapidly, cancer cells, are more dependent on this enzyme than cells that divide at a normal rate. Thus in theory, the DNA in the cancer cells would be prevented from religating and would be broken. The MCF-7 cells were treated with etoposide concentrations of 6.25 µM, 3.13 µM, 1.56 µM, 0.78µM, 0.39µM, and 0µM. The cells were characterized over a 24 hour, 48 hour, and a 72 hour treatment period to determine the effectiveness of the etoposide treatment. The effectiveness was qualified using Hoescht-33342 and Propidium-iodide staining. Using fluorescent microscopy, the dyes showed condensed chromatin and the progression of apoptosis.

**Databasing Specimens**

Brian Katafiasz, Freshman, Biology - Zoology  
Poster  
Faculty Advisor: Kurt Galbreath

For hundreds of years, wild organisms have been collected, studied and documented for scientific purposes. Forward-looking biologists archive these specimens in natural history museum collections so that they will be available for future research. Museum collections continue to play an important role in supporting biodiversity science, and in the Northern Michigan Museum of Zoology (NMZ) here at NMU we are focusing on building the capacity of our mammal collection to facilitate teaching and research. A major aspect of this effort is electronic databasing of our specimen data. Each specimen in the collection has accompanying data such as measurements, date and locality of collection, and reproductive information. We are uploading these data to Arctos, an online database that allows institutions around the world to manage collections and share information. Our involvement in the Arctos network will lead to greater connectivity between NMU and the rest of the scientific community, which may yield new collaborations and interactions.
Throwing of a Ceramic Cylindrical Vessel: How Height is Affected by Sensory Deprivation

Cheryl Konieczny, Senior, Psychology - Graduate Preparation  
Faculty Advisor: Mounia Ziat

Pottery is a multimodal task that involves auditory, tactile, and visual modalities. A potter relies not only on her vision to shape the clay, but also on the tactile contact with the clay and the sound produced by the potter’s wheel during the process of creation. In this study, we compared the potters’ performances to shape a round ceramic cylinder when deprived of a sensorial modality. Ceramic students were asked to shape the clay and were divided into groups: 1) participants of group 1 were blindfolded to remove the visual input, 2) participants of group 2 wore earplugs and headphones with a NRR of 62dB to prevent them from hearing the sound produced by the potter’s wheel, and 3) participants of group 3 wore nitrile gloves of 15 mil (0.381 mm) that significantly reduced the cutaneous contact with the clay. The results showed that the potters adapted very quickly to the task and succeeded to shape the cylinder despite the deprivation of one of their sensorial modality.

Ontic

Michael Lagerman, Senior, Philosophy – Philosophy/Art & Design  
Faculty Advisor: Christine Lenzen

Ontic: of, relating to, or having real being or existence. Ontic is a photographic presentation of a philosophical inquiry. Involving an existential thought about the "Idea of Others," my aim is to portray the distorted perception of self. This distortion is a byproduct of the unspoken guidelines of social norms enforced by the Others.

The Aftermath of Citizens United

Luke Londo, Senior, Political Science - Political Science  
Faculty Advisor: Ruth Watry

This research delves into the electoral landscape in the wake of the Citizens United decision, and whether or not the ramifications are as bleak as initially predicted.

The Religious Nons: Atheist/Agnostic Pre-Service Teachers

Holly Mathys, Graduate Student, Education, Leadership, and Public Service - Learning Disabilities  
Faculty Advisor: Derek Anderson

The purpose of this case study was to investigate how four American Atheist/Agnostic (A/A) elementary pre-service teachers (PSTs) planned, taught, and reflected on a world religions field experience with 7th-grade students, as well as to examine the role of self and professional identity. Data sources included at least three interviews with each participant, lesson observations, and document analysis of their lesson plans and reflection journals. All four of the PSTs experienced discrimination and exclusion during childhood because of their lack of religiosity. The A/A PSTs desire to teach in a manner that promotes critical thinking and student interpretation of historical events, yet they are indifferent about ubiquity of religion in schools and are nervous about offending students and parents. A/A teachers are likely to feel isolated and marginalized, which are key factors in teachers leaving the profession.

Trends in the Delivery of Special Education Services

Holly Mathys, Graduate Student, Education, Leadership, and Public Service - Learning Disabilities  
Faculty Advisor: Joan Cowell

Qualities that highly effective teachers possess have been the center of extensive research. Research has identified that effective teachers must be strong in content knowledge and clinical experience. With the increasing responsibilities demanded of school districts, stakeholders in the schools require even novice teachers to be competent and meet the needs of all their students. This research focused on the
trends in the delivery of services utilized by school districts to support special education students. Resource Room teachers, Learning Disability teachers, and Teacher Consultants in the state of Michigan were surveyed. The participants’ endorsements, their present teaching placement and their student caseload special education eligibilities were reported. Student eligibilities were compared to the teacher’s endorsement. Disparity between endorsements and student eligibilities were found. An opinion question was used to determine what skills would have helped the teacher to meet the needs of his/her student in a more confident, effective manner.

**Being Removed**

Brent Maynard, Senior, Art and Design - Photography

Art Display

Faculty Advisor: Dennis Staffne

For this series I am bringing attention to the rapidly accelerating rate of extinction facing planet Earth. I created these photographs to communicate that as a society we need to pay attention now and take corrective measures or these invaluable creatures will be gone forever. I removed the shape of these animals from their natural habitat using a laser cutter to represent that these animals are being removed from the planet with the help of modern technology. As a society that shares images of absolutely everything, we are used to seeing images on television, calendars, phones, and computers of these cute furry animals and we do not realize that in a short amount of time some of these animals could be gone from this planet. As humans we take familiar items for granted and we never notice until one day something is missing.

**Reading of “Children,” A Creative Work**

Robin McCarthy, Graduate Student, English - Creative Writing/Fiction

Presentation - LRC 235B at 12:15 p.m.

Faculty Advisor: Jon Billman

“Children” is a chapter of an untitled novella created over the course of EN 640, Form and Technique in fiction and nonfiction. “Children” is not wholly factual, nor is it fiction. It is in this murky intersection of truth and imagination that the story aims to utilize the tools of fiction to illuminate truths only hinted at within the facts.

“Children” tells the story of a group of local youth in a remote village in rural Labrador, just south of the Arctic Circle in Canada. The author has visited this village on several occasions, and “Children” is intended to reproduce those experiences in a way that we might find deeper meaning in travel to forgotten places.

**Divided Government and The Budget**

Crystal McGlone, Freshman, Political Science - Political Science

Poster

Faculty Advisor: Ruth Watry

This project uses case studies to examine the budget process within the context of divided government, and media involvement.

**History Department Web Pages**

Erin McNabb, Sophomore, History - Secondary Education/Social Studies

Presentation - LRC 235B at 10:45 a.m.

Faculty Advisor: Gabe Logan

Difficulty, frustration and confusion has always surrounded college student planning out what courses they need to take in order to fulfill all of their requirements. While working with Dr. Gabe Logan, I set up a website for secondary education social studies, history, political science, economics, as well as geography majors and minors that puts all of the program and liberal studies requirements in one place. In addition, a history degree for most people means teaching. I added a tab to the history department website detailing the many things that can be accomplished with such a degree. With the new social media age, a NMU history department Facebook page has been added to the cyber presence of the department.
A Need for Sustainable Development of Tourism in Phuket, Thailand

Kathryn Meade, Freshman, Earth, Environmental, and Geographical Sciences – Environmental Studies and Sustainability and Biology
Faculty Advisor: Susy Ziegler

Poster

The coastal environment attracts vast numbers of tourists annually. The Island of Phuket, Thailand, has become a major tourist destination, although 20 years ago it was used solely for its rice cultivation. This shift toward tourism has caused a large change in the environment and socioeconomic state especially in the Patong Beach area. The impact of the tourism industry has caused much destruction to the environment in Patong Beach, Phuket. To prevent total environmental devastation, a sustainable alternative needs to be found. To determine the environmental impact from tourism, I have gathered and analyzed environmental assessment reports, water quality experiments, reports from Thai natives and tourists, and personal observations. Though the destruction cannot be reversed, restorative measures and future development strategies will enable Patong to become sustainable. Environmental management on sewage discharge, shoreline erosion, and maintenance of beaches and natural vegetation need to be the center of attention, rather than more businesses to support the increased number of tourists. The actions of the tourists along with the Thai natives need to be regulated and restrained when it negatively affects the natural environment.

Effects of Androgen Receptor and Testosterone on Partner Preference

Gerard Miller, Senior, Biology - Secondary Education/Biology
Faculty Advisor: Carl Wozniak

Poster

It has been well-researched that sex hormones such as testosterone (T) can masculinize the male brain during development. It was originally thought that T organized the brain via conversion to estradiol, binding with estrogen receptors. However, recent evidence suggests that T may also masculinize the brain directly by binding to androgen receptors (AR). During adulthood, T activates male-typical behaviors, which include investigation of female odors and mounting. We tested the hypothesis that AR is necessary to organize the brain during development for the sexual differentiation of the response to olfactory cues and that hormones are necessary during adulthood to activate partner preference behavior. Adult male and female mice will be gonadectomized and given either a T capsule or a blank capsule. Subjects will then be placed in a Y-maze and undergo a partner preference test with a female scent donor in one arm and a male scent donor in the other. If differences exist in the amount of time spent investigating scent donors between male and female subjects given T may suggest a role for AR in organizing the brain to respond to olfactory cues. Subjects given blank capsules will serve as a control group, to support evidence that sex hormones are necessary produce these olfactory investigation cues in subjects. We predict to see males given T spend more time investigating the arm with the female scent donor, while we expect the females given T and the control group to show no preference, supporting our hypothesis.

Train the Trainer, Experiential Education (T2E2)

Andrew Mills, Graduate Student, Education, Leadership, and Public Service - Learning Disabilities
Faculty Advisor: Mitchell Klett

Poster

The current scientific consensus on global climate change based on climate science is recent warming indicates a fairly stable long-term trend in which serious damage may result if steps are not taken to halt the trend. There is a small but vocal number of scientists in climate and climate-related fields who disagree with the consensus view. The development of a scientifically literate and knowledgeable citizen is critical to becoming an informed voting body. This project proposes an avenue for developing scientifically literate and knowledgeable citizens through a train the trainer, experiential education (T2E2) model which will effectively bring these important subjects into classrooms. Teaching climate science supports the Next Generation Science Standards (NGSS) implementation through an integrated Earth system science approach in K-12 education. The purpose of this project is to detail a study based on two successful educational programs. NMU students will be working with middle-school level
students to learn concepts and teaching methods. These middle school students will then apply this knowledge to their own teaching of elementary level students.

**Method Validation in the Clinical Laboratory**

Kelsey Mitchell, Senior, Clinical Sciences - Science Technology  
Poster  
Faculty Advisor: Mary Stunkard

Method validation is performed in the clinical laboratory each time a new methodology or instrumentation is put into place. The goal of a validation study is to determine the degree of error that might affect the medical decision making by the physician. The criteria used in method validation was established by the Clinical Laboratory Improvement Act (CLIA ‘88) Final Rule which require that laboratories verify, among several items, the precision and accuracy of laboratory methods implemented after April 24, 2003.

**Effects of Seed Dispersers on Plant Distribution**

Emily Mydlowski, Senior, Biology - Biology/Ecology  
Poster  
Faculty Advisor: Alan Rebertus

An examination of mammal and myrmecochorous seed dispersers leads to further understanding of the role dispersers have on the distribution and structure of plant populations. Seed dispersal dynamics presumably influence plant processes ranging from colonization of new habitats to maintenance of diversity, with implications for succession, regeneration and conservation (Wang and Smith 2002), as well as coevolution of plants and invertebrate seed dispersers.

**Effects of Timber Harvest on American Black Bear Space Use**

Donald Norton, Graduate Student, Biology - Biology  
Poster and Presentation - LRC 235B at 3 p.m.  
Faculty Advisor: John Bruggink

Timber harvest can influence the composition and abundance of foods for American black bears (*Ursus americanus*). Also, variation in food availability is the primary source of seasonal changes in black bear space use. However, the effects of timber harvest on black bear space use are variable and have not been sufficiently investigated. Animal distribution theory’s ideal free distribution model predicts that black bears will use timber harvested areas in proportion to their quality as bear habitat. I will use black bear locations in the Escanaba River State Forest in Michigan’s Upper Peninsula, USA, to address the hypothesis that black bear space use in response to available forage is consistent with the ideal free distribution model. For each bear location, I will calculate distance from road, land cover type, timber harvest method, extent of harvest, forest type, and time since harvest. Generalized linear mixed models (GLMMs) will be used to estimate seasonal black bear resource use. GLMMs with appropriate random model structure will be used for final analyses and include sex, season, distance from road, land cover, timber harvest method, extent of harvest, forest type, and time since harvest as fixed effects, the number of black bear locations during each season will be the response variable. Identifying the effects that certain timber harvest characteristics have on black bear space use may be beneficial to forest and wildlife managers developing management strategies for black bears.

**Out of Place: A Learning Experiment in Environmental Education**

Melissa Orzechowski, Sophomore, Communication and Performance Studies - Communication Studies and Environmental Studies and Sustainability  
Presentation - LRC 235B at 1:30 p.m.  
Faculty Advisor: Jessica Thompson

Environmental education and communication during elementary and middle school is important because life-long environmental beliefs are still developing. Most environmental education events for urban and suburban children have focused on bringing the children into the wilderness, yet it is difficult for a foreign wilderness environment to connect later when the children are making environmental choices in their daily lives. Our research question asks: Does environmental education and communication work outside of the direct context of the environment and can discourse fill the “place” of the direct experience in an environment? We invited elementary and middle school students to an
environmental education event on the campus of our university. University student-led groups, with various expertise and interest in environmental topics were invited to lead “environmental communication stations.” The interactive lesson at each station lasted about twenty minutes, and was adjustable to various age levels. The student groups designed their station’s lesson and had free range to focus on any environmental topic. In this paper, we discuss the successes, failures and opportunities to sponsor and organize “out of place” environmental education and communication events for any university or non-nature setting.

Reacting to the Past--The Weimar Republic in Crisis: Germany, 1929-1932

Annika Peterson, Freshman, History - History
Poster

Faculty Advisor: Robert Goodrich

“Reacting to the Past” is a series of role playing games designed to teach students about the past through the simulation of a historically accurate political debate, supplemented with reading and writing assignments. Professor Goodrich is creating a game for the series about the Weimar Republic in Germany in the late 1920s. Students play as a member of the Reichstag and have to argue as their character tries to get their agenda passed and shape the future of Germany.

My role in this project was a student proofreader and editor. I helped to edit drafts of the manuals and gave my feedback on what students would find confusing, helpful, or interesting. I also created lists of potential secondary and primary sources about the time period to help Professor Goodrich create a list of readings for players to learn about their characters and the issues. I also searched for artwork from the period to use for the game cover.

Now, we are test running the game in one of Professor Goodrich's classes. I am playing in the game as well as recording my observations from the student perspective of how well the game is working and what might need to be changed.

Detection of Explosives Extracted from Potential Crime Scene Evidence Using Gas Chromatography with Mass Spectrometry

Alexis Pomplun, Senior, Chemistry - Forensic Biochemistry
Poster

Faculty Advisor: Eugene Wickenheiser

An explosive device can leave detectable residues at the site of detonation and at the location where the device was assembled. While preparing an explosive device, most criminals are probably not aware of the potential vapors being given off by the chemical compounds they are working with, although they are actively trying to conceal what they are doing. Components of explosives, such as 2,4-dinitrotoluene (DNT), can adsorb to the surface of the materials criminals use to conceal their illegal activities and identity. If DNT is found to be a component of the explosive used at the crime scene and is also detected in materials found in possession of the criminal, the DNT can then be used as supportive evidence of the crime.

In this study, an array of materials that may adsorb DNT was investigated using gas chromatography/mass spectrometry (GC/MS), an instrumental method commonly used in forensic laboratories. Gloves, paper, pencil erasers, and plastic totes have been exposed to DNT, extracted, and analyzed using the GC/MS. Based on our research, DNT was detectable in glove and paper samples, but the tote and pencil erasers need longer exposure in order to draw a conclusion.

Designing an Intraoperative Assay to Detect the IDH-1 Mutation and MGMT Methylation in Glioblastoma

Patricia Rempala, Sophomore, Clinical Sciences - Clinical Laboratory Science
Poster

Faculty Advisor: Catherine Bammert

Due to the heterogeneity of malignant gliomas, it’s difficult to provide accurate prognoses and the best course of treatment without determining the individual genetic signatures. The aggressiveness of surgery and the use of intraoperative therapies could be modified in the operating room if the status of
genetic mutations (IDH1) and methylations (MGMT), for example, were provided to the neurosurgeon before the time of closure. Yet, current methods are too slow to provide surgeons with these signatures. IDH1 genetic mutations are commonly associated with astrocytomas and oligodendrogliomas and may also be found in 17% of glioblastomas (GBM). Patients with GBM that have the IDH1 mutation experience prolonged survival as their tumor acts like a less aggressive cancer. MGMT is a gene that codes for a DNA repair enzyme. If the MGMT gene is methylated or epigenetically silenced, patients with GBM tend to have a better response to temozolomide, a commonly used alkylating chemotherapy agent. The purpose of this study was to develop a rapid intraoperative PCR assay (<25 minutes) to detect the IDH-1 mutation and the MGMT methylation status in glioblastomas. This genetic information will allow the neurosurgeon to determine an individualized treatment plan for the patient during surgery.

Kinesthetic Memory Adaptation in Flute Players

Andrea Savord, Graduate Student, Psychology - General Psychology
Faculty Advisor: Mounia Ziat
Presentation - LRC 235B at 10 a.m.

This study investigates well-practiced (8 or more years of experience) flute players in a kinesthetic memory adaptation task. Each participant played the C-major scale ten times in three different conditions: CTL, MOD1, and MOD2. For the CTL condition, participants used the traditional flute and standard fingerings. By using a modified flute, MOD1 and MOD2 conditions required flipping the right hand to be on the same side as the left hand; for the MOD1 condition, participants played using the same fingers to play the scale, while for the MOD2 condition they played the scale using the same keys. Using Narmour’s (1990) implication-realization model of melodic expectancy, it was expected that participants would adapt more quickly to the MOD2 condition than the MOD1 condition, as the MOD2 condition produces sounds consistent with those expected in the C-major scale. Interestingly, the preliminary results show no difference in performance times between the MOD1 and MOD2 conditions.

DNA Methylation in Genomically Imprinted Genes of Hybrid Mice

Ethan Scott, Senior, Biology - Biology/Ecology
Faculty Advisor: Katherine Teeter
Poster

As a major exception to Mendel’s laws, imprinted genes may have effects in biomedical phenomena like mental disorders and cancers, and may influence speciation in mammals. A common explanation for the silencing for one parental allele but not the other is differential methylation in regions of imprinted genes called imprinting control regions (ICR). A loss of this methylation in the cytosine residues of cytosine-guanine dinucleotides (CpG) can perhaps explain the hybrid inviability and disorders in a small number of mammals. This investigation examined the ICRs of four known imprinted genes (Grb10, Mest, Peg10, and Zim2) in Mus musculus, Mus domesticus and their hybrid offspring for possible losses in methylation. We discovered for the paternally expressed gene Peg10, the ICR is indeed differentially methylated, but this methylation is preserved in all F1 offspring.

The Ebbinghaus Illusion in the Tactile Modality

Erin Smith, Graduate Student, Psychology - Experimental Psychology
Faculty Advisor: Mounia Ziat
Poster

In this poster presentation, we report evidence for the existence of the Ebbinghaus illusion in the tactile modality. Participants were asked to bimanually explore two sets of Ebbinghaus circles while blindfolded. The results show that the participants are more likely to be deceived when the illusory stimulus is present compared to when a stimulus that does not present the illusion is present. These results contribute to the perception-action debate and the two-stream hypothesis, which states that the pathways for action and perception are separated in the visual system.

Seaborg Center College For Kids Summer Survey Reconstruction

Molly Smith, Sophomore, Education, Leadership, and Public Service - Special Education
Faculty Advisor: Joe Lubig
Presentation
The search began as a data analysis of the Summer College for Kids Pre-Test and Post-Test surveys. Based on fifteen contact hours with a classroom teacher from local school districts in a particular subject area, we expected to see measurable leaps in the question scores. However, upon extensive data analysis, I discovered that there was no significant change from pre-test to post-test. This was alarming, as the program is highly praised and popular. The question then arose that it could be an issue with the surveying tool, not the program itself. I then began to re-evaluate the surveys to see what we were attempting to address and compare that to what the actual questions we were addressing. I discovered a lack of purpose to the questions and an overall generalization that made change from pre-test to post-test seem improbable. I began to compile a list of questions to determine the objectives of the College for Kids program. Upon conducting interviews with the director of the Seaborg Center and the coordinator of the College for Kids program, I collected a list of goals for the program and separated these into five categories, which were used to create a new survey.

**N-Benzoyl-N’-dialkylthiourea and N-Benzoyl-N’-diphenylthiourea Complexes of Co(III).**

Suzy Solin, Senior, Chemistry - Chemistry
Poster

Faculty Advisor: Lee Roecker

N-Benzoyl-N’-dialkylthiourea and N-benzoyl-N’-diphenylthiourea ligands react with \([\text{en}]2\text{Co(OSO}_2\text{CF}_3\text{)}2^+\) to form two main complexes—one in which a single ligand displaces the labile trifluoromethanesulfonato groups binding in a bidentate manner through the S and O and another complex in which all of the original ligands about the Co(III) have been replaced. The synthesis and characterization of these complexes will be described.

**Campaign Simulation to Increase High School Students’ Skills for Civic Engagement**

Taylor Tillotson, Senior, Education, Leadership, and Public Service - Secondary Education/Social Studies
Poster

Faculty Advisor: Judith Puncochar

Short-term campaign simulation activities adapted from the American Association of University Women and Running Start’s Elect Her Campus Women Win workbook (http://www.aauw.org) were investigated in secondary social studies classrooms. Sixty-six students in three Advanced Placement U.S. Government classes engaged in a two-day communications-focused elections simulation workshop. Differences in knowledge of civic engagement as measured on pre- and post-surveys reached statistical significance. Qualitative responses revealed knowledge gains regarding campaign strategies and use of elevator speeches. Engaging in a constructivist, interactive workshop appeared to hone high school students’ civic engagement skills and knowledge when applied to real world settings beyond the classroom.

**The History of Nostalgia, Where the Term Originated and How it Evolved to the Present Meaning**

Robert Torrence, Graduate Student, Psychology - Psychology
Poster

Faculty Advisor: Harry Whitaker

Nostalgia has become a contemporary term often times used to describe the cliché, reminiscing about “the good old days.” Some of the earliest literary works, the Bible, Homer’s Odyssey, and Dante’s The Divine Comedy, refer to a sentimental reminiscence in a nostalgic sense as it is used today despite the absence of the term. Johannes Hofer coined the term nostalgia in his Dissertatio Medica de Nostalgia in 1688, defining an intense desire to return home that may cause physical illness or simply, homesickness. The concept of nostalgia slowly pervaded the medical community first considered only to be a Swiss disease. Eventually, the disease was accepted to afflict a more extensive population, thereby becoming adopted by the rest of Europe and the Americas. Despite the characteristic symptoms and the generalized diagnosis, not everyone accepted nostalgia to be a legitimate disease; for example, some considered it a cowardice reaction. After the American Civil War, nostalgia as a medical condition fell into disuse despite its definition as a medical condition for nearly three centuries. Evidence of the sentimentalized nostalgia is clear in some of the earliest literature, not as a medical condition, but as the romanticized, reminiscent concept it is considered today.
The Effect of High-Fat Animal Based Diet to Low-Fat, Plant-Based Diet on Cognitive Function in Mice

Robert Torrence, Graduate Student, Psychology - Psychology  
Poster  
Faculty Advisor: Sheryl Reminger

Obesity is correlated with a number of health problems including cognitive dysfunction. Research has shown that a diet high in saturated fatty acids induced cognitive dysfunction, but the research has not examined whether the dysfunction can be reversed through diet alone. The purpose of this study was to induce cognitive dysfunction in mice through diet, and then attempt to reverse the symptoms through diet alone. This study had two hypotheses: (1) after three months of a diet high in animal derived saturated fatty acids, cognitive function would decrease, (2) the diet induced cognitive dysfunction would be reversed through altering to a low-fat diet. This study used 27 mice divided up into three groups: control high-fat diet, control low-fat diet, and experimental group. An eight-arm radial maze was used to assess memory. The two control groups remained on their specified diet throughout the experiment. The experimental group ate a high-fat diet for two months and then tested for memory. The diet of the experimental group was then switched to a low-fat diet for three months and tested again. The results indicate that diet induced cognitive dysfunction can be reversed by switching to a low-fat diet.

Using Object Oriented Program Design in a Monte Carlo Particle Simulation

Matthew Trefilek, Freshman, Physics - Computer Science  
Presentation - LRC 235B at 9:30 a.m.  
Faculty Advisor: William Tireman

In this modern age, we have a desire to understand. We as humans want to understand how and why everything happens: from global events to particle physics. But how can humans measure particles they cannot even see? Scientists use particle transport simulations to aid in the design of experiments which are meant for extending our knowledge of the world. Today, advanced simulation software is being offered to any researcher that is stronger than anything that came before it. This availability and power comes from a relatively new concept of programming called Object Oriented Programming. This concept separates every object into its own entity. By utilizing this concept, simulation software like GEANT 4 (a particle physics simulation tool created by the CERN laboratory in France) can save power and speed while allowing for more advanced and fine-tuned simulations to better our understanding of the world around us. Topics discussed will include the enhanced speed, efficiency, and portability that come from the use of Object Oriented Design.

Abundance of Fish Found in Submerged Aquatic Vegetation Habitat in the Lower St. Johns River, Florida

Shaley Valentine, Senior, Biology - Zoology  
Poster  
Faculty Advisor: Russell Brodie

Submerged aquatic vegetation (SAV) provides numerous economic and ecosystem benefits including stabilizing shorelines, preventing soil erosion, improving water quality, and providing food, cover, and nursery habitat. In the St. Johns River, Jacksonville, Florida the Florida Fish and Wildlife Conservation Commission’s (FWC) Fisheries Independent Monitoring Program manages nekton species. The Lower St. Johns River (LSJR) was the focus of this study, and data collected using seine and trawl nets from 2006-2012 were used. The objective of this project was to determine whether fish are found more often in SAV habitats rather than bare substrate habitats. Contradictory to other studies, the results of this study showed fish communities in the LSJR are not significantly different in areas containing SAV compared to bare substrate. Percent cover of SAV and species diversity of SAV does not affect community composition either. However, at a species level, 11 of the 20 commonest species were significantly associated with SAV including economically important species of Atlantic croaker (Micropogonias undulates), Bluegill (Lepomis macrochirus), Pinfish (Lagodon rhomboides), and Largemouth bass (Micropterus salmoides). This data will be used to improve the FWC’s management system, especially in the face of detrimental dredging and water consumption projects.
An In-Depth Analysis of Winter Ice Conditions of Several Streams Located in Michigan’s Upper Peninsula

Joseph Wagner, Graduate Student, Biology - Biology

Poster

Faculty Advisor: Jill Leonard

Winter can be an especially difficult season to endure for many fishes inhabiting streams at northern latitudes. However, our understanding of this critical time period is limited due to the logistics associated with winter field work. Ice cover is an important component of winter stream ecology and this study examined the ice conditions of several tributaries within a major watershed located in Michigan’s Upper Peninsula. Time lapse photography was used to record ice conditions on an hourly basis for the duration of the winter season. These images were then analyzed and the types and amount of ice cover were determined for each of the streams. Temperature loggers were also deployed at each of the study sites to monitor water temperature. The results from this study reveal the dynamic nature of northern streams during the winter season. It was also demonstrated that ice cover can vary significantly between streams, even within a relatively small geographic region. Ice conditions likely have a substantial effect on the overwintering ecology of many fishes and may be an important habitat feature to consider when evaluating streams, especially when regarding continued climate change.

Haptic and Exoskeleton Devices for Neurorehabilitation of Upper Limb Paralysis: A State of Art and a Night Landing Task

Samantha Wagner, Graduate Student, Psychology - Experimental Psychology

Presentation - LRC 235B at 1:45 p.m.

Faculty Advisor: Mounia Ziat

Rehabilitation is an important training phase for those suffering from upper limb paralysis as a result of brain injury. When successfully completed, the re-trained limb should be able to successfully complete daily life activities. An alternative to traditional therapy is the usage of effective rehabilitation by using haptic devices in a virtual environment. The type of haptic device and task are crucial for the success of the therapy training sessions. After presenting a state-of-art literature review of several haptic devices that have been used in research and clinical facilities, we thought to use the black hole illusion (BHI), a night landing illusion, as a potential way to investigate the benefits of using a haptic device in a featureless environment. The purpose was to explore whether under a visual clueless environment, individuals could rely on their tactile and haptic modality to perform a task. More specifically, we asked the participants to land a virtual object during featured (F) and featureless night conditions (NF); with (H) and without haptic feedback (WH). The results showed that haptic feedback aided featureless night landing along the mediolateral direction. However, this benefit was less evident in a featured condition suggesting that participants were relying on visual cues during the task. This confirms previous findings related to night landing that the BHI is due to the fact that experienced pilots rely mainly on the visual input during the glide.

Selection from "Where I Belong"

Joy Weitzel, Graduate Student, English - English/Writing

Presentation - LRC 235B at 11:45 a.m.

Faculty Advisor: Matthew Frank

This thesis project produced a creative nonfiction chapbook about my ancestors, the Duckworth family, in West Virginia from 1830 to the present. The Duckworth’s were farmers who came to West Virginia from Maryland in the 1830s. They witnessed the growth of industrialism, the toils of migration, the extension of the B&O railroad, and the eruption of wars such as the American Civil War, World War I, and the Korean War. I will read the first essay entitled, "Coal Land," that begins my ancestor’s journey to West Virginia. It plays with the impact of coal mining on those dependent on agriculture, lyrically rendering history and biography.
Lake trout (*Salvelinus namaycush*) are a keystone predator in Lake Superior and are of great importance both ecologically and social-economically. There are four known morphotypes defined by bathymetry and are sympatric in the waters surrounding Isle Royale. Of the four morphotypes, the two most commonly known forms are lean, which inhabit the shallower waters, and the siscowet, a deep water form which is also the most abundant. The two less known forms are the humper, which inhabits offshore sea mounts, and the recently documented redfin, which inhabits intermediate depths. Even though the morphotypes seem to occupy different depth ranges, there is little known of the ecological interactions between them. We analyzed diet data collected during June, August, and October of 2013 at Isle Royale and used Schoener's overlap index to assess the potential for competition among the four morphotypes. This paper represents the first reporting of diet of all four lake trout morphotypes.