

Student Summer Scholars

Summer Showcase

August 5, 2010

Pere Marquette Room, Kirkhof Center

4:00 PM – 7:00 PM

Welcome to the 2010 Student Summer Scholars' Summer Showcase!

The Student Summer Scholars (S3) Program provides funds for a student and faculty mentor to devote twelve weeks to a research and/or creative project during the spring/summer semester. Through these grants and the mentorship of a faculty member, the S3 program offers a unique opportunity for undergraduate students to do hands-on, professional research and creative practice in their chosen field. Combining academics, field work, and a reflection component provides students with a meaningful learning experience that helps to prepare them for graduate school and future careers.

For each S3 participant, the project begins with an innovative and thoroughly researched proposal. With guidance from faculty mentors, students identify a research question or an area of creative practice, and then shape the structure of their project. The value of mentorship is an important part of S3. Experienced faculty mentors act as support and a sounding board for their students.

Through S3, students begin to direct their own educational paths and familiarize themselves with the requirements and structure of professional research. Participants quickly learn that a successful project requires more than scholarship. Detailed planning, attention to budget, and creativity allow student researchers to innovate while working in a self-structured environment, and to cope with unexpected complications. By building on a foundation of academic and critical thinking skills provided by undergraduate courses, self-motivated students can use S3 to further their knowledge in a specific area while learning to incorporate academics with professional work.

The project's critical assessment component requires each participant to reflect on and evaluate his or her own project and the S3 experience as a whole. This comprehensive analysis of a self-directed project provides students with an opportunity to examine their own learning styles and academic strengths in order to shape further learning and working habits. S3 provides students with a new lens through which to view their long-term educational, work, and life plans.

We thank you for joining us for this important step in the learning process, and we know you will enjoy seeing the S3 Scholars' work thus-far.

2010 Student Summer Scholars

Matthew Boeve
Katherine Butler
Kelsey Crowley
Josua Davis
Trevor DeWaard
Lena Drake
Kendall Gilbert
Tamara Hillman
Susan Krizmanich
Min Lee
Andrea Lowing
Alex McDonald
Bertil Nshime
Douglas Peterson
Jennifer Phelan
Daniel Rhode
Nichole Rydahl
M. Andrew Sanford
Shawna Tanner
Andrew Taylor
Jennifer Torreano
Julie Wesselink
Shawn Wright

Order of Events

4:00 PM – 4:45 PM Poster Presentations and Hors
D’ouvres

Presenters

4:45 PM – 5:00 PM Remarks by Robert Smart, Executive
Director of the Center for Scholarly
and Creative Excellence

5:00 PM Dinner

5:30 PM – 7:00 PM Oral Presentations

Presenters

Matthew Boeve
Faculty Mentor: Daniel Bergman, Biomedical Sciences

Visual learning and discrimination of abstract shapes by crayfish

In nature, animals commonly experience various combinations of stimuli at various points in time. When two or more stimuli are detected at the same time using different sensory systems, there is the potential for an association to form between the stimuli. The animal may learn and show a response originally associated with one stimulus when it now detects the second stimulus. These stimuli are the unconditioned and conditioned stimulus of classical conditioning. Many species of animals are known to learn by classical conditioning and a variety of responses can become associated with formerly neutral stimuli. Crayfish for example can learn new danger signals by association with the unconditioned cue of alarm odor, but can also learn to recognize stimuli associated with food as indicators of a feeding opportunity, and even learn social status through visual and chemical signals. Based on the results of our study, we will be able to make a definitive statement about the capabilities of crayfish to associate abstract visual shapes with food rewards. The classical conditioning trials for many days involve giving the crayfish a five-minute acclimation period in the testing tank and then releasing them for twenty minutes to explore and view the visual symbol in the presence of food each day. Eventually the food reward is removed after repeated exposure and if a learned association between the visual symbol and food reward occurs, we would expect crayfish spending a larger amount of time in the section of the tank with the reward symbol even when food is absent. Preliminary indications are that they are in fact capable of learning abstract visual symbols.

Katherine Butler
Faculty Mentor: Julia Mason, Women and Gender Studies

Does Gender Still Matter?: Women Physicians' Self-Reported Medical Education Experiences

The Women's Health Movement, which grew out of the Second Wave feminist movements of the 1960s and 70s, worked to call attention to gender bias and discrimination in medical training in the United States. Two interrelated problems were identified. First, women were under-represented both as students and faculty in medical schools. Second, the curriculum was overwhelmingly centered on men. In order to address these issues many medical schools developed programs to recruit women which has led to a substantial increase in the number of women attending U.S. medical schools (Shreier et al., 2007). However, simply increasing women's participation has not eliminated gender bias in either the curriculum or the treatment of women medical students. A study published in 2007 found that "sexual harassment and gender bias remain stubbornly entrenched in medical training" (Shreier et al., 2007, 893).

Building on previous research, this study is designed to contribute to feminist understanding of women's medical education experiences through an in-depth analysis of self-reported experiences of women physicians. One-on-one interviews will be conducted with approximately sixteen women doctors who graduated from a medical school in the United States. In addition to questions about blatant acts of harassment and discrimination, the interview will also include questions about overall experiences, course content, curriculum and mentorship programs, and preparedness for interaction with female patients. The goal of this research is to provide a rich analysis of particular women's medical training experiences.

Kelsey Crowley
Faculty Mentor: Martin Burg, Biomedical Sciences

Localization of serotonin and histamine-containing cells in the larval CNS of *Drosophila melanogaster*

The function of histamine in the *Drosophila* nervous system has been linked to photoreceptors and other sensory neuron communication with the nervous system. Histamine is also present in the central nervous system (CNS), although the function of these cells has not been established. The enzyme that catalyzes the formation of histamine is histidine decarboxylase (*Hdc*). Our lab previously created a gene fusion (pHdc-eGFP) between the transcriptional control region for the *Hdc* gene and the Green Fluorescent Protein (eGFP). Previous work has shown that in the pHdc-eGFP flies, cells that express eGFP also contain histamine, demonstrating co-localization of histamine and *Hdc* gene expression. The pHdc-eGFP flies are being used in this project to mark the presence of histamine-containing cells, allowing the localization of an additional neurotransmitter to determine the spatial relationship between histamine-containing and other neurotransmitter containing cells.

Immunocytochemical techniques were used to visualize both eGFP and another well characterized neurotransmitter (serotonin) using indirect immunofluorescence, in order to examine the spatial relationship between the pattern of histamine-containing cells to that of serotonin-containing cells in the central nervous system at the larval stage. Serotonin has been shown to contribute to the larva's response to light and control of locomotion, amongst other functions. Using the pHdc-eGFP flies enables us to identify histamine-containing cells without using the histamine antibody, which is difficult to use in combination with the serotonin antibody, as the best antisera available for both serotonin and histamine cannot be used together. We have been able to compare the localization of histamine and serotonin cells in the CNS using the approach described. Preliminary results suggest that the relative location of histamine- and serotonin-containing cells differs from one segment to the next, with more serotonin cells being detected in each segment. Serotonin seems to be more widely distributed within the CNS than histamine, suggesting that the role for histamine may be less widespread than that for serotonin. Further investigations into changes that occur in the relationship between histamine and serotonin localization in various developmental stages are currently being pursued.

Joshua Davis
Faculty Mentor: Stephen Matchett, Chemistry

Mapping the Reactivity Surface of Metal-Olefin Reactions

Among the basic organic molecules, there is the olefin. The olefin possesses two carbon atoms double bonded to each other. When a metal is bonded to the double bond in the olefin, the resulting metal olefin compound can be used as an intermediate to make many other compounds. In understanding how these metal-olefins react, better industrial processes can be developed. The metal to olefin bond is not always symmetrical. Depending on what is bonded to either carbon atom, the metal can be displaced closer to one carbon or another. The purpose of this study is to understand how the asymmetry of the metal olefin can affect the rate of nucleophilic attack. Previous studies suggest that as the asymmetry of the metal olefin increases, the rate of nucleophilic attack also increases, but only to an extent. If the asymmetry is too large the reaction stops completely.

In order to optimize the symmetry of the metal-olefin, the rate of nucleophilic attack must be measured by using several derivatives of metal-olefins. The symmetry of these derivatives will vary and be well characterized. Our goal is to develop reproducible ways of measuring the rate of these reactions. Before the rate of reaction can be measured, the initial concentrations of the nucleophile and metal-olefin must be measured accurately. The two issues that are delaying our progress are learning correct technique and solvent and reactant compatibility. Solutions of the metal-olefin complex are air-sensitive so they must be prepared under air-free conditions, with special glassware and techniques. If air is introduced into the solution during the prep of the solution or in the concentration measurement, it can lead to an inaccurate measurement of concentration. Some of the solvents we have used in our study have been shown to react with our reactants which also lead to inaccurate measurements of concentration. We are currently on our forth solvent system. With further exploration we will improve our methods enough to eventually measure reproducible kinetics data.

Trevor DeWaard
Faculty Mentor: Kathryn Remlinger, English

Identity, Language Practices and Language Ideologies Among Nepali-Bhutanese in West Michigan

The languages that we use are a result of our identities and the social contexts and related roles in which we participate. The language practices of one small community of ethnic Nepali-Bhutanese who were revoked citizenship in Bhutan, expelled into refugee camps in Nepal for nearly twenty years, and who now reside in Grand Haven, Michigan are of interest here. *Identity, Language Practices and Ideologies Among Nepali-Bhutanese in West Michigan* builds on previous research that examines the relationship between language choice and socio-cultural factors such as gender, age, language proficiency, education, citizenship, and context among multi-lingual speakers (Baquedano-López 2009, Booth 2009, Grimley 2001, Kachru et al 2009, Meinhof & Galasinski 2005, Fillmore 2000). In the current study we examine the linguistic means by which Nepali-Bhutanese negotiate American English speaking culture while simultaneously retaining their Nepali-Bhutanese languages and culture. Data include recorded ethnographic interviews, participant observation, and written texts such as email, Facebook wall posts, and essays. A potential benefit of this study is to aid ESL (English as a Second Language) tutors and teachers, social workers and the wider community of West Michigan in better serving, assimilating and welcoming this growing population. In addition, the results of the project may help trained educators, volunteers, and the Nepali-Bhutanese better understand language practices and their effects on identity, cultural assimilation and accommodation, as well as the teaching and learning of ESL.

Lena Drake
Faculty Mentor: Kathleen Blumreich, English

The Edible Body, a poetry chapbook: Food and Sex as Pleasure, Disorder, and Commodity

Food and sexuality are linguistically and culturally linked, especially through society's representations and perceptions of human bodies and experiences. The *Edible Body* explores the intersectionality of food and sex, through merged or juxtaposed poems about the pleasure, disorder, and commodity of the two topics. The feminist question of how bodies are viewed in terms of food and sex is proposed, especially with regard to women's bodies as consumable. The form of poetry is used to express researched knowledge-- including extensive readings and structured interviews with food and sex workers-- in terms of emotions and the small details of individual lives.

Kendall Gilbert

Faculty Mentor: Edwin Joseph, Geography

Using organic agriculture systems for introducing a model farming fieldwork program at Grand Valley State University

Grand Valley State University's Community Garden was established in 2008 by students who were interested in pioneering a renewed interest in gardening and agriculture while promoting local foods and developing an organic food system. According to the US Department of Agriculture, organic agriculture is "an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain, or enhance ecological harmony."

Organic agriculture is one of the fastest growing enterprises of US agriculture and agriculture continues to be Michigan's second largest industry. With West Michigan representing the largest food- growing region in the state, it is essential that Grand Valley State University recognize the need for contemporary agricultural education among college students and promotes the availability of land, resources, and research opportunities to study organic and sustainable farming methods.

The purpose of this project is to utilize the community garden for agricultural studies, research, education, and outreach which will help build enhanced opportunities for students and the campus community to engage in farming fieldwork. Our goal is to demonstrate the potential that this valuable parcel of land has for fostering creative interdisciplinary agricultural research and projects. We seek to conduct both physical and social science fieldwork that will analyze the methodology and application of organic farming methods in the community garden.

Our methodology involved three components: research, education, and outreach/extension. The research component is focused on three areas of organic agriculture practice which include improving soil fertility and crop vitality through the application of organic matter, exploring best management practices when creating organic agricultural food systems, and determining how organic agriculture can be an effective means to ensuring sustainable land management. We have performed the proposed research within raised-beds, container, and ground implanted test plots within a 2,000 sq. foot area in the community garden.

Our educational component has involved the campus and regional community by bringing in student groups to conduct garden projects. Our outreach/extension component focuses on expanding community partnerships, encouraging on- campus civic engagement and service learning, and obtaining sustainable funding sources. Through this project we developed an agriculture summer field practicum through the Environmental Studies department. We were able to partner with a number of interuniversity departments and community organizations in order to further develop agriculture programs, secure funding for the garden, and plan a community fresh food drive to be held in September.

Tamara Hillman

Faculty Mentors: Paul Keenlance, Biology; Joe Jacquot, Biology

Impacts of timber harvest on Southern Flying Squirrel survival and habitat use

The Southern Flying Squirrel (*Glaucomys volans*) (hereby after SFS) is a small, nocturnal, cavity nesting mammal commonly found in forests of the Eastern United States. Because this species requires mature trees and abundant mast, timber harvest can severely degrade SFS habitat and survival. The goal of this project is to investigate the impacts of a timber harvest on a SFS population in the Manistee National Forest of west central Michigan. The objectives are to determine habitat use, home range size and survival rates of radio collared SFS before harvest, determine the mortality rate of SFS caused by timber harvest, document dispersal distance and dispersal path characteristics of SFS leaving the area of timber harvest, and compare habitat use, home range size and survival of SFS which have relocated after harvest. The project began with establishing a study site in the Manistee National Forest which contained suitable SFS habitat, and was also scheduled to undergo timber harvest at some point during the summer. Live traps were attached to trees and baited to attract SFS in order to capture, ear tag, and fit with radio collars. To date we have four SFS fitted with collars and are working to track them during the day to find resting site locations, as well as at night to characterize habitat use during foraging. The goal is to have at least ten SFS fitted with radio collars by the time of the harvest, during which the squirrels will be monitored 24 hours per day and located every 30 minutes to confirm survival and document dispersal path. Dispersal paths will then be analyzed for habitat characteristics, and principle results will aim to include SFS home range size, survival and mortality rates, and dispersal distance and patterns. The results of this project will increase our understanding of the impacts of timber harvest on Southern Flying Squirrels, and in the future, promote the use of ecologically sound forest management practices.

Susan Krizmanich
Faculty Mentor: Colleen Lewis, Movement Science

Physical Educators Playing with Technology: Creating and Evaluating Motor Development Screencasts

According to the Beginning Physical Education Teacher Standards (NASPE, 2008), physical educators must utilize assessment and reflection to foster learning and inform instructional decisions. The goal of this study is to integrate a series of screencast activities as an innovative method to teach observation and assessment techniques. Assessment tools are typically taught in the abstract. By incorporating screencasts as a method of learning criteria for motor skills, students become more proficient in assessing skilled movement.

Effective teachers must be skilled in using a variety of assessment techniques. Research has demonstrated that there is a significant gap between assessment theory taught to pre-service physical educators and practice in the physical education setting. One of the most critical skills necessary in successful assessment is the ability to observe. Observational skills in physical education demand movement analysis and subsequent translation of this visual analysis into a series of criteria. The Test of Gross Motor Development II (TGMD II) provides criteria for motor skills taught to children in elementary school (age 3-10). In addition to the written criteria, a series of pictures are provided to assist the person performing the assessment. This study seeks to determine the effectiveness of pre-service physical educators utilizing screencasts of motor skills found in the TGMD II compared to pre-service physical educators who studied the images found in the TGMD II manual. The primary issue is whether pre-service physical educators who watch screencasts become skilled in observational techniques and thus are able to utilize these skills in the "real world" when observing children performing the TGMD II.

Min Lee
Faculty Mentor: Amy Russell, Biology

Genetic approaches to understanding the impact of wind energy on red bats (*Lasiurus borealis*)

As wind energy becomes more widespread, it is important to understand how much of an impact the industry is having on bat populations. Mortality of bats at wind turbine sites is emerging as a major environmental impact of wind power development. With high levels of mortality at wind power developments raises concerns about the long-term impacts on populations of migratory bats. Using molecular markers, it is possible to estimate N_e , which provides information on how fast genetic variation is being lost, or relatedness is increasing, in a population of interest. The estimation of N_e has seen wide application in studies of threatened or isolated populations, as the extent of genetic drift, and hence loss of genetic variation, is inversely proportional to N_e . We will use this approach to understand the demographic trends of bat populations in response to conservation pressures to expand wind farms. This study will allow us to assess the genetic health of the population, its capacity to respond to future environmental change and its population growth or decline. Data resulting from this project will provide the information necessary to understand the potential biological and ecological impacts of increased wind power development on Eastern Red Bat populations.

Andrea Lowing
Faculty Mentor: Francis Sylvester, Biomedical Sciences

Hawthorn extract - viable treatment for cardiovascular disease or unscrupulous herbal supplement?

Crataegus laevigata, more commonly known as the English Hawthorn, is a tree native to western and central Europe and parts of Asia but can also be found in the United States including the state of Michigan. The tree blossoms red and white flowers in the spring and produces bright red berries during the late summer and early fall. In the past the Hawthorn berries, leaves and flowers were used in parts of Asia to treat hypertension (i.e. high blood pressure) and other cardiovascular diseases.

It is hypothesized that extracts of the Hawthorn berries, leaves, and flowers act as a vasodilator (Chen et al, 1998; for review see Furey and Tassell, 2008) by relaxing the smooth muscle, by means of decreasing the amount of calcium that is present in the intracellular fluid. This may be accomplished by increasing the effectiveness of the calcium -ATPase pump or by altering the sodium -calcium antiport exchanger thus decreasing the amount of calcium present in the intracellular fluid. This current study evaluates the effects of the Hawthorn berry, flower and leaf on the coronary and pulmonary arteries to determine if the proposed relaxation of the smooth muscle actually occurs and to gain insight into the mechanism of action. By studying both the coronary and pulmonary arteries, it will allow us to understand how Hawthorn extract impacts specific organs.

Alex MacDonald
Faculty Mentor: Matthew Hart, Chemistry

Synthesis of Rigid Analogs of Thyronamine

The contemporary model of metabolism is centered upon the homeostatic regulation of thyroxine, and triiodothyronine. Once these potent hormones enter the bloodstream, it causes a body wide upregulation of sodium channels, increased heart rate and increased internal temperatures. Bluntly, these hormones drive growth and metabolism.

Recently, however, the discovery of 3-Iodothyronamine (abbreviated T1AM) has begun to demand a modification of the accepted mechanism of metabolism. This hormone, when delivered intravenously causes a complete inversion of physiological response to that of thyroxine and triiodothyronine. T1AM causes a decrease in cardiac drive, decrease in internal body temperatures and an overall down-regulation of metabolism. It is proposed that the mechanism of metabolism may not solely rely upon the regulation and inhibition of thyroxine and triiodothyronine, but rather the synergistic control of both the former hormones and the recently identified T1AM.

In the lab, our team is investigating methods to synthesize a more potent analog of T1AM. The effectiveness of the compound is evaluated based upon its activation of trace amine-associated receptor (abbreviated TAAR). By changing the molecular structure, the hormone's reactivity may be changed. This research holds promise for those suffering with hyperthyroidism and hypothyroidism conditions, where perhaps thyroxine and triiodothyronine levels may be better managed through the regulation of T1AM.

Bertil Nshime

Faculty Mentor: Andrew Lantz, Chemistry

Extraction of Pesticides from Contaminated Soil via Cyclodextrin Complexation

Cyclodextrins (CDs) are cyclic saccharides composed of 6-8 glucose units (α -, β -, and γ -cyclodextrin respectively), produced by microbially induced breakdowns of starch. CDs have a doughnut like shape with a hydrophobic interior, and a hydrophilic exterior, which give CDs the ability to interact with both polar and non polar compounds. Depending on the size, CDs can form inclusion complexes with non polar molecules, which then allow the complex to be soluble in a polar solvent. This ability to interact with both polar and non polar molecules has been of interest in industry since the 1980s. Since the 1980s, the drug industry has been using CDs as a way to deliver non polar medications that are insoluble in the human blood. Studies have also been conducted to determine whether CDs can be used to remove polycyclic aromatic hydrocarbons (PAHs) from industrial areas, and the removal of oral malodorous compounds which cause the unpleasant smell in the mouth.

In this study, we are interested in using different types of CDs to determine whether they can be used in the agriculture industry to remove pesticides from soil. Most pesticides are non polar, and they do not wash away with rain or irrigation water. However, if CDs are added to the contaminated farmland, the pesticides in the soil can form an inclusion complex with the CD, which will increase the solubility of the pesticide, and allow them to be washed away with water.

Douglas Peterson

Faculty Mentor: Merritt Taylor, Biomedical Sciences

The role of Nato3, a novel transcription factor, in dopamine neuron formation

Neural stem cells are cells in the developing nervous system that have the capacity to give rise to daughter cells that can mature, or “differentiate” into various different cell types. In the midbrain region of a developing embryo, a type of neural stem cells called floor plate cells have been shown to give rise to dopamine neurons.

Nato3, a basic helix-loop-helix protein, is expressed in the floor plate region of the midbrain in the developing embryo. To determine if Nato3 expression is sufficient to promote floor plate cell differentiation into dopamine neuron in the developing neural tube we are misexpressing Nato3 in the neural stem cells of the hindbrain and midbrain using in ovo electroporation. We are monitoring neural progenitors and their progeny that misexpress the electroporated Nato3 during development using a bicistronic EGFP reported expression vector.

Using immunohistochemistry we are comparing the effect of Nato3 misexpression on neural stem cells in the hindbrain and midbrain using the floor plate cell marker *Foxa2* and dopamine neuron marker *Nurr1*. If our hypothesis is correct, misexpression of Nato3 will induce neural stem cells to differentiate into DA neurons and express the dopamine neuron marker *Nurr1*.

Jennifer Phelan
Faculty Mentor: Dawn Clifford Hart, Cell & Molecular
Biology

A chemical genetics approach to elucidate mechanisms
of the fission yeast polo kinase in cell division

Cancer is a disease of improper and uncontrolled cell division. Understanding how cells divide is an essential tool for developing cancer therapies. Therefore, *Schizosaccharomyces pombe*, or fission yeast, provides an ideal model for understanding the process of cell division. Cell division is conserved from yeast to mammalian cells. While fission yeast represents a simplified version of mitosis when compared to humans, both cell types set up a contractile ring which constricts to divide the cell during the final phase of division (cytokinesis). The contractile ring is largely composed of actin and myosin but also requires multiple regulatory proteins including a protein kinase, Plo1, and a scaffolding protein, Mid1. Mid1 is essential for anchoring the contractile ring in the cell center. Cells lacking Mid1 fail to divide in the middle and often improperly segregate the genetic material. It is known that Plo1 functions with Mid1 and that this interaction is necessary for proper cell division. Previous research has shown that Plo1 activity increases during cell division but little is understood about its specific impact during cytokinesis. The purpose of this research is to better understand the specific roles of the proteins Plo1 and Mid1 during the final steps of cell division. *S. pombe* strains with mutant forms of these proteins will be analyzed for visible, phenotypic defects during cell division. By understanding the internal, molecular processes that occur during cell division it is possible to formulate a model for defects observed in diseases such as cancer.

Daniel Rhode
Faculty Mentor: Lisa Feurzeig, Music

Exoticism in the Composition and Reception of Rodgers
and Hammerstein's *The King and I* and *Flower Drum
Song*

In 1951, Richard Rodgers and Oscar Hammerstein II presented their new musical, *The King and I*, to an enthusiastic public. The musical's exotic location and the veiled, indirect relationship it depicted between the king and the English schoolteacher were new to Broadway. The musical appeared to give the audience a true view into the exotic world of Old Siam, where a harem and country revolved around a despotic king. The appearance of realism was strengthened by the fact that the musical was based on historical events from the 1860s. Anna Leonowens had indeed traveled to Siam to teach the children and wives of the king, but her own recorded experiences are much different from what was portrayed on the Broadway stage. When Rodgers and Hammerstein wrote *The King and I*, they bent the story of Anna Leonowens to fit the conventions and aesthetics of an American musical. In this talk, based on source documents from the Library of Congress, I will comment on the choices that Rodgers and Hammerstein made to portray the exotic and different nature of Siam.

Nichole Rydahl
Faculty Mentor: Stephen Borders, Public Administration

Outcome Evaluation of Emergency Food Programs in Kent County, Michigan

There are many food programs, such as soup kitchens, food pantries, and food banks that provide emergency food to individuals and families who are in need. Many of these different programs emerged in the 1980's in response to a recession. In Kent County, there are a number of agencies currently working together to tackle hunger in our community. The Kent County Essential Needs Task Force (ENTF) is a group of community leaders who help coordinate hundreds of non-profits, governmental agencies, faith-based organizations, funders, and concerned volunteers to help those in need become self sufficient. Another group that helps fight hunger in Kent County is the All County Churches Emergency Support System (ACCESS). ACCESS coordinates a network of food pantries and helps them gain the resources they need in order to provide for needy individuals and families. Feeding America is another organization that provides local pantries with food products that they use to directly serve the needy.

Our project focuses on working with these groups and figuring out the best way to provide those in need with nutritious foods. There was an increase in the ENTF funds last year and this allowed Feeding America to purchase a refrigerated truck. A refrigerated truck allowed them to transport perishable foods to the local pantries. The fund also allowed for an increase in the amount of useable storage space many food pantries needed in order to serve all of their patrons. We are looking at how the available funds were used (purchasing a refrigerated truck, increase storage space) and how it has or hasn't made a difference in the availability of nutritious foods for those in need.

M. Andrew Sanford
Faculty Mentor: John Uglietta, Philosophy

The Ethical Dimensions of Water Usage and Aquatic Invasive Species in the Great Lakes Ecosystem

In *The Land Ethic*, Aldo Leopold argues that in order to have effective ecology and conservation programs we must begin to recognize the land and natural environment as having ethical value. He asks us to add the land to our list of morally considerable entities. There will always be economic concerns that impact environmental decision-making but Leopold asks that economic considerations should not be the driving force of decisions related to the environment.

What is the value in ecosystems? How is value determined? Is there intrinsic value in the Great Lakes Basin? The economic value of the Great Lakes is well known. This economic value can be found in all of the commercial and recreational uses of the Great Lakes. However the intrinsic value of the Great Lakes as a unique ecosystem does not seem to be as well known. It seems clear that the intrinsic value of the Great Lakes can be affected by the economic use of these inland seas. At the same time the economic viability can be affected by measures taken to protect the intrinsic value. The search for or development of an understanding of intrinsic value is a complex philosophical inquiry. Australian philosopher Peter Singer argues that sentience is a necessary characteristic of something we recognize as having value. But this does not seem to help us when we realize that ecosystems, in our case the Great Lakes Basin, do not have sentience. Our ethical relation to, and the value we discover in the Great Lakes is critical to addressing environmental threats that face this unique ecosystem. Leopold recognizes as valuable the natural environment and suggests that we must preserve the integrity, stability, and beauty of the biotic community. I am investigating the meaning of Leopold's suggestion and using it to illustrate and illuminate questions of how we should understand and respond to the coming of invasive species in the Great Lakes and to some questions of water usage.

Shawna Tanner
Faculty Mentor: Brian Lakey, Psychology

Trait and Social Influences in the Link between Negative Thinking and Favorable Affect

The link between negative thinking and psychological distress is well established, however, the extent to which this link reflects both a cross-situationally stable part of personality and influences of social context has not been directly examined. Using Cronbach's and colleagues Multivariate Generalizability theory, we estimated the extent to which negative thinking is comprised of trait and social influences. Further, we examined the links of these two influences with mental health. In two studies, students rated negative thinking and affect when with or thinking about their mothers, fathers and closest peers. In both studies, we found negative thinking to be significantly comprised of both trait and social influences. Some constructs were more strongly trait-like than socially influenced, while other constructs were equally trait-like and socially influenced. Additionally, the socially influenced aspect of negative thinking was just as strongly related to favorable affect as was the trait-like aspect.

Andrew Taylor
Faculty Mentor: Michael Wolfe, Psychology

The relationship between beliefs and comprehension

Do students change the strategies they engage in while reading scientific information depending on whether they believe or don't believe the information? We are also interested in whether reading strategies vary if the students hold their beliefs for evidence-based reasons or affective based reasons (belief basis). Subjects with polarized beliefs regarding the effectiveness of spanking read a text that presented evidence either for or against the issue. Within each text, sentences were categorized as being consistent with the main position of the text, neutral, or inconsistent. Subjects then performed a sentence recognition task in which they determined if each of a number of sentences were presented in the text. Some sentences were from the text, and others had similar content but had not been presented. There were no recognition differences as a function whether the subjects believed the text position or not. There were belief basis differences, however. Evidence based subjects had higher false alarm rates to sentence that were inconsistent with the text position or neutral. We interpret this pattern as suggesting that evidence-based subjects attempt to create a balanced understanding of the evidence being presented, a phenomenon we refer to as balanced evidence processing. Affect-based subjects do not appear to engage in balanced evidence processing.

Jennifer Torreano
Faculty Mentor: Ellen Schendel, Writing

Designing Spaces, Mapping Disciplines: Toward Better Collaboration Between Writing Centers and Libraries

The Mary Idema Pew Learning Commons will include a Knowledge Market, which is a space in which various tutoring and other student support services around campus can "roost" and provide services to students working in the library. As the writing center looks ahead to working in this space, we are interested in exploring what writing centers and libraries have to offer one another in transforming the work that we do, with the end goal being that students experience a smooth, integrated, supportive environment that nurtures their writing and their research.

This project aims to answer the following questions: How can writing center theory and practice, and core principles in libraries, inform each other and push each other toward better collaborative models? Given their similarities and differences, how can libraries and writing centers collaborate in physical and virtual spaces? I will begin by reading about existing writing center and library collaborations to learn how we might best begin collaboration here at GVSU. I will also use rhetorical analysis to examine white-paper statements of philosophy published by composition studies, writing center, and library professional organizations to find areas of overlap, but also areas of departure. I will visit writing centers that are housed in libraries, conducting case studies that describe the spacial, technological, programming, and philosophical points of contact and divergence so that we might better understand the ways in which writing centers and libraries do (and do not) collaborate in meaningful ways. We hope that this project will result in a unique and meaningful collaboration which will benefit the students of Grand Valley in new ways.

Julie Wesselink
Faculty Mentor: Roderick Morgan, Biology

The Antibacterial Properties of GV-1 and GV-2 Chemical Derivatives

Scientific and medical advances abound in the 21st century, but some tried-and-true treatments are now putting this capacity for medical development to the test. Bacterial strains that were once easily abated with antibiotics have become a daunting obstacle, mutated into forms that render those same antibiotics powerless to stop them. The crux of this research project is to find what hospitals are seeking today: variations of a chemical compound that will prove to be effective against Gram-positive bacteria, including the antibiotic-resistant pathogens Methicillin-resistant *Staphylococcus aureus* (MRSA) and Vancomycin-resistant enterococci (VRE).

The goal of this study is to build on previous research and collaboration with the GVSU Chemistry department to develop and test variations of antibiotic compounds "GV-1" and "GV-2" that have had success inhibiting Gram-positive bacteria. Ideally we would find derivatives of these compounds that were potent enough to inhibit bacterial growth at concentrations lower than 1 microgram per milliliter. Upon finding compound variations that showed this degree of strength, we would then do further testing in infectious disease model scenarios. A more recent addendum to the project includes testing a few select antibiotic compounds against *Ustilago maydis*, a fungal pathogen that causes corn smut. This corn disease is the thorn in the side of livestock businesses, much like MRSA is the blight of hospitals today. Because the antibiotic compounds we are developing and testing attack bacteria in a different way than antibiotics have in the past, these novel compounds could address disease questions that seem to be stumping scientists in the midst of current medical progress.

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Redesign of the Wheelchair Trainer

The purpose of this device is to help disabled children learn how to use a powered wheelchair. Currently for a disabled person to have their insurance provide a powered wheelchair they have to prove they are able to use it. Many handicapped children have the potential to use a powered wheel chair but have no experience using one. This causes a problem where they cannot get a powered chair without knowing how to use it, and cannot learn how to use it without the chair. This device solves this problem by providing a temporary means for these children to learn how to use a powered wheel chair. Access to a powered wheel chair can provide a significant improvement to the quality of their lives. Such as it can provide mobility to those children who are unable to move their wheel chair under their own power.

This device has gone through some revisions at the engineering school in the past couple years. These revisions have fallen short of the needs of the problem. The purpose of this student summer scholars project is to make a new revision that is able to overcome the previous challenges.

The main challenges to this design involve the layout of the frame of the trainer. The previous designs incorporated the drivetrain in such a way that it made it very awkward to load a wheel chair. This layout also prevented the unit from being able to be used on larger individuals; it was underpowered. Also due to the frame, it was unable to accommodate the majority of children's wheelchairs. It was designed around a standard adult wheel chair.

The most significant change in design with the new trainer is that the drive train is located below the user, underneath a platform. The unit is designed so that it has a 30"x40" flat platform in which to secure a manual wheel chair to. This provides many advantages. It allows the drive wheels to go closer to the center of mass of the unit, increasing it's maneuverability. A flat platform also allows wheel chairs with odd size wheels to be used in this device, many wheelchairs that did not fit on the old trainers.