

# **OURUWM**

— 10TH ANNIVERSARY —  
**OFFICE OF UNDERGRADUATE RESEARCH**

**UWM Undergraduate Research Symposium**  
**April 27, 2018**

## **Contents**

Letter of Welcome.....	3
Information.....	4
Symposium Schedule.....	5
Oral & Performing Arts Schedules .....	6
Abstracts.....	10

## Letter of Welcome

Dear Symposium Attendees:

Welcome to the 10th Annual UWM Undergraduate Research Symposium!

This event celebrates the research collaborations of UWM undergraduate students with our faculty and staff. Over the course of this afternoon, over 300 students from across UWM will present some of the results of their research from this last year. This is a busy season for undergraduate research across the university with students presenting at departmental and school/college events and also participating in national and state-wide undergraduate research conferences, lobbying efforts, and an increasing number of national disciplinary conferences. The work being presented today is not all of the mentored research work being done by undergraduates at UWM. Every year, over 900 UWM students work directly with faculty in research. About half of these students either volunteer or receive academic credit for their work; the other half are paid through external and internal grants, including the SURF (Support for Undergraduate Research Fellows) grants awarded by the Office of Undergraduate Research.

We want to thank the faculty and graduate students who have committed themselves to working collaboratively with UWM undergraduates. Too often the work of research mentors is unseen and unacknowledged, and as much as this event is a celebration of the work of our undergraduate students, it is also a celebration of the very idea of research and the long traditions of mentoring the next generation of researchers. We encourage you to take this opportunity to learn more about the extraordinary research collaborations happening across our campus and hope that you will continue to advocate for the participation of undergraduates in research at UWM. And, as always, please thank the people walking around with clipboards today. Over 130 UWM faculty, staff, and graduate students are serving today as judges.

Sincerely,



Nigel Rothfels, Director  
Office of Undergraduate Research

## **Information**

### **Presenter Registration - Outside of the Wisconsin Room, Union 2nd Floor**

Presenter Registration will be open from 10:30am to 1:30pm. All participants can pick up Symposium information and T-shirts at registration. Presentation set-up should occur from 10:30am to 11:45am.

### **Coat Check - Union 220**

For your convenience, a complimentary coat check is located in Union 220. Bags and posters may also be checked. It will be open from 10:30am to 4:30pm.

### **UWM Graduate School - Union 2nd Floor Hallway**

Be sure to stop by the UWM Graduate School table just outside of the Wisconsin Room to pick up information about the graduate programs available at UW-Milwaukee.

### **UWM Libraries, Digital Commons - Union 2nd Floor Hallway**

The UWM Libraries encourages all student researchers to publish their research presentations (Power Point, Posters, Videos, Audio, etc.) to the Digital Commons. Please note, you will need to have your faculty mentor approve publication of research materials to the site. Publication of your research in the UWM Digital Commons will help build a record of your research work and will be available to a wide audience! If you wish to upload your work, please send it to [open-access@uwm.edu](mailto:open-access@uwm.edu). We will contact your mentor(s) for their approval. The deadline for your submission is June 1, 2018. The deadline for your mentor(s) approval is July 1, 2018.

## **Symposium Schedule - Friday, April 27, 2018**

### **10:30 – 11:45am**

Registration & Presentation Set-Up, Union Wisconsin Room

Oral Presentation Set-Up (Load/Test PowerPoints in Union Breakout Rooms)

### **11:45am**

Welcome, Nigel Rothfels, Director of the Office of Undergraduate Research,  
Union Wisconsin Room

### **12:00 - 1:40pm**

Oral Presentations, Union Breakout Rooms (see schedule on page 6)

### **1:30 - 3:30pm**

Poster Session

Welcome, Provost Johannes Britz

Poster and Visual Arts Presentations, Union Wisconsin Room

### **3:30pm**

Closing Remarks by Chancellor Mark Mone, Announcement of Mentor of the Year, and  
Acknowledgment of Outstanding Presentations, Union Wisconsin Room

## Schedule of Oral & Performing Arts Presentations by Location

Room	Time	Presenters	Presentation Title	Research Mentor
Union 240	12:00PM	Nia Keranova	Examination of the Evolution of Finger-Style Guitar from 1967-1992	John Stropes, Music
Union 240	12:20PM	Michael McKinnon & Josh Kim	Legacy of the 1969 and 1970 Ann Arbor Blues Festivals	John Stropes, Music
Union 240	12:40PM	Lori Martello	On the Wings of Dramaturgy	Alvaro Rios, Theatre
Union 240	1:00PM	Audra Cashman	Chronic Illness in Musical Theatre	Robin Mello, Theatre
Union 240	1:20PM	Molly Kiefer, Annie Peterson, Amy Sutheimer & Rebecca Whitty	Applying Feldenkrais Lessons to a Dance Context	Daniel Burkholder, Dance
Union 250	12:00PM	Matthew Vogt, Max Sabitov, Gus Greiling & Ronald Salmon	Can Wealth and Nature Coexist?	Itziar Lazkano, Economics
Union 250	12:20PM	Mikael Luter & Jocelyn Kroetz	Can Your Daily Commute Slow Climate Change?	Itziar Lazkano, Economics
Union 250	12:40PM	Hugo Ljungbäck	What We Can Learn from a History of Film Studies	Tami Williams, English
Union 250	1:00PM	Audrey Waln	Her Stories: Day Time Soap Opera and US Television History	Elana Levine, Journalism, Advertising & Media Studies
Union 250	1:20PM	Bailey Flannery	The Monstrous Mouths of Women	Jacqueline Stuhmiller, English
Union 260	12:00PM	Jonathon Gould	Identification of Novel Pepsin Inhibitors for Target Drugs to Treat Laryngopharyngeal Reflux Disease	Alexander Arnold, Chemistry & Biochemistry
Union 260	12:20PM	Sarah Philippi	The Role of APOE Genotype, Sex, and 17 $\beta$ -Estradiol in Memory Consolidation in a Mouse Model of Alzheimer's Disease	Karyn Frick, Psychology
Union 260	12:40PM	Vladislav Friedman	ANC-1 Promotes Axon Guidance in Touch Receptor and Motor Neurons in <i>C. elegans</i>	Christopher Quinn, Biological Sciences

## Schedule of Oral & Performing Arts Presentations by Location

Room	Time	Presenters	Presentation Title	Research Mentor
Union 260	1:00PM	Nancy Duque	Major Element Geochemistry of the Pulo do Lobo Metasedimentary Rocks Affected by the Southern Iberian Shear Zone, Andalusia, Spain	Dyanna Czeck, Geosciences
Union 260	1:20PM	Trevor Georgeson	Lights, Camera, Inflation!	Whitney Moon, Architecture
Union 280	12:00PM	Brodie Kerst	Oshkosh E.R.	Nikole Bouchard, Architecture
Union 280	12:20PM	Ever Clinton	The Physical Environment Resources For or Impediments to Social Sustainability	Brian Schermer, Architecture
Union 280	12:40PM	Lena Jensen	The Ethics and Practices of Caring	Arijit Sen, Architecture
Union 280	1:00PM	Teonna Cooksey	The Human and Environmental Impacts of Foreclosure: Washington Park and Sherman Park	Arijit Sen, Architecture
Union 280	1:20PM	Jonathan Zagrodnik	Grand Avenue and the Encyclopedia of Milwaukee	Amanda Seligman, History
Union 340	12:00PM	Perry Spott	Development of Eutectic Based Self-healing in Al-Si Hypoeutectic Alloy	Pradeep Rohatgi, Materials Science & Engineering & Volkan Kilicli, Materials Science & Engineering
Union 340	12:20PM	Emily Gerstein	Numerical Approximation of Solidification Behavior in Co-27Cr-5Mo-0.25C Alloys during Pulsed Laser and Tungsten Inert Gas (TIG) Welding of As Cast Biomedical Inserts	Hugo Lopez, Materials Science & Engineering
Union 340	12:40PM	Jacob Beihoff & Adam Honts	How Green is Our County? Street View Imagery Based High-Resolution and High-Accuracy Human Environment Vegetation Mapping	Istvan Lauko, Mathematical Sciences
Union 340	1:00PM	Kirill Shmilovich	Investigating Protein Hydrogel Mechanics through Force-Clamp Measurement and Validation with Dynamic Modeling	Ionel Popa, Physics
Union 340	1:20PM	Joshua Myszewski	Spectral Feature Extraction and Analysis in Human Electroencephalogram (EEG) Signals	Mohammad Rahman, Biomedical Engineering
Union 344	12:00PM	Rebecca Willer	Impact of Service Learning Programs on Undergraduate Students Working with Older Adults in Long-Term Care Settings	Sabine Heuer, Communication

## Schedule of Oral & Performing Arts Presentations by Location

Room	Time	Presenters	Presentation Title	Research Mentor
Union 344	12:20PM	Sarah Groh	Lesbian Coming-Out Experiences: Using Affect Control Theory to Examine the Context of Same-Sex Disclosure	Celeste Campos-Castillo, Sociology
Union 344	12:40PM	Samer Alanani	Off-Target Effects of FDA-Approved Histone Deacetylase Inhibitors on Mature Lymphocyte Populations	Douglas Steeber, Biological Sciences
Union 344	1:00PM	Jessye Hale	Strategies for Targeting Immunosuppressive Myeloid Cells in a Murine Breast Cancer Model	Douglas Steeber, Biological Sciences
Union 344	1:20PM	Kevin Rymut	Optical Imaging to Assess Metabolic State of Diabetic Wounds	Sandeep Gopalakrishnan, Nursing
Union Cinema	12:00PM	Alex Kayser & Gabriella Cisneros	Art Shay, Prolific Photographer: Editing a Full Length Documentary Film	Jenny Plevin, Film
Union Cinema	12:20PM	Cory Fitzsimmons, Izaiah Ramirez, Elisabeth Markman, Connor Finnegan, William Thiemann, Erik Peppey & Parker Muñoz	Playing The Play: How We Wrote A Play By Playing Games	Robin Mello, Theatre
Union Cinema	12:40PM	Annie Peterson, Katelyn Altmann & Kelsey Lee	Body and Place: Between The Form and Formlessness of Objects and Desire	Maria Gillespie, Dance
Union Cinema	1:00PM	Morganna Milgrim	Body Talk	Robin Mello, Theatre
Union Cinema	1:20PM	Chelsey Becher, Jimmi Weyneth & Megan Velez	Sherman Park Through Embodied Research	Simone Ferro, Dance

## **Presentation Abstracts**

**Ala Abdeljaber**

How Does Phonological Neighborhood Density Influence Image Naming?

Mentor: Sabine Heuer, Communication Sciences & Disorders

Poster Presentation, Easel 87

Everyone is familiar with the tip-of-the-tongue phenomenon. This common word finding difficulty is known as anomia and is one of the hallmark characteristic of aphasia, a neurologic communication disorders caused by stroke. Aphasia causes difficulty with speaking, understanding, reading, and writing and affects the person's quality of life negatively. Naming is an intuitive process that unfolds rapidly. However, our understanding of the naming process remains incomplete. As a result, our clinical approaches to treating anomia also remain limited in scope. While some traditional therapies can improve naming performance, gains are typically restricted to trained words, with only minimal improvement for untrained words. Of particular relevance to the current study is the use of words and pictures with varying phonological neighborhood density (PND). A phonological neighbor differs from a target by a single phoneme (e.g., tear – deer; coin - cane). Neighborhood density refers to the number of phonological neighbors of a given target word. The purpose of this research is to understand the role of PND in image naming. Specifically, we will determine whether high PND pictures result in faster naming reaction times compared to low PND pictures. In this experiment, 21 college-age language-normal participants were presented with a series of 96 well-controlled images and are asked to name each image as accurately as quickly as possible. The images are all based on monosyllabic words with a 1:1 ratio of low to high phonological neighborhood density. Naming response times will be analyzed for differences across PND condition. It is anticipated that high PND words will be produced more quickly than low PND words, suggesting that a greater number of phonological neighbors facilitates the activation of target words. This study is the first of a series of experiments designed to specify phonological processing assumptions in the spreading activation models of word selection.

**Samer Alanani**

Off-Target Effects of FDA-Approved Histone Deacetylase Inhibitors on Mature Lymphocyte Populations

Mentor: Douglas Steeber, Biological Sciences

Oral Presentation, 12:40pm, Union 344

Epigenetic regulation of gene expression plays a fundamental role in tumor development and growth. Because of this, drugs that affect gene expression such as histone deacetylase inhibitors (HDACi) have been developed and used as an adjunct treatment to other standard anti-cancer drugs. Currently, three FDA-approved HDACi have shown promise in the treatment of specific lymphoid cancers by reducing tumor cell proliferation and inducing apoptosis. However, a significant downside to using HDACi is their lack of cell

specificity as they can affect both tumor and normal cells. Furthermore, the approved HDACi affect both nuclear and cytoplasmic HDACs and thus can alter cytoplasmic protein acetylation and function in addition to gene expression. We hypothesized that treatment with these non-specific HDACi will result in increased normal lymphocyte death. To identify off-target effects, normal mature leukocyte populations harvested from wild-type mice were treated with different doses of two FDA-approved HDAC inhibitors, FK228 and pinobostat, or vehicle control. After 24 or 48 hours of treatment, the cells were labeled with fluorochrome-conjugated antibodies and analyzed by flow cytometry to identify T lymphocyte and B lymphocyte subsets, and myeloid cells. Cell counts and viability were also determined by flow cytometry following addition of propidium iodide. Initial results indicate that FK228 has more off-target effects than pinobostat and that the cytotoxic CD8+ T lymphocyte population was the most severely affected. Future work will determine whether a novel panel of class-specific HDACi developed in the Hossain lab (Department of Chemistry/Biochemistry) has less severe off-target effects.

**Lydia Albright**

Paleoecology and Taxonomy of Middle Triassic Bivalves Following the Permo-Triassic Mass Extinction

Mentor: Margaret Fraiser, Geosciences

Poster Presentation, Easel 108

At the end of the Permian period, the Earth experienced the largest known drop in biodiversity with the elimination of ~78% of marine invertebrate genera. Evidence suggests that life on Earth did not return to pre-extinction diversity until 5 million years after the extinction, in the Middle Triassic. The nature of the biotic recovery is still unknown despite the end-Permian mass extinction and the Early Triassic aftermath being extensively studied and its significance widely acknowledged. The main objective of this research is to determine the taxonomy and paleoecology of bivalves that lived in the marine environments during the Middle Triassic. By employing standard paleoecological techniques and statistical tests, this research will determine the important aspects of post-extinction ecological structure and will lead to an understanding of the spatial and temporal nature of ecosystem renewal after major biotic crises in deep time. The methodology is studying skeletonized fossil specimens collected from the Middle Triassic strata in Nevada to identify and take inventory. The objective is to determine which organisms were taxonomically and numerically abundant, the mean rank-order, breadth of distribution, the Simpson's index (D), the Shannon Index (H'), evenness, and dominance. The fossil data is used to construct time-environment diagrams by stage to visualize the paleoenvironmental context of biotic patterns. This is done by comparing collected data from the Middle Triassic bivalves to Early Triassic *Claraia* bivalves that have been previously studied. The primary research outcome will be the first quantitative analysis of these Middle Triassic paleocommunities from

Nevada. This study represents an important first step in more fully understanding how ecosystems bounce back from environmental disaster, and the results may allow scientists to better predict future effects of climate change on modern ecosystems.

**Randie Alf**

Mutations in Fibrillin-1 Protein Cause Hereditary Connective Tissue Disorder  
Mentor: Madhusudan Dey, Biological Sciences  
Poster Presentation, Easel 162

Fibrillin-1 (FBN1) proteins aggregate to produce microfibrils that provide both rigidity to bone and support tissue as well as stretch to ligaments and vessels. Mutations in the FBN1 affects the formation of microfibril, causing a genetic disorder called Marfan FBN1 affects the formation of microfibril, causing a genetic disorder called Marfan Syndrome. This syndrome affects ocular, skeletal and cardiovascular systems in the body. Researchers have found that ~1,300 different mutations in the FBN1 gene cause Marfan Syndrome. Retrieving the sequence of the FBN1 gene is the starting point for understanding the best way to treat and possibly cure this disease. Here, I analyzed the gene and protein sequences of FBN1 gene protein sequences from several organisms. My analysis will allow for understanding of where mutations can occur and looking at the amino acid composition will show how the protein will present itself. Knowing what the protein looks like will help identify when it is misshapen due to mutation in the gene. Additionally, studying the homologous protein sequences of the gene will show what organisms have the same sequence and expression. These organisms can then be used to study the mutations and can provide accurate answers to understanding Marfan Syndrome.

**Bob Aloisi, August Schuett, Pancho Cruz, Natalie Meyers, Ryan Roekle & Luke Daniels**

Clocking Dead Stars with Radio Telescopes: Timing 4 Pulsars from GBNCC Survey  
Mentors: David Kaplan, Physics & Joe Swiggum, Physics  
Poster Presentation, Easel 144

Undergraduate students participating in course-based research had the opportunity to learn about radio telescopes and pulsars (a type of neutron star), with pairs of students ultimately "adopting" a pulsar to determine a full solution that describes the pulsar's position, spin-properties, age, and expected evolution. The discovery and timing observations were taken using the 100-m Robert C. Byrd Green Bank telescope. These students were the first to learn the properties of these unique stars, which involved multiple steps of data processing and analysis. One of the pulsars, PSR J0038-2501, is slowing down at a slower rate than expected, which suggests that it has a low magnetic field and may have had an unusual evolutionary path. The students are writing a paper based on the results to be published in a journal.

**Bob Aloisi, Katie Krause, August Schuett, Dan Cairns & Ryan Kisolek**

Students for the Exploration and Development of Space - Rocksat-C 2018 Payload  
Mentor: David Kaplan, Physics  
Poster Presentation, Easel 143

Students for the Exploration and Development of Space (SEDS) is a group of students from UW Milwaukee and UW Sheboygan who are working together to design and build a payload that will be flown to space on a NASA sounding rocket as part of the RockSat-C 2018 program. The payload will test the effects of space flight on DNA. On the payload, there will be tubes of plasmids, along with sensors to record the radiation, temperature, and acceleration. Some of the samples will be shielded, reducing radiation exposure by about 20%. Multiple geiger counters, some shielded, are being used to differentiate between Gamma and Beta radiation. Post-flight, the plasmids will be mixed with bacteria to evaluate the efficiency of gene transmission after space flight compared to control samples. Last summer, a similar payload was built to test the same effects on plasmid DNA. Unexpectedly, it was found that the gene transfer efficiency improved for the samples exposed to space flight conditions. This is the opposite of what was predicted, so this 2018 project will be used to further study why this occurs.

**Jennifer Ammerman**

Deciphering Lost Google News URLs  
Mentor: Amanda Seligman, History  
Poster Presentation, Easel 14

The Encyclopedia of Milwaukee provides an online source for a myriad of topics relating to the history and development of Milwaukee and its surrounding communities. A key difference between the Encyclopedia of Milwaukee and other similar online encyclopedia is the inclusion of research footnotes with each entry. Fact checking of URL links associated with these entries was complicated by the disappearance of the Google News archive of Milwaukee's newspapers in 2016. A means to rapidly identify the date of publication and the newspaper sourced for these dead links needed to be developed. Assumptions were made based on what appeared to be a date and ID pattern within the Google News URLs, deciphering of that pattern required delving into UWM's microtext library for verification. Four entries containing twenty-two Google News links were examined; eighteen of these links corresponded exactly as anticipated. The result was verification of a consistent pattern for three ID phrases which differentiated the Milwaukee Journal, the Milwaukee Sentinel, and the Milwaukee Journal Sentinel. This work provides a useful aid for other history researchers encountering similar dead Google News links.

**Lauren Andrews**

Antibody Purification through the Use of Protein Hydrogels  
Mentor: Ionel Popa, Physics  
Poster Presentation, Easel 152

Our goal is to develop a method of purifying antibodies using protein hydrogels. An antibody is a specialized protein produced by certain lymphocytes in response to the presence of specific antigens. Antibodies can be harvested from various animals and are used in medications to treat certain immune disorders. In the lab, we are building columns made from porous materials that are used to soak up the protein and polymerize it into a hydrogel forming a gel like capsule. Then, antibodies are passed through the column so it can have the opportunity to bind with the protein hydrogel. After washing unbound antibodies with Tris NaCl, we elute the antibody with citric acid. Most purification techniques use beads which are extremely expensive and can only be used once which makes them inefficient. On the other hand, protein hydrogels have never been used before to purify antibodies so it is uncertain if they will be durable enough to withstand some of the more difficult tests like centrifugation.

**Emily Anhalt**

Social Skills in School-Age Children with Neurofibromatosis type 1  
Mentors: Bonita P. Klein-Tasman, Psychology & Danielle M. Glad, Psychology  
Poster Presentation, Easel 27

Neurofibromatosis type one (NF1) is a disorder caused by a mutation of the NF1 gene on chromosome 17, a gene that suppresses the growth of tumors. This mutation in the NF1 gene leads to a predisposition in developing a variety of tumors, both malignant and benign. NF1 is characterized by café-au-lait spots, pigmented birthmarks aptly named "coffee with milk" after their light brown color, freckling in the inguinal or axillary regions, and neurofibromas, among a myriad of other symptoms (NIH, 1988). Children with NF1 and neurofibromas, among a myriad of other symptoms (NIH, 1988). Children with NF1 frequently experience social and behavioral problems; specifically, they exhibit poorer social skills than their peers (Barton & North, 2004). The purpose of the current study is to examine social functioning and several social skills including communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. Participants were forty children with NF1 (22 boys, 18 girls), ranging in age from 9-13 years (M = 10.9 years). The Social Skills Improvement System (SSIS) Parent Form and Teacher Form was given to assess overall social functioning, based on parent and teacher reports. Frequencies of difficulties on each of the social subscales and overall level of social functioning will be examined. More explicitly, the number of children who fall in the below average range, average range, and above average, will be examined, as well as overall standard scores. It is expected that the children with NF1 will display below average scores, which would be suggestive of social difficulties.

**Cedrick Antonio**

Engagement with Physicians on Twitter  
Mentor: Celeste Campos-Castillo, Sociology  
Poster Presentation, Easel 129

The U.S., just as other nations, has a shortage of primary care providers. At the same time, the rise in chronic conditions and an aging patient population is increasing the demand for health care. If this challenge is not addressed, it could lead to longer waiting periods between hospital visits and increase the unmet needs of vulnerable populations. The purpose of this study is to determine perceptions of credibility when a person is introduced to a physician on Twitter who is offering medical advice. This study used Amazon's Mechanical Turk to recruit its participants, who were asked questions pertaining to three different profiles of a Twitter user offering medical advice: 1) A profile picture of a man in physician's clothing; 2) A profile picture of the same man in a plain collared shirt; 3) No profile picture. We asked participants about the credibility of the Twitter user offering advice and found that credibility was higher when the Twitter user had a profile picture compared to when the user did not have a profile picture. This difference occurred regardless of how the user was dressed in the profile picture. Telemedicine, such as offering medical advice on social media, may help address the shortage of primary care providers. People often use social media to seek advice about things such as where to eat, what car they should buy, or advice on how to keep their budget in order. Will people use social media to access health care?

**Ciara Ayala**

Effects of Childhood Trauma and Exposure Community Violence on the Development of Post-Traumatic Stress Disorder  
Mentor: Christine Larson, Psychology  
Poster Presentation, Easel 94

This research is part of a larger study known as iSTAR which focuses on identifying neurobiologic and psychological markers of risk for post-traumatic stress disorder (PTSD). As part of this study we collected data to identify whether there is a correlation between childhood trauma, exposure to community violence and the severity of PTSD symptoms in civilians whom have recently been involved in a traumatic event. We recruit participants from the Emergency Department at Froedtert Hospital and have them undergo multiple assessments measuring their risk for developing PTSD. Self-report measures of childhood trauma, community violence exposure, and current PTSD symptoms were administered two weeks and 6 months post injury. From the data that we have collected we have found a positive correlation between the measures. Meaning, the participants that have had a significant amount of childhood trauma and have lived in a community where they were exposed to different forms of violence do have a higher probability developing PTSD from a recent traumatic event. These findings will be beneficial for future diagnosis and prevention of PTSD.

**Armando Barron**

Evaluation of Wrist Kinematics during Geared Manual Wheelchair Propulsion in Veterans with Spinal Cord Injury  
Mentor: Brooke Slavens, Occupational Science & Technology  
Poster Presentation, Easel 85

In the United States, there are about 3.33 million people who use manual wheelchairs for mobility. Manual wheelchair users rely on the upper limbs for both mobility and daily living activities. Manual wheelchair mobility puts users at high risk of repetitive strain injuries such as carpal tunnel syndrome (CTS). Constant or frequent wrist orientations at extreme limits have been proven to cause median nerve damage and eventually lead to CTS (Keir et al.). CTS develops in 49%-63% of manual wheelchair users and causes numbness and pain in the hands and wrists (Zukowski et al.), decreasing a manual wheelchair user's quality of life. Propelling a wheelchair using more neutral wrist orientations would decrease the risk of developing CTS. Geared manual wheelchairs could be an alternative to decrease applied wrist forces and avoid wrist injuries. We hypothesized that using a geared wheel system compared to standard direct-drive wheels will result in improved wrist joint angles during wheelchair propulsion. Three complete paraplegic veterans with spinal cord injury will propel their wheelchairs on level-floor using the Intelliwheels geared wheelchair wheels (Intelliwheels, Inc., IL) in both the geared (gear ratio of 1.5:1) and non-geared (direct drive with a gear ratio of 1:1) settings. Wrist joint motion will be tracked using a 15 camera Vicon analysis system. A custom biomechanical model will be used to calculate the two-dimensional wrist joint angles during the propulsion tasks, and peak angles and range of motion will be determined in each plane. Group average angular data will be compared between the wheel types to evaluate the effect of geared manual wheelchair propulsion on wrist joint kinematics. This information will help determine the possible benefits of geared wheel systems on wrist health of manual wheelchair users.

**Jennifer Bautista**

Analysis of Tyrosinase: A Protein Determinant for Our Skin and Hair Color  
Mentor: Madhusudan Dey, Biological Sciences  
Poster Presentation, Easel 157

Tyrosinase gene (TYR) encodes a protein that regulates the production of the pigment melanin, a primary determinant of skin, eye and hair color. Tyr protein, in the presence of copper, converts the amino acid tyrosine to dopaquinone, which then is transformed into the pigment melanin. Mutations in the TYR gene can result in several autosomal recessive disorders such as albinism and other types of variations in skin pigmentation. Researchers have found that there are roughly 320 mutations on the TYR gene that can cause complications to individuals. In order to better understand the gene and the mutations causing disease, I retrieved the sequence of

the TYR gene. I then analyzed the gene and its protein sequence against several organisms to locate where the mutation has occurred. The shape of the protein is also another indicator of mutation and can also be studied by looking at the molecular structure. These studies can help with the study of key components that cause albinism in individuals and possibly find cures to this disease.

**Chelsey Becher, Jimmi Weyneth & Megan Velez**

Sherman Park Through Embodied Research  
Mentor: Simone Ferro, Dance  
Performing Arts, 1:20pm, Union Cinema

Milwaukee is comprised of a wide variety of neighborhoods, all different, all with their unique history, people, cultural background, dynamics, and atmosphere. The Sherman Park neighborhood is no different. However, in recent years it has been displayed by media overwhelmingly as a poor, dangerous part of Milwaukee. Our research is to show the true characteristics of the Sherman Park Neighborhood and its people, which greatly contradict the characteristics displayed by the media. The bulk of our research this year has been done through interviewing residents, property owners, and employees of the Sherman Park neighborhood. The relevance of this research is seen in each and every person we interview; there is a passion and care for the betterment of their community and this is what defines the community. The people of Sherman Park are who currently make it, and will continue to make it a safe, growing community. We as researchers are just here to make their stories and efforts more widely known to other residents of Milwaukee, through creating dance performances, websites, and presentations for the community to have access to and learn from. Sherman Park is beautiful example of the importance of community involvement and how it can impair or benefit a community and all of the people in it. Why is this important to share to a larger audience? Because the misconceptions that surround Sherman Park are not Sherman Park or its people. However, they control what the community receives from the city of Milwaukee and all of its other residents, from the allotment of resources to the perceptions people hold. Sherman Park is a concrete, zoomed-in example of the struggles that neighborhoods and people in Milwaukee, and the United States in general, face currently in our society.

**Bill Becker**

Quantitative Financial Analysis  
Mentor: John Huck, Lubar School of Business  
Poster Presentation, Easel 23

The objective of this project is to produce a measure of revealed utility. Utility will be measured using proxies such as suicide, heart attacks, hospitalization due to anxiety or depression, etc. The assumption is that low utility leads to psychological distress which can adversely affect individuals. The goal is to build a dataset based on The Center for Disease Control's Behavior Risk Factor Surveillance System. Then see how changes in the stock market and economy impact utility as proxied by our

measures. The proposed outcome is to have a measure of perceived utility that can be used to find correlations between happiness (utility) and asset/stock pricing.

#### **Jeffrey Becker**

Layered MXene-Sn as a Promising Anode for Lithium Ion Battery with Ultrahigh and Stable Capacity  
Mentor: Junjie Niu, Materials Science & Engineering  
Poster Presentation, Easel 58

As the need for better means of energy storage is on the rise, lithium ion batteries show promise in meeting society's energy storage necessities, due to their ultrahigh capacity after many cycles and high energy density. The use of new, conductive two-dimensional transition metal carbide materials, known as MXene ( $Ti_3C_2$ ), has the potential to increase overall performance of lithium ion batteries. Here we present a novel lithium ion battery with the anode electrode comprised of a nanocomposite, MXene/Sn. Initially, MXene is synthesized by aluminum exfoliation of  $Ti_3AlC_2$  (MAX) powder. MXene is shown to have a high capacitance due to its layered geometry and complex composition that allows for efficient intercalation of  $Li^+$  ions. Sn nanoparticles were then dispersed uniformly throughout the layers to form MXene/Sn nanocomposite. The MXene/Sn nanocomposite demonstrates a high capacitance and significantly improved efficiency for lithium ion batteries.

#### **Brooks Beffa**

Connected and Autonomous Vehicle Cybersecurity  
Mentor: Lingfeng Wang, Electrical Engineering  
Poster Presentation, Easel 196

Modern vehicles are implementing features of autonomy at a staggering rate. Many models already include assisted parking and automatic braking, supported by the coordination of several on-board sensors. As vehicles transition toward full autonomy and driverless vehicles become an everyday reality, a robust network of connectivity must also be implemented. A secure Vehicular Sensor Network (VSN) for exchanging data enables enhanced road safety features and anti-congestion algorithms for a smooth flow of traffic. Along with these advances in technology, however, more complex cyber vulnerabilities continue to emerge. Researchers have already highlighted a wide variety of security flaws in modern systems, allowing attackers to steal or modify information, deny services, and even hijack control of moving vehicles. These studies have inspired a recent emphasis on the development of defensive techniques. The in-vehicle network consists of many Electronic Control Units (ECUs) which exchange messages over a Controller Area Network (CAN) bus system. For connected networks of vehicles, the Ad hoc On-demand Distance Vector (AODV) protocol is emerging as the primary means of communication. Focusing mostly on these two communication methods, the aim of this study is twofold. Firstly, to compile and describe known attacks against modern and emerging vehicle technology. Second is to propose state of the art defense mechanisms

against attacks in this realm. Proposed techniques include message verification and malicious node detection schemes for the CAN protocol within vehicles, as well as AODV communication between vehicles.

#### **Jacob Beihoff & Adam Honts**

How Green is Our County? Street View Imagery Based High-Resolution and High-Accuracy Human Environment Vegetation Mapping  
Mentor: Istvan Lauko, Mathematical Sciences  
Oral Presentation, 12:40pm, Union 340

Measuring the amount of vegetation in a given area on a large scale has long been accomplished using satellite and aerial imaging systems. A primary limitation of these methods has been their ability to measure vegetation coverage accurately only at the top of the canopy, often neglecting green vegetation located beneath canopy cover. Measuring the amount of urban and suburban vegetation along a street network that is partially beneath the canopy has recently been introduced with the use of Google Street View (GSV) images, made accessible by the Google Street View Image API. Analyzing green vegetation through the use of GSV images can provide a comprehensive representation of the amount of green vegetation found within geographical regions of higher population density, and it facilitates an analysis performed at the street-level. In this presentation, we propose a fine-tuned color based image filtering and segmentation technique based on which we define and map an urban green environment index. We deployed this image processing method and, using GSV images as a high-resolution GIS data source, we computed and mapped the green index of Milwaukee County. This approach generates a high-resolution street level vegetation estimate that may prove valuable in urban planning and management, as well as for researchers investigating the correlation between environmental factors and human health outcomes.

#### **Kenza Bencheikribou**

The Effect of Chronic Ankle Instability on Foot Kinematics and Lower Extremity Function During Walking  
Mentor: Stephen Cobb, Kinesiology-Exercise Science  
Poster Presentation, Easel 93

Nearly two million people in the United States experience an ankle sprain each year and more than half will develop chronic ankle instability (CAI). CAI is a common cause of ankle osteoarthritis and long-term disability. Abnormal function during gait associated with CAI may contribute to these adverse health outcomes. The purpose of this study is to investigate differences in lower extremity walking kinematics between middle-aged adults with CAI and uninjured subjects. Methods: 30 participants (age 45 – 64 years) will be recruited from the surrounding UWM community. 15 participants will have CAI and 15 will be age, gender, and body mass index matched uninjured participants. The CAI group will have a history of at least one ankle sprain, the most recent occurring > 3 months prior to the study, and score < 24 on the Cumberland

Ankle Instability Tool. Walking gait will be assessed by placing clusters of retro-reflective markers on the foot, leg, thigh, and pelvis. Gait data will be collected using a 14 camera system sampling at 200 Hz. The participants will complete 5 barefoot walking trials down a 15 m walkway. Results: Sagittal plane hip and knee angles, and sagittal and frontal plane ankle angles will be calculated during three sub-phases of stance (loading response, mid-stance, and push off). Multivariate Analysis of Variance (MANOVA) tests ( $n = 3$ ) will be run to determine sagittal plane range of motion (ROM) group differences within each sub-phase. Significant MANOVA results will be followed up with independent *t*-tests. For the frontal plane, independent *t*-tests ( $n = 3$ ) will be performed to investigate ankle ROM differences in each sub-phase. All analyses will be run with SPSS and alpha will = 0.05. Conclusions: The results of this study will further the understanding of the effects of CAI on lower extremity kinematics.

#### **Sarah Benforado**

Archiving the Radical Jewelry Makeover Project  
Mentor: Michael Bernard, Art & Design  
Poster Presentation, Easel 131

Radical Jewelry Makeover is a community engaging awareness project that promotes reuse of materials from discarded jewelry, consideration of the social and environmental impacts of mining and jewelry production, and introspection on our habits of consumption. Radical Jewelry Makeover participants will produce artwork for a competitive exhibition at the Union Art Gallery as well as online and pop-up events in the Milwaukee area. Professor Michael Bernard and Research Assistant Sarah Benforado are working to create a print catalog of “Radical Jewelry Makeover: Wisconsin” which will contain documentation of the project such as digital photography, articles by experts, and interviews. While the Radical Jewelry makeover project was established in 2007, there have not been any publications that showcase the process, effects, and importance of Radical Jewelry Makeover. Our print catalog and online research process blog will showcase the research efforts of the project, and the way relevant, intellectual work permeates the UWM undergraduate experience.

#### **Evan Bennett**

Effects of Lithium Cobalt Oxide Nanoparticles on *Daphnia magna*  
Mentors: Rebecca Klaper, Freshwater Sciences & Nicklaus Neureuther, Freshwater Sciences  
Poster Presentation, Easel 92

Nanotechnology has emerged as a novel technique to solve problems in material science, with new nanomaterials being produced for numerous purposes, having numerous applications across many consumer products. For example, Lithium cobalt oxide (LCO), are metals commonly used in batteries, which are currently being engineered as nanoparticles to enhance specific qualities of the battery. Batteries are typically disposed of in landfills rather than recycled, and therefore may

inadvertently be introduced into the environment, causing detrimental impacts to organisms. Therefore, it is essential to screen for these effects early on in the development of these particles, which is the goal of The Center for Sustainable Nanotechnology. We will be studying the effects of LCO nanoblocks on the model organism *Daphnia magna*. *Daphnia magna* are commonly used as a model organism for environmental toxicity due to their importance in the food web as primary consumers, quick lifecycles, and their ability to remain viable in lab cultures with relative ease. Another benefit for using *Daphnia* is that they reproduce asexually via parthenogenesis, essentially making clones of themselves, ensuring that DNA lineages are kept constant in the culture. This study will expose *Daphnia magna* to LCO nanoblocks at concentrations of 0.1, 1, and 10 mg/l for 48 hours as well as a chronic exposure measuring reproductive impacts. Nanoparticles can affect the organisms in several ways, such as altering DNA, interacting with the cell membrane, or interfering with normal cell processes, depending on the properties and shape of the molecule. Earlier studies seem to indicate that rod-like molecules are more toxic to cells, but there is little known on the effect of nanoblocks on cell function. Consequently, adverse effects on survival will be a measured endpoint as well as gene expression to determine the effects on metabolism and detoxification.

#### **Kari Berna**

3D Printable Ceramic Paste for Magnesium  
Rapid Prototyping  
Mentor: Benjamin F. Schultz, Materials Science & Engineering  
Poster Presentation, Easel 210

In this work, an extrudable ceramic paste is being developed, that in the sintered state can act as a non-reactive mold for producing magnesium castings. This paste would allow molds to be 3d printed from a computer aided drafting (CAD) file, which could then be used to create intricate cast magnesium shapes. Magnesium is notoriously difficult to cast, as it reacts with most refractory compounds that have been used in the 3d printing process. Despite this drawback, magnesium is an attractive material due to its lightweight, good mechanical and damping properties, as well as its biodegradability. If successful, this new technology would allow for the production of custom magnesium prototypes and components for the transportation, aerospace, and biotechnology sectors.  $\text{CaCO}_3$  is being studied as a starting material for producing molds for magnesium bone scaffolds. Pastes with varied binder and dispersant compositions were produced by acoustic mixing and then extruded into simple test coupons. The sintering behavior of the pastes were evaluated by thermo-gravimetric analysis (TGA), systematic sintering heat treatments, and hardness measurements. Finally, the flexural properties of the sintered pastes were evaluated by 3 point bend tests. The initial results of this work have shown that the binder and dispersant system can be removed during the sintering process with very little ash content high  $\text{CaCO}_3$  volume percentages can be achieved in the green compact. It is expected that the sintered strength will be equivalent to that of an investment casting shell mold.

**Leo Bohlmann**

Assessing Composts for Urban Organic Farms  
Mentor: John Berges & Erica Young, Biological Sciences  
Poster Presentation, Easel 183

Urban organic farms heavily rely upon composts to grow crops, however there lacks a reliable source of information on the quality and content of composts which are available to the farming consumer. This project aimed to assess various composts sourced from established local compost companies and to see how well 3 different crops (lettuce, tomato, carrots) grown in them performed. This involved quantification of 1) organic matter 2) Carbon 3) Nitrogen 4) Phosphorus for both the composts and the crops which were grown in them at various stages during the growing season. In order to further assess the performance of the crops, a 2-level analysis of Photosynthetic ability was taken using a PAM fluorometer (Fv/Fm) & Chlorophyll content of leaf tissues ( $\mu\text{g/g}$  Chlorophyll). This project provides a source of important information for the consumer about how composts perform in a field setting as well providing an interesting perspective on how different crops affect the soil which they are grown in over time.

**Leo Bohlmann**

Characterizing Chemical Signaling Between Rhizobia and the Non-nodulating Legume Honey Locust Using HPLC/MS

Mentor: Gyaneshwar Prasad, Biological Sciences  
Poster Presentation, Easel 184

Many Legumes have a symbiotic relationship with the bacteria Rhizobia, which provides a source of fixed Nitrogen for the plant. Chemical signaling plays a crucial role in mediating this symbiosis, typically involving compounds derived from flavonoids. Upon infection from the bacteria, the host plant forms characteristic root nodules. Although nodule formation is very common throughout the Fabaceae family, there are certain species which do not form root nodules. One such non-nodulating Legume is Honey Locust (*Gleditsia triacanthos*). In order to investigate if a relationship between Honey Locust and Rhizobia was present, we assayed root and seed exudates using coupled high-performance liquid chromatography and mass spectroscopy (HPLC-MS) to see if the plant was secreting any known signaling compounds. The 4 compounds of interest were: Apigenin, Diadzein, Luteolin, and Naringenin, all of which have been confirmed signaling molecules in other Legume species. This research has important applications due to the importance of the Rhizobia symbiosis in modern agriculture, as well as to further characterize the symbiotic relationship in a species which is a non-nodulate.

**Jared Bonack**

Shoulder Joint Kinematics During Weighted Reaching Tasks Preoperative and Postoperative Supraspinatus Repair  
Mentor: Alyssa Schnorenberg, Occupational Science & Technology

Poster Presentation, Easel 71

Rotator cuff tears are one of the most common injuries to the shoulder joint with about one fifth of the US population experiencing a rotator cuff tear. Around 200,000 Americans have surgery to repair a torn rotator cuff each year. These tears can impact normal shoulder function and often cause mild to severe pain and discomfort, while limiting independence. Therefore, it is important that successful surgery and rehabilitation occurs to ensure that patients can safely resume daily activities. In this study, three subjects with supraspinatus tears will be tested pre-operatively and post-operatively while performing two weighted reaching tasks in the coronal plane. A 15 camera Vicon T-Series Motion Capture System will be used to record upper extremity joint kinematics, while lifting a weight of up to two pounds from waist height up onto a platform that is 30.3 cm tall and then taking a weight of up to two pounds off a platform at eye level and moving it down 30.3 cm. The subjects will do these tasks both before surgery and nine to twelve weeks after surgery. A custom biomechanical model will be applied to the motion data to calculate three-dimensional shoulder joint angles. These tasks will help to compare the subjects' range of motion (ROM) and peak abduction between the pre-operative and post-operative visits. It is expected that each participant's ROM and peak abduction will be greater after surgery, as the supraspinatus is responsible for abduction of the arm. It is the goal of surgery that after operation the compensation and limited movement of the injured arm is reduced. These results may be used by therapists to create new strategies for shoulder rehabilitation.

**Sidney Brod & Benjamin Overeem**

Measuring Mechanical Properties of the Bicycle Tire  
Mentor: Andrew Dressel, Mechanical Engineering  
Poster Presentation, Easel 5

Our research intends to further develop the model of bicycle. The goal is to understand how changing tire properties will affect the stability and handling of the bicycle as a whole. Some of the properties of the tire include: inflation pressure, and load; while operating parameters to be varied are tire width, and tire composition. Data will be collected on forces exerted between the tire and the pavement. The current goal is data collection, however, in the future the aim is to also develop a model of the tire. A model will allow properties of tire design to be predicted through a mathematical simulation rather than physical testing. Input of construction coefficients into a successful model will yield behavioral trends. This will ultimately allow for design property optimization and lower associated development costs.

**Liam Brodie**

Approximation of Lake Michigan Light Field with Various Light Sources

Mentors: Russell Cuhel, Freshwater Sciences & Carmen Aguilar, Freshwater Sciences

Poster Presentation, Easel 166

Light is the driving factor of photosynthesis, giving energy to primary producers that in turn feed an ecosystem. Under optimum conditions determined through evolution, primary producers will grow faster. To determine how algae affect water chemistry, sampled algae must be incubated under conditions as close to their natural habitat as possible. To achieve as close to natural light conditions, multiple types of light are used in lab. First, a light table with LED strip bulbs and an adjustable power output was built. Light Emitting Diode bulbs work by passing electrons through a semiconductor. Despite having a high initial price, advantages to LED bulbs include run cost, ability to have set wavelengths, and dimming capabilities. The table allows for a timed day/night cycle with intensities that resemble the light cycle of Fox Point, the most observed fixed point of the Cuhel and Aguilar labs. One prevalent observation was the reduction in intensity for the strip LEDs in series. Bulbs closest to the power source had the highest intensity. While the six rows did show linear, similar values for the same row, full rows had noticeably different range intensities as a result of distance from the power source. Second, metal halide bulbs measured in a large wheel photosynthetron were used to simulate depth. Metal halide lamps emit massive amounts of light relative to energy, and are often used for outdoor blanket lighting. While these lamps are efficient, the color range is limited and may shift from lamp to lamp. Lastly, mercury fluorescent bulbs were stacked vertically to create a light wall. While fluorescence is efficient, the bulbs can be more expensive, produce only white light, and have no dimmer capability. In attempting to reproduce Lake Michigan's light field, multiple types of bulbs were needed, each with advantages and disadvantages.

**Jessica Carpenter**

Instructional Technologies and App Development

Mentor: Jacques Du Plessis, Information Studies

Poster Presentation, Easel 24

US students lag behind the rest of the world in primary education. Little automation of higher mathematics skills exists, leading to tedious visualizations or paper-and-pencil scratch work to solve a problem as simple as  $213-94=x$ . Automation of higher functions (advanced addition, subtraction, multiplication, and division) would de-clutter the brain and leave room for more complex mathematics. Our research lays the foundation to be able to accelerate mathematics education. We are currently prototyping a website-based game that aims to facilitate the formation of math fluency skills by presenting prospective testers with a flashcard game. Testers will be given a set of three numbers from a pre-selected set. One of these numbers will be blank, and the tester will be presented with an audio recording of the flashcard shown

on screen. After some time has elapsed, the answer will be displayed and accompanied by the corresponding audio file. We are hopeful that this method will help students take control of their own learning by not only having access to a resource like this as school, but also at home. In the future we would like to move the application from solely web-based to mobile and other platforms. We hope our application will help revolutionize the juvenile math education system and put American students on par with the rest of the world's children.

**Audra Cashman**

Chronic Illness in Musical Theatre

Mentor: Robin Mello, Theatre

Oral Presentation, 1:00pm, Union 240

The SURF grant has allowed me to create a musical called KILLER GREEN, which is based on the experiences of living with a chronic disease (Lyme's Disease). I am holding 3 performances over the weekend of March 3rd and 4th. The cast includes 14 other student actors, singers, and dancers. For my SURF presentation at the April conference I will be presenting using a multi-media approach including: 1) a 1-2 minute promotional video that gives people a snap-shot of the performance and the script; 2) a discussion and explanation (by myself) accompanied by a slideshow of photos and work the cast did in rehearsal. I will also show examples of Poster I created, the scores of music I composed and notated, as well as an example of the script and videos of the choreography.

**Benjamin Chapman**

Plantar Pressure Profiles during Gait in Children with

Hypermobility Ehlers-Danlos Syndrome (hEDS)

Mentor: Brooke Slavens, Biomedical Sciences

Poster Presentation, Easel 199

Hypermobility Ehlers Danlos syndrome (hEDS) is a connective tissue disorder representing 80-90% of all types of EDS individuals, occurring in at least 1 in 5000 people. hEDS is characterized by many symptoms including hyper-flexible joints, joint instability and laxity, early onset osteoarthritis, and extensible skin. These symptoms often result in altered gait patterns, thereby affecting the pressures and forces experienced on the bottom of the feet. Over time, these alterations can cause chronic pain and deformity and continue to negatively impact gait patterns, further decreasing quality of life. Despite this, there is a paucity of research on gait biomechanics, particularly plantar pressure profiles, in individuals with hEDS. This study endeavors to comprehensively map pressures distributed across the feet during gait in children with hEDS. Three subjects with hEDS, between the ages of 8 and 18 years, will be recruited. First, to assess pressure profiles during quiet standing, each subject will stand barefoot on a Novel emed system, a capacitive sensor pressure platform, embedded in and level with the lab floor. Then, subjects will walk across the platform at their preferred speed for a maximum of five trials. Data collected will include peak pressures, maximum forces, and force-time integrals

over the entire foot from the time of heel contact to the time of toe off. Data may be divided into distinct areas of the foot such as the ball, heel, or toes. Three trials per subject will be used to calculate a group average and standard deviation for each metric. A statistical difference in plantar pressure profiles is expected when compared to data of healthy individuals as reported in the literature. Deviations found may elucidate the cause of pain and pathology development and will ideally help healthcare and rehabilitation professionals design strategies and orthopedic devices to alleviate them.

#### **Eugene Cherry**

Exploratory Study of Eye Care Needs of Adults in S. E. Wisconsin: Community Scan and Needs Assessment  
Mentor: Sandra Millon-Underwood, Nursing  
Poster Presentation, Easel 48

Diabetes, a complex chronic disease characterized by persistent hyperglycemia, affects one-third of the population in the U. S. The NIH Institute of Diabetes and Digestive and Kidney Diseases report that 29.1 million Americans are living with diabetes and 86 million Americans have pre-diabetes. Diabetes is a serious health concern that if left untreated could cause many long-term complications. Complications that could result from untreated diabetes include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, and damage to the eyes which could lead to permanent blindness. Diabetic retinopathy (DR), the most common microvascular complication of diabetes, is the leading cause of acquired blindness among working-age adults in the U. S. DR affects all population groups. The burden of DR has been noted to be higher for racial/ethnic minorities than for Whites. Tight glycemic control and routine eye screening can diminish the public health impact of DR. However, data reveal that racial/ethnic minority patients are more likely to have poorer glycemic control and are less likely to be screened for DR than Whites. Early detection, timely treatment, and appropriate follow-up care of DR can protect against vision loss. Identifying men and women at risk-for vision loss due to DR is a national health concern. However, few efforts have been undertaken in local communities to identify populations in the greatest need of screening, diagnostics and treatment. An exploratory study of the eye health concerns, eye health risks and eye care needs of adults in S. E. Wisconsin's inner city was therefore undertaken.

#### **Gabriella Cisneros & Alex Kayser**

Art Shay, Prolific Photographer-editing a Full Length Documentary Film  
Mentor: Jennifer Plevin, DOC UWM  
Performing Arts Presentation, 12:00pm, Union Cinema

Shay, now age 95, has been taking photographs for 80 years. The Chicago-based, Bronx-born photographer worked with big names like Life magazine and newspapers all over the country, written children's books, published photo essay books, and more. He has taken pictures of most of the popular culture icons and historical events

over the last decades. The feature-length documentary about Shay's life has been in the works for 5 years. Now in the hands of doc|UWM, the documentary is being edited using interviews and verité footage. I have gotten the chance to meet and film two interviews with Art Shay over the last two semesters, and now I've researched and put together an edit for an introduction to the film, mixing live footage, archival photos, and video. We are working to tell the story of Art Shay's life and work, and hoping to do justice to this eclectic and prolific artist.

#### **Ian Clark**

Big Data Enabled Intelligent Influent Forecasting for Wastewater Treatment Systems  
Mentor: Lingfeng Wang, Electrical Engineering  
Poster Presentation, Easel 113

The purpose of this research was to create an artificial neural network (ANN) that would predict the energy usage of a Wastewater Treatment Plant given its influent. To do so, recorded influent and energy usage data were provided by the Wastewater Treatment Plant, which were then used to train an ANN to see if there was a strong relationship between the values and predict the energy usages when given an influent value. The result of the research was with the use of the neural network a strong relationship was shown between the values and an energy usage could be predicted.

#### **Ever Clinton**

The Physical Environment: Resources For or Impediments to Social Sustainability  
Mentor: Brian K. Schermer, Architecture  
Oral Presentation, 12:20pm, Union 280

As one of the 3 pillars of sustainability, Social Sustainability has not been a focal point of many scholarly discourses until the late 1960's. Social Sustainability is "the continuing ability of a city to function in a long-term, viable setting for human interaction, communication and cultural development" (Yiftachel O, Hedgcock D, 1993). This continuous process is now surfacing through diverse professions, but has been alive and kicking within neighborhoods, especially in communities suffering from persistent economic disparities. The intent of this research is to address the role of the physical environment in fostering Social Sustainability within the Washington Park Neighborhood, located on the Northwest Side of Milwaukee, WI. Through ethnographical methods, this piece explores how one understands and acts upon social sustainability through the Community Capital Framework, Jobs to be Done, and the integrational taxonomy of the Integrated Network of Social Sustainability. This research is essential because it introduces a more sufficient way to design and plan for those within economically disadvantaged neighborhoods; this continuous process is constantly in motion.

**Ismael Coello**

Correlation of Mechanical Deformations and Corrosion Resistance on Aluminum Alloys by Electrochemical-Impedance Spectroscopy Testing

Mentor: Benjamin C. Church, Materials Science & Engineering

Poster Presentation, Easel 186

Aluminum alloys are prone to rapid corrosion after being heated to high temperatures. Differences in the deformations of the metal leads to differences in the metal's susceptibility to corrosion at these temperatures. First, to mimic the high temperatures, the aluminum samples with different deformations are individually put into a furnace. This will cause the aluminum alloys to acquire a layer of corrosion, called an oxide layer. Further, to test the oxide, an electrochemical-impedance spectroscopy(EIS) test is enacted. This test indicates the electrical resistance of the aluminum which may change with its oxide layer, as oxide is non-conductive. The EIS test will be used to make bode plots that show change in electrical impedance with changing frequencies. The goal of this experiment is to see if a correlation between the deformations of the aluminum and its corrosion resistance can be measured. Furthermore, if the relationship can be measured, a procedure to properly guide future research in aluminum corrosion testing is expected. If the results are not measurable, a detailed analysis of the parameters to measuring the corrosion is expected.

**Cheyenne Cole**

Experiences of African American Students in Shorewood School District

Mentor: Joan Blakey, Social Work

Poster Presentation, Easel 101

The purpose of this study is to identify ways in which the Shorewood School district can more effectively address the needs of African American students so that they are better able to excel in school. There is a widening gap between African American and White students grades 6 – 12 who attend Shorewood Intermediate and High Schools. This gap is reflected in test scores and other metrics of academic achievement. During the 2016-2017 academic year, there was a 28% - 53% difference in reading scores between African American and White students. There was an even wider gap in Math with a difference of 18% – 64%. Moreover, African American students are almost two times more likely to experience a referral than white students. The research questions guiding this study are: How do African American students grades 6 – 12 experience a suburban, predominantly white, middle/ upper class school district? 1. Why do African American students experience more referrals and lower academic achievements than other groups of students? 2. 3. How are African American and White students grade 6 – 12 similar and different? Methods Using a mixed method study design, this study will draw from both quantitative and qualitative traditions in order to understand the experiences of African American students in a deeper, more meaningful way. The goal of using a mixed

method design is to capitalize on the strengths of both approaches while minimizing the weaknesses of a single methodological design (Creswell, 2013; Johnson & Onwuegbuzie, 2004). Moreover, mixed method designs can lead to multiple perspectives from different vantage points (e.g. individual and school level data) within a study. The quantitative component of the study will include analysis of six measures. These measures include: (1) Youth Risk Behavior Surveillance System survey (YRBSS); (2) Perceived Stress Scale (PSS)- Cronbach's alpha.82); (3) Racial and Ethnic Microaggressions Scale (REMS) – Cronbach's alpha.912); (4) Self-Efficacy Questionnaire for Children (SEQ-C); (5) Coping Strategies Inventory Short-Form(CSI-SF) and (6) Child and Youth Resilience Measure (CYRM). Implications for Practice By learning more about students' experiences, it is our hope that this study improve the educational experiences of African American students in the district, increase the quality of education that African American student receive which will lead to greater success within the Shorewood School District. We also hope that this research will contribute to pedagogical and institutional practices that also would contribute to students' success.

**Caley Conley**

Simple Transitive Mate Choice in *Enchenopa Binotata* Treehoppers (Hemiptera: Membracidae)

Mentors: Bretta Speck, Biological Sciences & Rafael Rodriguez, Biological Sciences

Poster Presentation, Easel 175

Simple Transitive Mate Choice in *Enchenopa Binotata* Treehoppers (Hemiptera: Membracidae) Caley Conley\*, Bretta Speck, Rafael Rodriguez The purpose of this research lab was to look at the importance of female mate choice in *Enchenopa binotata* treehoppers. Mate choice decisions are based on the mate preference functions, which are curves that distinguish the relationship between attractiveness of the mate and the features that the mate provides. The use of transitivity relates back to preference functions in the decision making of a female's mate. In our research, we used a competitive alternative, which incorporates the intransitivity, that allowed the females to respond to either a very low or very high quality male. When given this stimuli, females had altered their preference in mate choice, meaning they chose one or the other, or non at all. In almost all the female treehoppers tested in this study, it was found that majority of them preferred the traits when presented with the preferred male mate. We tested the transitive and intransitive mate choice hypotheses with *Enchenopa binotata* treehoppers. We picked up signaling from vibrational playbacks that varied in single variable and frequency from each female. We found that females selected the preferred males over the non-preferred males regardless of the presence of a decoy or the quality of the decoy. These findings show that *Enchenopa* treehoppers use transitive mate choice.

**Teonna Cooksey**

The Human and Environmental Impacts of  
Foreclosure: Washington Park and Sherman Park  
Mentor: Dr. Arijit Sen, Architecture  
Oral Presentation, 1:00pm, Union 280

The transformation of American cities caused by urbanization and gentrification has created an outlet where foreclosure and eviction have become sources of capital. Housing policies implemented in the past, such as redlining, have created areas within American cities where poverty is highly concentrated. This research presents a vivid century long pictorial, structural, and economic transformation of eight foreclosed homes that were used as a case study. These boarded-up houses are in two north side neighborhoods in Milwaukee, WI. I examined why these once-active households turned into vacant and derelict buildings in the span of one year, between 2016 and 2017. The homes shared one thing in common: The residents of these homes were evicted by the city because the homeowners failed to pay property taxes or keep up with home maintenance. These are not bank-foreclosures. Instead, they are called city-tax-foreclosures, and since 2011, the number of city tax foreclosures has increased exponentially. This research explores how a foreclosure—which leads to a possible eviction and a definite vacant home, impacts the entire cultural landscape of a community. Multiple instances of foreclosure within a single entire cultural landscape of a community. Multiple instances of foreclosure within a single neighborhood influences the gradual decline of economic and social stability of that neighborhood. The findings from this research show that homes have deteriorated over time because many of them are hardly inhabited or repaired. The overall environment of the community has diminished due to the displacement of community members and the disinvestment in jobs and other basic resources throughout the neighborhoods. This research provides a historical perspective of the Washington Park and Sherman Park Neighborhoods, as well as details that could be utilized for revitalization. In addition, the results could broadly provide insight to some of the challenges that are disabling impoverished communities from becoming stable—economically and socially.

**Rocio Cruz**

Characterization of Neural Crest Cell Migration in the  
Absence of Cabin1 in Developing Zebrafish  
Mentor: Ava J. Udvardia, Biological Sciences  
Poster Presentation, Easel 203

Craniofacial anomalies are a prominent issue in newborns. In order to study a possible cause for such events, we are looking further into the behavior of neural crest cells (NCCs). NCCs are progenitor cells found in early development, which eventually give rise to diverse populations of specialized cells including those that make up craniofacial cartilage. Their ultimate function is determined by their location after they migrate out from the developing nervous system, where they originate, into the rest of the body. The protein Cabin1 is a transcriptional repressor, and it has not been researched to a great extent

in the context of craniofacial development. However, previous work from Dr. Udvardia's lab showed that larval zebrafish with reduced expression of the Cabin1 protein developed craniofacial deformities. Therefore, we hypothesize that a loss of the protein Cabin1 affects the migration of neural crest cells. To test our hypothesis, we are working with zebrafish strains that contain deletions in the Cabin1 gene, which prevent synthesis of functional Cabin1 protein. The Cabin1 mutant strains have been outcrossed with transgenic reporter strains, which will allow us to follow the migration of NCCs and chondrocytes in live developing embryos. The transgenic reporter strains express green fluorescent protein (GFP) in the developing NCCs and chondrocytes. With the use of a fluorescent microscope we will be able to capture images of the NCCs and chondrocytes at the larval stage of fish during craniofacial cartilage development. The movement of the NCCs and the morphology of the cartilage will be analyzed using the ImageJ and MorphoJ computer programs. The analytical comparison of the images will elucidate the effect of the loss of Cabin1 in the movement of NCCs as they form chondrocytes. The findings from this study have the potential to explain new mechanisms underlying craniofacial birth defects in humans.

**Alexandra Dewey**

Intensive/Extensive: Representing the Multivalent  
Reality of Architecture  
Mentor: Alex Timmer, Architecture  
Poster Presentation, Easels 205

Architecture, although often thought of only existing in an extensive reality (volume, mass, dimensioned space), is also a part of the intensive reality (pressure, humidity, temperature). This research project looks at how we as architects can represent architecture in its totality, not just the extensive properties of architecture. By looking at historical and contemporary documentation, exploratory development of representational techniques, and testing that technique to describe relevant architectural and urban spaces, we looked at the campus through a new architectural lens. The intent is to remap UWM's campus in terms of both intensive and extensive properties. Through multiple iterations and testing various distilled techniques, we use software such as Photoshop, Rhino 3D, Illustrator and InDesign to produce four detailed drawings. Each drawing contains the same information pertaining to each of the seasons. These drawings will inform those who walk through campus on a regular basis on how they could more comfortably move through campus depending on the intensive properties on any given day. They will also help to organize campus based on public and private spaces on campus. Similar to the Nolli map of Rome, this large-scale map will show the multivalent qualities of the campus. Our findings might lead to making recommendations about how campus could be modified to improve the intensive reality for the many people who use it.

**Lukas Dommer**

The Association Between Thought Suppression Tasks, Anxiety, and Beta Brain Wave Patterns

Mentor: Han Joo Lee, Psychology

Poster Presentation, Easel 164

This study's primary purpose was investigating if anxiety negatively impacts cognitive tasks involving memory, attention, inhibitory control, and reaction time. With anxiety being a natural phenomenon associated with individuals' daily dysfunctions, the goal was to replicate this hypothesis finding any association between anxiety and brain precise cognitive function in a controlled environment. Also it investigated if there were any identifications of neural underpinnings corresponding with this negative impact. Volunteers were first asked to complete the State-Trait Anxiety Inventory (STAI-T), which is a validated self-report questionnaire used to identify one's inclination of anxiety. After this, they performed the computerized cognitive task called the Flanker task. Meanwhile, their brain electrical activity was monitored and recorded using an electroencephalogram (EEG) headcap. The Flanker task refers to a series of response inhibition tests that are used to evaluate one's ability to suppress unwanted responses. EEG refers to a test that is used to locate and record electrical brain wave patterns. Results showed individuals who reported high scores of anxiety based on STAI-T also demonstrated slower reaction time to Flanker task trials with distractions. The EEG recordings indicated these individuals had a significant amount of beta wave brain activity, which corresponds with high levels of anxiety and depression. Their beta wave activities were also negatively associated with poor performance on the Flanker task. Utilizing wireless, minimal EEG devices with individuals performing high-stakes tasks would allow monitoring and identifying when one is going into a high anxiety state, which then could prevent potential tragedies.

**Cassandra Doolittle**

Genre-Specific Music Training Affects Auditory Perception

Mentor: Adam S. Greenberg, Psychology

Poster Presentation, Easel 75

Acquired expertise has been shown to alter our perception of the world around us. Previous research from our lab has revealed a correlation between differences in auditory object perception and extent of formal music training. During object perception, highly trained musicians rely on a different collection of low-level sound characteristics than those with less formal music training. Here, we hypothesize that highly trained musicians of a specific genre (i.e., Classical, Jazz, etc.) may rely on low-level sound features that are different from those exploited by highly trained musicians of another genre. To test this, participants completed a detailed screening survey designed to (1) ensure that participants are highly-trained musicians (superior to previous methods of training measurement), (2) categorize participants by the degree to which they consider themselves performers versus listeners of different genres, and (3) discern participant

comfort levels with deviations from notation when performing and listening to different genres. We predict that musicians who specialize in genres that promote musical improvisation (e.g., Jazz) will be more comfortable with deviations from notation when performing and listening to music; whereas, musicians who specialize in genres that promote the precise execution of notation (e.g., Classical) will be less comfortable with deviations from notation when performing and listening to music. Our preliminary analyses support this hypothesis. Future directions include an exploration of the relationship between auditory object perception and training in specific musical genres. Just as highly trained musicians differ from those with less training, we expect to find differences in auditory object perception between Classical musicians (i.e., less comfort with deviations from notation) and Jazz musicians (i.e., more comfort with deviations from notation). Genre-specific training may bias attention towards unique sound features that influence the formation of auditory perceptual objects.

**Quincy Drane & Eli Liebenow**

Microhousing: the Next Generation of Domesticity

Mentor: Mo Zell, Architecture

Poster Presentation, Easel 31

Ludwig Mies van der Rohe is known in the architecture world for saying, "Less is more," in regards to design, specifically minimalistic design. As generations continue to change their way of living, renovation and adaptive reuse is becoming more prevalent leading into small multifunctional spaces creating high flexibility to live, work, and play. The combination of Mies', "Less is more," and multifunctional spaces line up to be the growing phenomenon: Microhousing. Taking minimalism a step further, we designed within a conceptual community that is self-sufficient consisting of units with their own personal identity: Dining Room, Garden, Living room, Porch, Stair, and Study—all organized around a fluent circulation. Created with a specific function, each space's language talks and supports one another. Taking this information, we applied it to the 2018 International Ragdale Ring Competition, located in Lake Forest, Illinois, to reinterpret the original 1912 Shaw's Ring as a contemporary environment. This prompted us to reimagine our microhousing units as performance venues/seating arrangements. The competition served as our creative break from our microhousing research, allowing us to strip down the units to their bones and toggle back and forth with new designs using A-frame construction with 2x6 stock pine wood and standard 4 x 8 8mm polycarbonate sheets. Our design is also focused on longevity and how it can be applied for other uses. After Ragdale, the design will return to focus on Microhousing. Specifically, each unit will become a Microhousing prototype for housing kids have aged out of foster care in a project called Pathfinder.

**Jessica Drews**

Comparisons of Stress among ROTC and Civilian Students  
Mentor: Christine Larson, Psychology  
Poster Presentation, Easel 204

This study will explore the different stressors that ROTC (Reserve Officer Training Corps, This study will explore the different stressors that ROTC (Reserve Officer Training Corps, comprised of students who will commission into the military upon graduation) students experience as compared to the civilian student population. Currently, there is very little research regarding stress of ROTC students. Much of the research focuses on physical characteristics like muscle mass and endurance capacity. This study will be a qualitative interview study, with approximately 10 ROTC students and 10 civilian students from the University of Wisconsin – Milwaukee involved. A standard interview guide will be used in the interviews with both groups, where the transcripts will be analyzed for common themes. The anticipated conclusion is that ROTC and civilian students will experience many of the same stressors, but that ROTC students will have an added dimension of stress due to their military involvement. This study will seek to explain what this added stress looks like. Mental health in the military is becoming an increasing problem, and this study looking at future military leaders will explore what impact military involvement has on student leaders. This study is intended to serve as a baseline for future research on mental health and the military. It will give future researchers a better understanding of what ROTC students go through in college as compared to civilian students.

**Nancy Duque**

Major Element Geochemistry of the Pulo do Lobo Metasedimentary Rocks Affected by the Southern Iberian Shear Zone, Andalusia, Spain  
Mentor: Dr. Dyanna Czeck, Geosciences  
Oral Presentation, 1:00pm, Union 260  
Poster Presentation, Easel 219

A shear zone is a narrow band of rocks that are highly strained due to tectonic forces that preserves a detailed record of deformation history. The Southern Iberian Shear Zone (SISZ) is a 60 km long shear zone in southwestern Spain that was active approximately 300 million years ago. On one side of the SISZ, metasedimentary rocks of the Pulo do Lobo (PdL) formation include a mixture of schists and quartzites deformed during shearing. During deformation, fluids may interact with rocks and facilitate or enhance deformation. The fluids themselves are transient, so studying their effects directly in ancient structures is unfeasible. However, the fluids may leave altered rock chemistry, metamorphic reactions, and/or distinctive microstructural evidence. Little is known about the major element geochemical changes across the PdL caused by the SISZ. This project is a preliminary major geochemical analysis of 14 PdL samples taken near the SISZ. The primary goal is to determine whether geochemical changes related to deformation and fluid interaction can be distinguished from initial PdL heterogeneity. Major

element geochemical data have been collected using X-Ray Fluorescence. Among the 14 samples, there were 3 distinct groups: high, intermediate, and low silica. We determined that the low silica samples are the best targets for further evaluation. In one of the transects, there were three PdL samples in this group, so we were able to evaluate two altered samples (closer to the SISZ) compared to the least altered sample furthest from the SISZ. Many of the major elements show consistent patterns: MnO, MgO, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, and Al<sub>2</sub>O<sub>3</sub> show enrichment, and SiO<sub>2</sub>, Na<sub>2</sub>O, and CaO show depletion. These trends suggest the deformation related geochemical signature in the PdL may be separated from heterogeneity of the PdL itself, and the PdL warrants further study for fluid/rock interaction during shear zone deformation.

**Madeline Dzikowski, Kristen Meyer & Hilda Ramirez-Martinez**

Development of a LC-MS/MS Method for Quantitative Bioanalysis of Carmofur and its Application to Pharmacokinetic Study in Rat Plasma  
Mentor: Shama Mirza, Chemistry & Biochemistry  
Poster Presentation, Easel 106

Glioblastoma is considered as the most aggressive form of brain tumor with overall survival less than fifteen months after diagnosis, even with multimodal therapy. It constitutes major percentage of malignant brain tumors, with over 10,000 new cases reported every year in USA. Recent studies from our lab have identified acid ceramidase as a novel drug target for glioblastoma. While temozolomide (TMZ) is the only FDA approved drug for glioblastoma treatment, carmofur, an acid ceramidase inhibitor has shown promising results against different brain tumor cell lines. In order to understand the drug's therapeutic potential against glioblastoma, further animal studies are required. This study aims to develop a liquid chromatography tandem mass spectrometry (LC-MS/MS) method to reliably quantify carmofur in rat plasma with a goal to evaluate pharmacokinetic behavior of the drug molecule. We developed a multiple reaction monitoring (MRM) method to quantify carmofur in rat plasma. To our knowledge, this is one of the first study to quantify carmofur using LC-MRM-MS method. A chromatographic separation was achieved on a C18 (100 x 3mm, 3 $\mu$ ) column on a Shimadzu Nexera X2 HPLC interfaced with a Shimadzu 8040 triple quadrupole mass spectrometer. LC-MRM-MS analysis was carried out by electrospray ionization in negative ion mode. Carmofur has been monitored for MRM transitions m/z 256.25 to m/z 129.10, and m/z 256.25 to m/z 42.0. While the internal standard, 5-bromouracil has been monitored for MRM transition m/z 189.0 to m/z 42.0, and m/z 191.0 to m/z 42.0. This method has demonstrated adequate sensitivity and specificity to be used in pharmacokinetic study of carmofur in rat plasma samples.

**Byron Edwards, Eileen Freres, Alice Lecus & Amir Kordijazi**

Novel Porous Material for Removal of Phosphorus from Stormwater

Mentor: Marcia R. Silva, Ph.D., Civil & Environmental Engineering

Poster Presentation, Easel 193

Most farming operations require nutrient fertilizers to maintain consistent production levels. Excess nitrogen and phosphorus seep into soil and bodies of water, making agriculture a primary cause of nutrient pollution in freshwater. A team at UWM WaTA Technology Accelerator has developed a novel approach to reducing the effects fertilizers have on freshwater bodies. An engineered natural porous material filters phosphorus from farm water runoff. This unique adsorbent material is inexpensive, accessible, and reusable, allowing farmers to effectively reduce water pollution without experiencing considerable loss of profit. To analyze performance, UV Spectroscopy tests were used to measure the change in concentration of the phosphorus before and after filtration. To optimize the model material, several variables have been tested and controlled, including the flow rate and phosphorus concentration of the subjected fluid. In addition, fabrication techniques for the optimized, functionalized filter have been perfected for large-scale production. Future tasks include the fabrication of a full-scale apparatus and the coordination with local farmers to test the system in the field, while addressing farmers' concerns. This new technology has shown to be an effective method of phosphorus removal and is well on the way to becoming a revolutionary approach to pollution control as it relates to agriculture.

**Eric Edwards**

Chemically Binding Fluorescent Compounds to Glass Slides

Mentor: Jörg Woehl, Chemistry & Biochemistry

Poster Presentation, Easel 102

This research involves the study of fluorescent compounds and which solvent gives the best results. In the end, clear fluorescent images are desired. The use of several different chemicals to clean the surface of the glass and chemically react it with the fluorescent compounds was how this research was carried out. The use of organic solvents in the fluorescent compound reaction step was what gave the best results. Using these, several clearly fluorescing images were obtained. It can be concluded that this method is successful for glass slides. Our goal is to extend this method to optical fibers.

**Marie Enderle**

Adaptive Behavior in School Age Children with Neurofibromatosis-1

Mentor: Professor Bonnie Klein Tasman, Psychology

Poster Presentation, Easel 115

Neurofibromatosis 1 (NF1) is an autosomal dominant genetic disorder affecting 1 in 3,000 people, and is characterized by attention and learning problems. There has been minimal research regarding adaptive

behavior in young children with NF1, and close to none regarding adaptive behavior in school-age children with NF1. The purpose of the current study was to determine how a sample of school age children with NF1 scored on the Scales of Independent Behavior (SIB-R), a measure studying adaptive behavior skills, related to their same age peers. The parents of thirty-eight (n=38) school age children with NF1 (age 9-13) completed the SIB-R parent assessment, which assesses broad independence by examining motor skills, social interaction and communication skills, personal living skills, and community living skills. Twenty-four (n=24) of these children with NF1 participated in related research during the preschool years, and as such we also examined how adaptive behavior skills develop through preschool to school-age years. We expect to find that school-age children with NF1 continue to have weaknesses in adaptive behavior in comparison to other children their age, based on comparisons to normative data. We also expect that the difficulties present in preschool children with NF1 will continue in school age children with NF1, specifically regarding motor skills and language expression. We predict that we will find a correlation between IQ and adaptive behavior in school age children with NF1, as a similar correlation was found in preschool children with NF1. Studies regarding adaptive behavior have potential to help better care for and teach children with NF1 and represents a topic that needs to be more broadly explored.

**Michael Esson**

Effects of Aerobic Fitness on Cognitive Performance

Mentor: Krista Lisdahl, Psychology, Ann Swartz, Kinesiology, & Tasha Wade, Psychology

Poster Presentation, Easel 68

Aerobic fitness has been linked with improved brain health in adults and older adults, although few studies have examined aerobic fitness and cognition in youth. For this study, we examined how aerobic fitness relates to cognitive functioning in healthy adolescents and young adults, and whether there were gender differences in the healthy adolescents and young adults, and whether there were gender differences in the link between fitness and cognition. Data was collected from 41 adolescents and young adults aged 16-25 (16 highly fit and 25 low-fit individuals). We examined whether aerobic fitness (measured by VO2 max) independently and interactively with gender predicted cognition in adolescents and young adults. Results. High-fit youth did not significantly differ from low-fit youth on any demographics (race, ethnicity, gender, age, education) or drug (marijuana use, alcohol, nicotine past year use) variables. Multiple regressions revealed that higher aerobic fitness was associated with improved psychomotor speed and sequencing ability (b=.28, p=.03). There was also a significant interaction between gender and aerobic fitness in predicting letter fluency (b=-.44, p=.004), and marginally predicted working memory (b=-.30, p=.09) and sustained attention (b=-.30, p=.07); in all cases, the males demonstrated a more robust relationship between increased aerobic

fitness and better cognitive performance. Conclusions. Aerobic fitness is a strong predictor of cognitive performance among males than in females. Although aerobic fitness is important among youth as evident in its association with increased psychomotor speed, however aerobic fitness and its effect on cognitive performance depends on gender. Future research should be performed on a larger sample group. Future research should look to explore the factors that lead to gender mediating the effects of aerobic fitness on cognitive performance among males.

#### **Abbie Esterline**

The Relationship Between Physical Activity and Fatigue in Young Adults with Cancer

Mentor: Jeanne Erickson, Nursing

Poster Presentation, Easel 153

Many young adults who have been diagnosed with cancer deal with the adverse effects of fatigue and one solution to lower fatigue is to increase their physical activity. This study will analyze the relationship between physical activity (steps/day) and fatigue levels in young adults with cancer at the start of chemotherapy. At the beginning of the study, each participant completed the Godin Leisure-Time Exercise Questionnaire to get a baseline of their levels of physical activity before their cancer diagnosis. The levels of physical activity of the participants were measured for 7 days using an accelerometer, and the participants self-reported their fatigue using the PROMIS Fatigue short form. Physical activity and fatigue were both reported by patients recording their steps/day as well as how their fatigue worsened or improved. At present, the study has enrolled 23 participants. Descriptive statistics will be used to summarize the data and analyze the relationship between physical activity and fatigue. My hypothesis is that increased physical activity levels will be associated with less severe fatigue. Studying the relationship between fatigue and physical activity is important because fatigue is something that many young adults with cancer deal with, and the lowering of fatigue can also help to lower symptoms of depression making a patient's chemotherapy treatment more manageable.

#### **Sara Falline**

A Validation of Childhood Body Size Assessed by Stunkard Figures with Childhood Photographs in the Young Women's Health History Study of Breast Cancer

Mentor: Ellen Velie, Public Health

Poster Presentation, Easel 67

Authors: Sara C. Falline, Sofia Haile, Jennifer M.P. Woo, James M. Groh, Darek R. Lucas, and Ellen M. Velie. The prevalence of obesity has increased dramatically in the United States in recent decades, and is associated with multiple poor health outcomes, including breast cancer. The association between increased body mass index (BMI) in childhood and breast cancer, however, is not well understood. Self-reported Stunkard body size figures — a scale with nine gender-specific body figures — have been used as a proxy for childhood body size. The main

objective of this project is to evaluate a novel childhood body size assessment technique where size at age 9 years, based on self-reported Stunkard figures, is validated with childhood photographs. The ultimate goal of this study is to provide a correction factor for self-reported childhood body size using photographs for future research. Study participants are women without breast cancer randomly selected from the Young Women's Health History Study (YWHHS) (n=48), a socioeconomically diverse, population-based case-control study of breast cancer among non-Hispanic Black and White women age 20-49 years. YWHHS participants provided a childhood photograph and rated their body size on a Stunkard scale at age 9 years. Two evaluators objectively assessed each photo and assigned a Stunkard value. Stunkard values were converted into categories of underweight (1-2), normal weight (3-5), and overweight (6-9). The evaluator's assessments were averaged and compared to the participants' self-assessment using Cohen's Kappa Coefficient. Agreement between evaluator photo-assessed and participant self-reported Stunkard body size of underweight, normal weight, and overweight at age 9 years showed only some agreement ( $\kappa = 0.08$ ), suggesting objective measures may improve self-reported childhood body size. Based on these findings, there is evidence that use of childhood photos may provide a useful correction factor when examining self-reported childhood body size based on Stunkard figures. Future research will examine whether characteristics, such as race or socioeconomic position, differentially affect self-reported childhood body size.

#### **Ruth Fenelon**

Carbon Isotopic Signatures in Laguna Bacalar, Mexico

Mentor: Timothy Grundl, Geosciences

Poster Presentation, Easel 202

Laguna Bacalar is a marl lake in Quintana Roo, Mexico that is actively precipitating large amounts of calcium carbonate. This lake lies within a fault controlled graben and is the second largest lake in Mexico. It also contains the largest occurrence of freshwater stromatolites in the world. There are no surface water inlets to the lake and the water flux is dominated by groundwater. This study will investigate whether the carbon being sequestered in the lake originates from the atmosphere or if it is being transported in by groundwater. If the source is atmospheric the lake is serving as a net sink of atmospheric carbon. The  $\delta^{13}\text{C}$  isotopic signature of carbonate samples collected in the lake will be analyzed to determine if the driving force for precipitation is biogenic precipitation from the atmosphere by stromatolites or abiotic precipitation from the groundwater. Carbonate samples were collected in 2017 and 2018. Both sets of samples will be analyzed for carbon isotopes.

**Travis Fichtenbauer**

Analyzing Nulling Pulsars using Gaussian Mixture Models  
Mentor: Joe Swiggum, Physics  
Poster Presentation, Easel 140

Pulsars are rapidly rotating neutron stars that emit radiation from their poles. A small portion of the pulsar population is known to occasionally cease radio emission for periods of time; these are called nulling pulsars. The study of nulling pulsars allows us to better understand the emission mechanism of pulsars and how pulsars “die.” Observations for this project were made using two of the world’s largest radio telescopes - the Green Bank Telescope and the Arecibo Observatory. We proposed confirmation observations of 15 nulling pulsar candidates, sources originally discovered in the Green Bank North Celestial Cap (GBNCC) survey, and have so far conducted remote observations for five of them. Until now, techniques used to estimate the nulling fraction (fraction of time pulsar spends in a null state) were biased, so we employ a new method using Gaussian mixture models to better estimate nulling fractions and characterize the nulling behavior of several rediscovered pulsars.

**Garrett Finn**

Development of a Real-Time Process Monitor:  
Spectrophotometric Characterization of Novel Metal-Binding Chemosensor Dyes.  
Mentor: J. Aldstadt, Chemistry & Biochemistry  
Poster Presentation, Easel 178

The Environmental Protection Agency (EPA) sets strict standards for various metals such as copper, zinc and lead in industrial wastewater. To be in compliance with these regulations, the “over-treatment” of industrial effluent is typically practiced. Over-treatment results in increased operating costs, as well as environmental impacts. Current at-line and off-line monitoring methods are unable to provide adequate information to meet more efficient, real-time adjustments that are needed for the treatment of wastewater. Given the limitations of current monitoring methods based on spectrophotometry, we are studying the analytical utility of new long-lasting sensor dyes developed by the Schwabacher Group at UWM. By characterizing these novel chemosensor dyes, a real-time process monitor for industrial effluent can be potentially be designed and tested. In my project, I am studying the acid-base properties of these dyes, as well as their binding affinity for the cations of interest (e.g., zinc, lead, and chromium) so that a quantitative model can be further developed and optimized. I am employing a method that is based upon using a high-resolution optical fiber-based (visible) spectrometer with a charge-coupled device (CCD) detector for the selective and sensitive characterization of the dye:metal interaction.

**William Fiore, Travis Fichtenbauer & Zachary Komassa**

ARCC@UWM: Searching and Solving Pulsar Puzzles  
Mentors: Xavier Siemens, Physics & David Kaplan, Physics  
Poster Presentation, Easel 141

Pulsars are a type of evolved star that are extremely dense, rotate at an extremely reliable rate, and produce an intense beam of radiation similar to a lighthouse pulse. This unique pulse allows for novel ways to study the exotic physics of neutron star matter and general relativity. Particularly fast-spinning pulsars known as Millisecond Pulsars (MSPs) can be used to form Pulsar Timing Arrays (PTAs), which have the potential to detect gravitational waves produced by merging supermassive black holes in other galaxies. The sensitivity of a PTA depends on the number of MSPs included in the array, so the Arecibo Remote Command Center (ARCC) was formed as a way for undergraduate students to be involved in the search for new pulsars. Students remotely observe from UWM with the Arecibo Observatory in Puerto Rico and the Green Bank Telescope in West Virginia, two of the world’s largest radio telescopes. Students then analyze the resulting data to discover and study these fascinating astrophysical objects. In this effort, students at UWM collaborate with students at a number of other US institutions and with researchers across the globe.

**William Fiore**

SkyPlotter: Displaying Source Candidates Near High-Energy Neutrino Events  
Mentor: Anna Franckowiak  
Poster Presentation, Easel 142

The IceCube neutrino observatory has detected a flux of high-energy neutrinos. However, the origin of those high-energy astrophysical neutrinos is currently unknown. Finding the source of these neutrinos is crucial for IceCube’s main aim, which is to study the origin and propagation of cosmic rays. Possible source class candidates are supernovae (SNe), active galactic nuclei (AGN), gamma-ray bursts (GRBs), and other sources of gamma rays. I have developed a visualization tool called SkyPlotter, which displays sources of those classes that are close to the coordinates of a neutrino detection. SkyPlotter draws on catalogs of gamma ray, X-ray, and optical sources of both steady and transient nature. Skyplotter visually displays sources within the neutrino error circle and prints relevant information, such as flux and redshift. The next step is to begin applying the tool to IceCube’s public neutrino candidates and comparing the results to sources found in random directions in the sky.

**Cory Fitzsimmons, Izaiah Ramirez, Elisabeth Markman, Connor Finnegan, Erik Peppy & Parker Muñoz**

Playing The Play: How We Wrote A Play By Playing Games  
Mentor: Robin Mello, Theatre  
Oral Presentation, 12:20pm, Union Cinema

This presentation focuses on the collaborative writing

process we developed while writing a full length play. We based this new research on our pilot project as well as further research we did over the past year. The pilot, *Orphan Train* (Spring 2016) required us to learn to work as a theatre company, conduct literature reviews, and read research already published on the topic. They were then charged with crafting an original and collaborative theatre piece focusing on the social issues and lived experience of the Orphan Train Movement. This work-in-progress was successfully presented to the public in April 2016. Data from the pilot show that we developed a strong creative group dynamic, healthy work ethic, and significant knowledge about the history of the Orphan Trains. We built on this foundation and used the outcomes from the project (nascent script, radio interview on *Lake Effect*, post-show discussions and lectures, dramaturgical and historical research from archives and other primary and secondary sources, and music pertaining to Orphan Train history) to pursue new research on the subject. During our earlier research on the Orphan Train Movement, we learned a method that our current research is based in. This method, “Devising”, rewards experimentation and teamwork. We have come to understand that devising, as a concept, could revolutionize not only playwriting, but many other fields of study, if properly applied. We have applied our research in a combination workshop/audition, which we used to bring in new cast members to help test our writing methods.

#### **Karl Flanagan-Morris**

Increasing Conductivity of ZnO Thin-films by way of Parameterization of Precursor Sol Composition and Processing

Mentor: Nidal Abu-Zahra, Materials Science & Engineering  
Poster Presentation, Easel 180

In this presentation, the parameterization of ZnO thin films will be investigated. These thin films serve a vital role as a protective layer from UV-radiation, oxidative and moisture degradation. The ever-increasing need for inexpensive materials to serve as a replacement of expensive films, such as Indium Tin Oxide (ITO), used on solar panels has been growing; with the objective of lower the cost of solar panels. The films in this study are subjected to numerous variations in precursor concentration and composition, as well as processing conditions, with the goal of increasing conductivity of the film and utilizing it as a viable replacement for ITO as an electrode and protective layer. The characterization and electrical properties will be determined via XRD, SEM-EDS, Confocal Microscopy, 4-point probe and UV-Vis Spectroscopy.

#### **Bailey Flannery**

The Monstrous Mouths of Women  
Mentor: Jacqueline Stuhmiller, English  
Oral Presentation, 1:20pm, Union 250

The vagina dentata, literally meaning “toothed vagina,” is an age-old motif in art and literature. It signifies the fear that women are sexually aggressive rather than passive and

submissive, threatening to symbolically castrate men. Scylla and Charybdis in Homer’s *The Odyssey* are perhaps some of the most iconic representations of the vagina dentata. The former is a six-headed woman-monster who devours Odysseus’ crewmen in her many mouths; the latter is a gaping whirlpool that threatens to suck in the entire ship. These examples from classical literature emphasize that man must navigate the dangerous mouths of the sea, lest they devour him whole—a metaphor for man’s fear and desire of sexually assertive women. The examples of Scylla and Charybdis also reveal that the mouth, although not actually genitalia, is often the site of the vagina dentata, a site of rebellion and power for women. This presentation explores how representations of women’s monstrous mouths have evolved through several readings, beginning with Eve in Genesis. The presentation then examines the more contemporary vagina dentata found in femme fatale starlets whose blood-red mouths ooze sexual desirability and danger, such as Ava Gardner, Angelina Jolie, and Megan Fox. Finally, the presentation discusses the monstrous mouth’s most recent development: the device Rape-Axe, which is a “real life” vagina dentata that prevents unwanted vaginal penetration. The vagina dentata’s transformation from textual symbol, to screen trope, to palpable reality confirms that while the mouths of women have been monstrous throughout Western history, they change with each reappearance to represent evolving, yet interconnected fears of women and their bodily power, fears that are all too present in current depictions and manifestations.

#### **Meredith Frank**

Do Tumor-Induced Myeloid-Derived Suppressor Cells Proliferate Outside of the Bone Marrow?

Mentor: Douglas Steeber, Biological Sciences  
Poster Presentation, Easel 154

Myeloid-derived suppressor cells (MDSCs) are a heterogeneous class of Myeloid-derived suppressor cells (MDSCs) are a heterogeneous class of immunosuppressive cells that, under pathological conditions, circulate in very high numbers and accumulate in the lymph nodes, spleen, and at tumor sites. MDSCs can be separated into two distinct populations, polymorphonuclear MDSCs (PMN-MDSCs) and monocytic MDSCs (M-MDSCs), based on the expression of cell surface markers. Previous studies in the lab using flow cytometry suggested that actively proliferating PMN-MDSCs and M-MDSCs were present in tumor-bearing mice outside of the bone marrow, specifically in the spleen and tumor tissue. The purpose of the present study was to follow up on this unexpected result using immunofluorescence microscopy to directly identify proliferating MDSCs in the tumor. To address this, 4T1 tumors were induced in female BALB/c mice and allowed to grow for 4 weeks. One hour prior to tissue harvest, the mice were injected with bromodeoxyuridine (BrdU), a thymidine analog used to identify proliferating cells. Harvested tissues were placed in OCT medium, rapidly frozen, and sectioned using a cryostat. Sections were labeled with antibodies specific for BrdU and an MDSC surface marker, Ly6G. A nuclear

stain, DAPI, was used to identify all cells within the tissue section. Labeled sections were viewed using fluorescence microscopy. Multiple images from each tissue section were captured using a monochromatic digital camera, pseudocolored and overlaid. Data was collected from two separate tumors. Within tumor tissue, MDSCs were seen organized in large clusters and also as individual cells disbursed throughout the tissue. Interestingly, while BrdU + proliferating tumor cells were abundant, few if any BrdU+ MDSCs were observed. This difference in results may be due to heterogeneity between tumors and therefore more tumors need to be analyzed before a final conclusion can be made.

#### **Eileen Freres**

Ceramic Membrane for Water Purification  
Mentor: Marcia Silva, Freshwater Sciences  
Poster Presentation, Easel 194

With the growth and advancement of the world's human population, global demand for freshwater is expected to increase by 55% between the years 2000 to 2050. However, only 0.3% of the Earth's water is usable freshwater, a fraction of which is attainable. Advancements to small and large scale water purification systems have been made, but most are still costly. The proposed technology is a novel approach to water filtration that is cost-effective and efficient. The method combines mechanical filtration and ion exchange by using a ceramic membrane filter. Important mechanical properties of membrane filters such as compression strength and permeability will be controlled through thermal treatment and use of various grain sizes of the adsorbent material. With optimized levels of strength and permeability, in addition to the low cost and accessibility of the base material, these ceramic membranes will have high potential for use in small and large-scale water purification operations.

#### **Vladislav Friedman**

ANC-1 Promotes Axon Guidance in Touch Receptor and Motor Neurons in *C. elegans*  
Mentor: Christopher Quinn, Biological Sciences  
Oral Presentation, 12:40pm, Union 260  
Poster Presentation, Easel 218

Axon guidance is the process by which axons in the developing nervous system grow to reach their synaptic targets. This process is mediated by intracellular proteins that direct migration of the axonal growth cone in response to attractive and repulsive cues. Anc-1 (abnormal nuclear anchorage) is a *Caenorhabditis elegans* gene which functions in anchoring the nucleus to the cytoskeleton, but has also been implicated in the neuronal development, including synapse formation and axon termination. Mutations in the anc-1 human ortholog, SYNE1 (Spectrin repeat containing, nuclear envelope 1), are known to cause spinocerebellar ataxia and are additionally associated with developmental disorders such as autism and schizophrenia. However, the role of SYNE1 in regulating axon development is not well understood. Here, we show that ANC-1 can promote

axon guidance in multiple neuron types. We used two *C. elegans* fluorescent marker strains to score axon guidance defects in light touch receptor neurons (PLM, PVM, ALM, AVM) and motor neurons (DA, DB, VA, VB) in individuals carrying an anc-1 null allele, e1873. We found that anc-1(e1873) mutants display axon guidance defects in DA/DB motor neurons and posterior processes from the ALM cell body; we also saw increased overextension of the PLM axon, consistent with previous findings.

#### **Mickey Frigge**

Bicycling Facility Optimization for Shared Bicycle Programs and Urban Transportation  
Mentor: Xiao Qin, Civil Engineering  
Poster Presentation, Easel 217

Bicycling is viewed as a sustainable form of transportation that not only improves health but also reduces carbon dioxide emissions and decreases traffic congestion. The present study analyzes the factors that contribute to safety for shared bicycle rental services. These factors were obtained from a complete literature review of bicycle safety, facilities, and shared bicycle rental services with a special emphasis placed on practices adopted by successful cities in Europe. While previous authors have assessed specific factors that influence bicyclist safety, this is the first known complete review of the current literature. Consequently, analyzing the relationships between variables has never been attempted within the literature before. Besides the previous literature, the current study surveyed 183 respondents in Southeastern Wisconsin to determine relationships between perceptions of safety for both bicyclists and non-bicyclists and their behavior with an emphasis on the factors that are specifically related to bicycling within a city. The results of this study should provide necessary information for city planners when modifying and/or designing current and/or future bicycle facilities and identify areas to improve shared bicycle rental services that are currently seen as potentially hazardous that may lead to lawsuits.

#### **Margarita Garcia-Rojas**

Documenting Deportation: Where There is Oppression, There is Resistance  
Mentor: Rachel Buff, History  
Poster Presentation, Easel 9

Immigration policies have subjected the immigrant community to a life of fear. The historical growth of Mexican American communities is important to understand the conflicting views on immigration. Particularly in light of the recent intensification of xenophobia and nationalism, a coercive regime has subjected immigrant communities to enhanced scrutiny and the risk of deportation. The Documenting Deportation Database is a result of an international partnership between librarians, archivists, scholars, and students. The database documents incidences of arrest and deportation occurring in the United States since the new administration was installed on January 21, 2017, for a period of one year. My work included contextualizing

Trump-era immigration policies by comparing them to policies of previous presidential administrations and analyzing the use of rhetoric and emotional impact it has had on documented and undocumented communities. The main themes include detention centers, Immigration and Customs Enforcement (ICE), non-criminal arrests, sanctuary cities, workers' rights, and health care for the undocumented. However, my focus has been on community response and resistance on many levels, primarily that of young activists who are essential in creating change. By documenting the experience of individuals and the impact migration has had on their family, community, and personal life we can provide an understanding of the consequences and responses of living under a government with an outdated immigration act. The numerous people being directly and indirectly affected are not just numbers on a census, there are livelihoods at stake. The archive provides a timeline that refers to individual stories, policy change, and mobilization & organization from community activists, also as a way of providing future generations with the necessary tools and motivation to change for the better. This archive will work to challenge negative views of migration by exemplifying the humanitarian crisis that immigrant communities face.

#### **Elizabeth George & Ashveer Singh**

Substantive Representation at the Intersection of Identity and Immigration

Mentor: Paru Shah, Political Science

Visual Art Presentation, Easel 49

The number of women, people of color and immigrants running for office today is remarkable. This project examines if and how this newfound descriptive representation in the statehouse influences policy outcomes. We begin with a descriptive analysis of legislative and committee assignments, and leadership roles. Are minority legislators pigeon-holed in specific roles, and does this vary by race, gender and immigrant status? We next examine authorship of legislative bills between 2014-2016, and the impact of race, gender and nativity on effective substantive representation. Do nativity and immigrant generation—of either the legislator or their constituents—shape the legislative agenda? Using a new database that includes the race, gender, and nativity of state legislators, their legislative actions, and the demographic composition of their constituents, our analysis draws distinctions between the representative efforts of women and men within, and across, racial groups, and immigrant generations.

#### **Emily Gerstein**

Numerical Approximation of Solidification Behavior in Co-27Cr-5Mo-0.25C Alloys during Pulsed Laser and Tungsten Inert Gas (TIG) Welding of As Cast Biomedical Inserts

Mentor: Hugo Lopez, Materials Science & Engineering  
Oral Presentation, 12:20pm, Union 340

Poster Presentation, Easel 149

With an ever-aging global populace, an escalated need for biomedical implants with enhanced in vivo performance has posed itself as a challenge for the metallurgical community. Co-Cr-Mo alloys have been used for decades as orthopedic and dental implant materials because of their high hardness, strength, wear properties and corrosion resistance within the human body. While as cast implants have demonstrated favorable performance, failure to safely increase alloy ductility has led to premature device failure and in some cases leaching of toxic byproducts into surrounding tissues. To combat this issue, development of rapid solidification methods capable of producing fine cast dendrite or cellular structures upon cooling of liquid metal have garnered considerable interest as they may both reduce carbide size and allow for fine dispersal of alloying elements, in turn further enhancing mechanical properties. Surface modification and repair of implant materials using pulse laser and tungsten inert gas (TIG) welding where large amounts of undercooling in weld pools occurs have been shown to produce such structures and demonstrate potential for both increasing hardness and producing more favorable wear properties in Co alloys exposed to aqueous environments. To further understand the relationship between solidification and cast structure during welding, this work aims to develop a numerical scheme for capturing the effects of melting parameters on both the weld metal and heat affected zones (HAZ) developed in weldments using these methods. Through the generation of thermal profiles using classical Rosenthal assumptions, information regarding secondary dendrite arm spacing (DAS) may be determined, and considered alongside resulting carbide structure, alloy distribution, microhardness and wear behavior to construct a holistic view of how welding may enhance implant performance.

#### **Michael Gilligan**

Computer Aided Design Using Virtual and Augmented Reality as a Practical Solution to Design, with Regards to Wayfinding

Mentor: Adream Blair, Art & Design

Poster Presentation, Easel 118

While virtual reality and augmented reality has seen vast improvements and innovations over the last two years, the technology is still very much in its infancy. As such, it lacks the proper research, to distinguish itself as an impractical fad, or a realistic alternative to current methods of computer aided design. Is CAD modeling in virtual/augmented reality a feasible solution to design with regards to 3D printing? More specifically, does it hold advantages over traditional means of CAD

modeling, i.e. keyboard and mouse? This research aims to test the usefulness of virtual/augmented reality within a specific area. My role is to develop and test the usefulness of the existing technology in the real time creation of objects and explore the methods of creation in which people create in a virtual space. The technologies in question serve as a more immersive means of interaction between a user and the digital realm. Though similar, virtual reality and augmented reality operate at different levels of immersion. Augmented reality superimposes a computer-generated image on a user's view of the real world. This creates a composite view, in which the computer-generated image interacts with the real world and the user. Virtual reality fully immerses the user in a computer-generated realm, with no interaction to the real world. Virtual reality is purely an interaction between the user and a computer-generated environment. Through this experimentation and problem solving, I plan to document my own experiences using virtual/augmented reality to determine its advantages and disadvantages over other methods of CAD.

#### **Sanjna Girdhar**

Engineering and Expression of Polyprotein A  
Mentor: Ionel Popa, Physics  
Poster Presentation, Easel 182

Protein A is a surface protein found in the cell wall of bacteria *Staphylococcus aureus* and is encoded by *spa* gene. It is extensively used in biomedical research because of its ability to bind to immunoglobulins with high affinity. The folding of five homologous Ig-binding protein domains leads to the composition of this three-helix bundle protein and each domain is capable of binding to many mammalian proteins, essentially IgG. IgG is a type of immunoglobulins (antibodies) circulating in the blood that aid in the phagocytic destruction of antigens. The objective of this project was to create octamers of the two, out of the five, subunits of this protein: subunit B4 and B5. Starting from the monomeric unit, we applied molecular biology protocols and engineered a poly protein A made from eight repeats. The entire project can broadly be classified into three major steps: monomer to dimer, dimer to tetramer, and tetramer to octamer. Each step further had sub steps that included digesting the fragment and vector, ligating them together, screening the ligation product, finally followed by sequencing to double check the obtained product. We have finally expressed this protein and tested its antibody activity using SDS-PAGE gels and other binding assays.

#### **Olivia Gloria**

Study of the Mechanics of Proteins in the Presence of their Natural Ligands  
Mentor: Ionel Popa, Physics  
Poster Presentation, Easel 123

Talin is a cytoskeletal protein that plays a critical role in mechano-transduction, and its misregulation is thought to play a critical role in cancer metastasis. Talin is an essential part of the linkage that cells form between

their cytoskeleton and the surroundings (extracellular matrix) and works like a mechanical computer, governing adhesion and migration. Here we are investigating the mechanical response of R7R8 rod domains of talin in the presence of different binding partners such as RIAM, vinculin and DLC1. RIAM brings talin to the plasma membrane and activates cells. Vinculin reinforces focal adhesions. The role of DLC1 is unknown, but it was shown to have tumor suppressor activity. These partners are mutually exclusive, with RIAM and DLC1 binding to the folded state of R8 and vinculin binding to the unfolded state of both R7 and R8. We engineered constructs with these proteins and measured the mechanical response of the talin R7R8 rod domains in the presence and absence of its ligands using magnetic tweezers. We find that both RIAM and DLC1 lock talin R8 in a folded conformation, preventing vinculin binding and that DLC1 has higher affinity than RIAM. Our measurements show a new mechanism for DLC1 as a tumor suppressor.

#### **Zahra Gohari, Abigail Ginther & Kaitlin Salter**

Predictive Modeling of *E. coli* Levels at Urban Beaches along Lake Michigan  
Mentors: Todd R Miller, Public Health &  
Gabriella Pinter, Mathematical Sciences  
Poster Presentation, Easel 2

Sewage contamination of natural water bodies is a serious problem inhibiting usage of recreational aquatic environments such as beaches. The bacterium *Escherichia coli* is often found in the feces of warm blooded animals, so high levels of *E. coli* in water suggest contamination with sewage. As such, the United States Environmental Protection Agency uses *E. coli* as an indicator to assess the risk of acquiring a gastrointestinal illness due to using recreational waters. Both growth-dependent and growth-independent molecular assays require hours to measure *E. coli* in water. Therefore, significant delays exist between the time of sampling and time when warnings are issued to the public. Thus, results are not indicative of the current conditions. In this study, we explored the use of statistical models to predict current conditions based on real-time limnological and meteorological conditions. To do this we sampled Lake Michigan's water over the summer of 2017 in order to monitor *E. coli* concentrations at popular beaches. We then created predictive statistical models with computer software (Virtual Beach v3.0) using *E. coli* data from previous years, and paired it with hourly recorded environmental conditions obtained from a nearby buoy, and the Great Lakes Forecasting System. We will present a comparison between measured data and our models, and discuss potential changes that can be made to improve predictions.

**Zahra Gohari**

Novel Porous Material for Removal of Legionella  
Mentor: Marcia Silva, Freshwater Sciences  
Poster Presentation, Easel 3

Legionella pneumophila are widespread in natural water sources and often colonize Legionella pneumophila are widespread in natural water sources and often colonize (become established) in manufactured water systems. Legionella have been isolated from many sources including: ice machines, hot water systems, air-conditioning cooling towers, hot and cold water taps, showers, nebulizers, spa baths and spa pools, hydrotherapy pools, ornamental fountains, and home birthing pools. The bacteria must be inhaled to cause disease. Legionnaires' disease occurs most commonly in the warmer months. Legionella generally infects the lung, causing pneumonia, which is often very severe. Symptoms may include: fever, cough, chest pain, breathlessness, and diarrhea. Ongoing maintenance of water systems significantly reduces the risk of Legionella growing and being released into the surrounding environment. This research is focused on the development of a novel porous material for removal of Legionella. We expect this adsorbent material to be of low cost and high efficiency.

**Jonathon Gould**

Identification of Novel Pepsin Inhibitors for Target  
Drugs to Treat Laryngopharyngeal Reflux Disease  
Mentor: Alexander Arnold, Chemistry & Biochemistry  
Oral Presentation, 12:00pm, Union 260

Laryngopharyngeal Reflux Disease (LPRD), an extension of gastroesophageal reflux disease (GERD) occurs when gastric contents are refluxed past the esophagus into the larynx, pharynx, and even the middle ear. Current acid suppression therapy with proton pump inhibitors (PPIs) has proven ineffective because unlike GERD, pepsin is the mechanism behind damaging healthy tissues, not stomach acid. Pepsin is a protease that is produced in the stomach, breaks down larger proteins to smaller peptides and when refluxed extraesophageally can actively digest healthy tissues, damage cells and lead to mutations and subsequent cancers. Herein, we present the synthesis of four novel molecules that were designed by molecular docking using the crystal structure of pepsin to inhibit the enzymatic activity of pepsin. Unfortunately, these compounds were unable to reduce the proteolytic activity of pepsin determined by a two independent binding assays. In the future, we will continue to design new reversible inhibitors for pepsin to develop a first-in-class therapy for LPRD.

**Rachel Gremminger**

Effect of Long-Term Ovariectomy on ER $\beta$  (estrogen receptor beta)-mediated Memory Enhancement and ER $\beta$  Expression in Mouse Hippocampus  
Mentor: Karyn Frick, Psychology  
Poster Presentation, Easel 128

Although animal and clinical studies suggest estrogen therapy can benefit cognitive function in aging females, the Women's Health Initiative Memory Study (WHIMS) suggested that estrogen therapy did not benefit cognitive functioning in post-menopausal women over age 65. Because women in the WHIMS were past the onset of menopause, it was thought that estrogen therapy was administered too late to be beneficial. This idea, the "critical period hypothesis", posits that estrogen therapy only benefits cognition when initiated during or near the onset of menopause. Although the mechanisms underlying the critical period are unclear, they may involve alterations in estrogen receptor expression. Our laboratory has shown that infusion of 17-estradiol into the hippocampus of ovariectomized female mice increases spatial memory consolidation in an object placement task. The beneficial effects of 17-estradiol are mediated through various types of estrogen receptors (ER), such as ER. In this study, we tested the effectiveness of the ER agonist diarylpropionitrile (DPN) on spatial memory consolidation in mice experiencing estrogen deprivation. Female mice were ovariectomized and tested in an object placement task either one or four months after surgery. When tested one-month post-surgery, DPN-treated mice showed enhanced object placement memory. However, when tested four-months post-surgery, DPN-treated mice did not exhibit enhanced memory. These results support the critical period hypothesis suggesting DPN only enhances memory shortly after estrogen deprivation. Dorsal hippocampal tissue was collected two or five months after surgery, and levels of ER protein were measured using Western blotting. Relative to vehicle-treated mice, ER levels were significantly lower in mice treated with estradiol starting four-months after surgery. In contrast, ER levels did not differ between mice receiving vehicle or estradiol one-month post-surgery. Together, these findings suggest decreased ER levels might contribute to closing of the critical period and account for estrogen therapy's reduced efficacy in older post-menopausal women.

**Sarah Groh**

Lesbian Coming-Out Experiences: Using Affect Control Theory to Examine the Context of Same-Sex Disclosure  
Mentor: Celeste Campos-Castillo, Sociology  
Oral Presentation, 12:20pm, Union 344

Research documents the importance of coming-out experiences for lesbian, gay, and bisexual (LGB) individuals. Unfortunately, few studies assess the experience for lesbian women coming-out to their families because limited data exists. This study uses affect control theory and its computer program, Interact, to simulate how family members respond to lesbian

women coming-out to them. The simulations consider historical (three time periods: 1978, 2002, and 2015) and interpersonal (family member: parent or sibling) context in modeling the experience. Results indicate the importance of historical and interpersonal context overall, as well as the interplay between the two: 1) experiences are more positive over time; 2) experiences are more positive when coming-out to siblings than parents; and 3) the more positive experiences with siblings are a recent phenomenon. These findings compliment the limited information about lesbian women's coming-out experiences and show the utility of simulating data when traditional data sources are unavailable. Keywords: Affect Control Theory, Interact, LGB, lesbian, coming-out, disclosure

**MaryBeth Groth**

Binge Drinking Impact on Verbal Memory Recall in Adolescents and Young Adults  
Mentors: Krista Lisdahl, Psychology & Kyle Jennette, Psychology  
Poster Presentation, Easel 127

Alcohol use has an adolescent onset and continues to be the most popular drug among teens and emerging adults. Binge drinking (4 or more drinks in one episode for females, 5 or more for males) remains a public health problem in adolescents and young adults, with approximately 40% engaging in binge drinking in the past two weeks. Previous research has shown that binge drinking affects verbal learning with variable, inconsistent results in adolescents (Carbia, et. al, 2017). Studies have also demonstrated that females may be more sensitive to binge drinking effects on verbal memory. The aim of this study was to examine whether past year binge drinking episodes predicted verbal memory performance, and whether gender moderated these effects. Data was collected from 89 adolescents and young adults with a wide range of binge drinking episodes (0-126; 44% male, 64% Caucasian; aged 16-25). A series of multiple regressions were run to examine whether number of past year binge episodes were associated with verbal memory (initial recall, short and long-delayed recall and recognition ability on the CVLT-II while controlling for alcohol, nicotine and gender). We also examined whether gender moderated these effects. Increased past year binge drinking episodes were associated with marginally poorer verbal memory recognition ( $p=.07$ ). Gender did not moderate any findings. Increased number of past year binge drinking episodes marginally predicted poorer recognition ability in adolescents and young adults. Future prospective, longitudinal studies, such as the Adolescent Brain Cognitive Development (ABCD) Study, are needed to examine causality and whether these verbal memory deficits recover with abstinence.

**Matthew Grutza**

Thalamic Terminals Regulate Fear Memory Retrieval and Retention  
Mentor: Fred Helmstetter, Psychology  
Poster Presentation, Easel 116

Pavlovian fear conditioning is a behavioral procedure that is used to examine memory. Pavlovian fear conditioning is a behavioral procedure that is used to examine memory formation and retrieval. Fear conditioning involves an initially neutral cue, the conditioned stimulus (CS), paired with an aversive stimulus, the unconditioned stimulus (UCS). After several pairings, a new memory is formed and memory strength can be measured by presenting the CS during a retrieval session. Importantly, the process of retrieval can trigger cellular changes that alter the memory. The amygdala is a critical brain site for plastic changes during learning but little is known about how the sensory inputs to the amygdala regulate fear memory at retrieval. The medial geniculate nucleus (MgN) of the thalamus encodes auditory information representing the CS and sends direct neural projections to the amygdala. The projections from the MgN to the amygdala play an important role in the brain circuit for auditory fear conditioning. Much of what we know about the brain regions modulating fear expression at retrieval and later fear retention is from pharmacological approaches that render the brain region inactive for several hours. Optogenetics provides a more temporarily precise way to manipulate neuronal activity using light sensitive ion channels and specifically allows for the manipulation of input from the MgN to the lateral amygdala. In the current study, groups of rats were presented with an auditory cue paired with a UCS during a training session. The next day, groups are exposed to a retrieval session and activity from the MgN in the amygdala is selectively silenced during CS presentation. Our results suggest the activity from the MgN in the amygdala during auditory cue presentation at retrieval is critical for fear responding.

**Makenzie Hack & Lainey Koch**

PCO (Portable Camera Obscura)  
Mentor: Joseph Mougel, Art & Design  
Poster Presentation, Easel 173

Within a fast-paced image-saturated world, we're easily detached from the fundamentals of the photographic process. Through our development of a large-scale camera obscura, we slow down and think about an image before it's taken. Our research on in-camera manipulation considers the physics of light in relation to image capture, including optics used to focus light and characteristics of light sensitive materials. A PCO (Portable Camera Obscura) is comprised of the minimum components needed to create a camera: a light-tight box with a small hole to let light rays enter and reflect on the opposite wall. We stretch these boundaries to create a camera obscura that is not only portable, but is large enough to allow for observation and experimentation from inside the camera. Through community outreach events, we share the experience of image making by merging a 17th

century photographic device with ethics of documenting the world around us. Our purpose is to facilitate a pedagogical discourse about photography, regarding history, contemporary practice, and social implications of documentary approaches.

#### **Annie Hackl**

Transposon Mutagenesis in *Shewanella Oneidensis*  
Mentor: Daad Saffarini, Biological Sciences  
Poster Presentation, Easel 176

The cAMP receptor protein CRP is involved in controlling the expression of aerobic reductase genes. Adenyl cyclases synthesize cAMP in response to environmental stimuli and aid in activation of CRP. *Shewanella oneidensis* mutants that have a deficiency in CRP production show no growth under anaerobic conditions. These mutants are able to grow aerobically, but to a lesser extent than wild type. In addition, cAMP levels are also regulated by the activity of a phosphodiesterase *cpdA* (SO\_3901). When deleted, SO\_3901 doesn't affect anaerobic growth. It does however, cause a greater deficiency in aerobic growth. The purpose of my work is to investigate the reason for the difference in aerobic growth deficiency between CRP and SO\_3901 mutants. SO\_3901 suppressor mutants have been generated through transposon mutagenesis to identify potential factors that may contribute to the loss of aerobic respiration in SO\_3901. The plasmid pminiHIMAR RB1 was transferred into SO\_3901 from *E. coli* WM3064 by conjugation. Suppressor mutants were selected on basal media containing lactate and kanamycin. Mutant chromosomal DNA was isolated and digested using the restriction enzyme BamHI. The fragments were ligated together and used to transform *E. coli*. The resulting plasmids were used for sequencing. This research is ongoing and isolated suppressor mutants will continue to be tested for aerobic growth in basal media. The mutants will also be complemented to determine the effect on aerobic growth. Finally, additional suppressor mutants will be generated and their sites of transposon insertion will be identified.

#### **Lauren Hahn & Jorge Arciniegas**

The Effects of Computerized Interpretation Trainings on Thought-Action Fusion  
Mentors: Hanjoo Lee, Psychology & Stephan Siwec, Psychology  
Poster Presentation, Easel 158

Thought-action fusion (TAF) is a phenomenon that occurs in various emotional disorders, but it is strongly associated with individuals who experience Obsessive-Compulsive Disorder (OCD) symptoms. Holding TAF beliefs causes an individual to interpret intrusive thoughts as an indication of poor morals (Moral TAF), and/or believing that negative thoughts can make negative outcomes more likely to happen (Likelihood TAF). Past research has used Interpretation Training (IT) to modify biased interpretations about personally relevant emotional information and reduce distress and impairment. The current study is comparing three different computerized

ITs to examine their effects on TAF beliefs. The primary outcome measure is the Thought-Action Fusion Scale-Revised (TAFS), with higher scores indicating greater TAF belief. Eligible participants include undergraduate students (N = 35) enrolled in Psychology courses at UWM, with prescreen TAFS scores 18, and the presence of minimal obsessional beliefs. Eligible participants are randomly assigned into one of these three following training conditions. The TAF Incongruent condition (TAF-INC) challenges TAF interpretations of thoughts, the TAF Congruent condition (TAF-CON) does not challenge TAF interpretations, and a Stress Management Psychoeducation condition (SMP) is a credible comparison condition as it has been shown in past research to reduce obsessional severity without directly targeting TAF. Results indicated that participants in TAF-INC displayed the largest reduction in TAF Total Scores at post-training (M=22.92, SD=16.72), while the TAF-CON (M=37.92, SD=11.12) and the SMP (M= 35.20, SD=18.93) displayed only small reduction. These condition differences were held when TAF was broken down into Moral TAF and Likelihood TAF. The results indicated that a single session of TAF-targeted interpretation training (TAF-INC) outperformed the control (TAF-CON) and comparison condition (SMP) in TAF belief reduction. Further research is warranted to examine the long-term effects of training. The clinical and theoretical implications from the study findings will be discussed.

#### **Jessye Hale**

Strategies for Targeting Immunosuppressive Myeloid Cells in a Murine Breast Cancer Model  
Mentor: Douglas Steeber, Biological Sciences  
Oral Presentation, 1:00pm, Union 344

The immune system is the body's most exacting defense, combating everything from pathogens to cancerous cells, with incredible precision and accuracy. However, the function of the immune system can be disrupted by its own regulatory components. Overexpression of immature immune cells, known as myeloid derived suppressor cells (MDSCs), can downregulate the body's T-cell anti-tumor response in cancer patients through multiple inhibitory mechanisms. MDSCs also diminish the effectiveness of current immunotherapies, such as Chimeric Antigen Receptor (CAR) T-cell therapy, by creating a very immunosuppressive environment within solid tumors. Therefore, depleting or inhibiting the activity of MDSCs is an active area of research. One possible therapeutic target is the beta form of the folate receptor (FR $\beta$ ), which is expressed on some populations of myeloid cells. Our study used an induced 4T1 murine breast cancer tumor model. The spleen, bone marrow and tumors were harvested at 4 weeks and analyzed via immunofluorescence microscopy and flow cytometry to visualize localization and numbers of MDSCs in the tissues. In some studies, the thymidine analog Bromodeoxyuridine (BrdU) was injected into the animals 1 hour prior to tumor harvest to identify proliferating cells. Our results indicate that some proliferation of MDSCs may

occur outside the bone marrow; therefore, current treatments that only target MDSCs within bone marrow may be ineffective. We were also able to quantify the expression of FR $\beta$ + subsets of MDSCs in the tissues. Interestingly, while splenic MDSCs had uniform FR $\beta$  expression, distinct high and low FR $\beta$  expressing populations of MDSCs were found within the tumor tissue. Future studies will explore the possibility of using novel folic acid (FA)-conjugated therapeutics, such as FA-conjugated histone deacetylase inhibitors, to target and destroy MDSCs in tissue thereby increasing the body's anti-tumor immune response and maximizing the efficiency of current immunotherapy technology.

#### **Hamzah Hamdan**

Analysis of Phosphoinositide 3 (PI3) Kinase Gene and Protein

Mentor: Madhusan Dey, Biological Sciences

Poster Presentation, Easel 195

Phosphoinositide 3 (PI3) kinase phosphorylates the 3'-hydroxyl group of the inositol ring of the lipid phosphatidylinositol. 3'-phosphorylated inositol lipid functions as a secondary messenger by interacting with many other cellular proteins that control multiple cellular processes, including cell growth, survival, and motility. Humans and yeast share a common isoform of the PI3 kinase which is known as Vps34. Here, I analyzed the gene and protein sequences of Vps34 gene and its encoded protein sequence. My studies will help identify the important determinants in PI3K protein that contribute to its biological function, which will ultimately provide insights into how PI3K impacts on development of many human diseases, including lymphoma, immunodeficiency due to hyperactive PI3 kinase, and insulin resistance due to its role in autophagy.

#### **Sarah Haq**

Horizontal Gene Transfer Observed in the Genus *Vibrio*

Mentor: Charles Wimpee, Biological Sciences

Poster Presentation, Easel 130

Horizontal gene transfer has had an enormous impact on the evolution of bacterial genomes. Typically, this event would be detected retrospectively, by incongruent phylogenetic trees or anomalous base composition. In certain cases, horizontal gene transfer can result in the replacement of a resident gene. When this occurs, it is possible that the recipient bacteria will harbor two non-identical copies of the same gene. Our lab has seen multiple examples of this with the *luxA* gene, strongly indicating ongoing horizontal gene transfer. Merodiploids have been detected by sequence analysis showing multiple occurrences of double peaks in the same position in the gene. Current work involves amplification of the gene with high fidelity Phusion polymerase to preclude the mistakes made by the more error-prone Taq polymerase. Products of the amplification are being cloned and will be sequenced. The results of the sequencing will be presented.

#### **Lindsay Hayward**

Social Factors Best Predict Chorus Behavior of Gray Tree Frogs (*Hyla versicolor*)

Mentor: Gerlinde Hoebel, Biological Sciences

Poster Presentation, Easel 146

Gray treefrogs (*Hyla versicolor*) descend the forest canopy in the summer and gather at a nearby body of water when it is time to find a mate. Male frogs call to attract females during the night. The size of the resulting chorus, as well as the duration of nightly chorus activity, is highly variable. Using data from a long-term recorder stationed at Byer's Pond (Saukville, WI) that recorded one minute of sound every hour for the duration of the 2017 frog season, we extracted data on frog calling activity and examined whether it was best predicted by variation in environmental (temperature, rainfall, humidity, moonlight) or social (previous night chorus size) factors. The best predictor of chorus size was the size of the previous night's chorus, with temperature also playing some role. The only predictor of chorus duration was also the size of the previous night's chorus. Our results show that Gray Treefrog calling activity is somewhat influenced by temperature, but that social factors play a larger role than environmental ones.

#### **Dulce Hernandez-Blanchard**

Major Element Geochemical

Changes Across a Transect of the Southern Iberian Shear Zone

Mentor: Dyanna Czeck, Geosciences

Poster Presentation, Easel 169

Interactions of tectonic plates cause deformation in rocks. A shear zone is a tabular zone of rocks that has a measurable thickness in which strain is localized when two sections of rock smear against each other at depth. Water and other fluids can change the deformation style of shear zones, strongly influencing the heterogeneity of deformation in the Earth's crust. Fluids in deformation zones are transient, so are difficult to study in situ, but they may leave behind their signatures by altering rock chemistry or enabling metamorphic reactions and showing microstructural evidence. The research I am participating in is investigating the major geochemical changes across one shear zone, the Southern Iberian Shear Zone (SISZ), located in southwest Spain. The rocks analyzed in this study are the Acebuches Metabasites which are found on the north side of the SISZ. Prior to deformation and metamorphism, the metabasites were midocean ridge basalts, rocks with homogeneous chemistry and mineralogy. During deformation, the rocks metamorphosed to banded amphibolites; near the shear zone, the rocks underwent a second retrograde metamorphic event to locally change them into chlorite greenschists. The SISZ largely affects rocks with relatively simple geochemistry, metabasites, so shear zone related changes in chemistry are relatively easy to identify. Major element geochemistry was conducted across transects from outside to inside the SISZ. Major element geochemical changes in the rocks induced by fluid interaction were primarily responsible for deformation localization and strain softening.

**Ashley Hickey, Abigail Behling & Caroline Ho**

White-mansplaining Under-Representation: How Mediocre White Men Beat Qualified Women and Candidates of Color in Primary Elections  
Mentor: Paru Shah, Political Science  
Poster Presentation, Easel 50

Despite the record number of women and candidates of color running for office since 2016, racial and gender minorities continued to be under-represented in elected office. In this project, we collect data on primary elections for state legislative office to examine the role of candidate quality on the success of women and candidates of colors. Prior research suggests that in low information and low salience elections, voters will rely heavily on gender-based and racial stereotypes for their vote choice. Thus, our hypothesis is that more qualified women and candidates of color will be beat by less qualified white men. Our findings support the argument that primary elections are not race or gender neutral.

**Danielle Hobach & Vanessa Bravo**

A Systematic Comparison of Two Mindfulness-Based Interventions for Individuals with Upper-Limb Musculoskeletal Disorders  
Mentor: Bhagwant Sindhu, Occupational Science & Technology  
Poster Presentation, Easel 20

The rotator cuff is composed of four muscles: supraspinatus, infraspinatus, teres minor, and subscapularis. Rotator cuffs are at increased risk for tearing due to genetics, frequent overhead activity, and age-related degeneration. Rotator cuff tears come along with lengthy rehabilitation times causing barriers in performing Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and resulting in psychological distress. Mindfulness is a strategy that helps reduce psychological distress by achieving a mental state of awareness in the present moment. Mindfulness means an individual accepts their own thoughts, feelings and bodily sensations without judgment. Current evidence suggests that mindfulness-based interventions support an individual in self-management of pain and associated psychological distress, which may present as a mental health disorder, in patients with chronic musculoskeletal conditions, such as rotator cuff tears. The purpose of the study will be to determine similarities and differences between two mindfulness interventions: Mindfulness-Based Stress Reduction (MBSR) and Headspace. MBSR has been described as "a group program that focuses upon the progressive acquisition of mindfulness." In contrast, Headspace is a mobile application that provides guided meditation for individuals to achieve a stable mental state. As part of this study, we will conduct a critical review of literature, which will help us acquire knowledge on how we can apply Headspace or MBSR to individuals who have undergone rotator cuff repair. We will examine the training required, time for training, access to intervention, ease of use of intervention, and cost of intervention. Our findings of the critical review of literature will be reported at UWM's Undergraduate Research Symposium.

**Nathan Hodges**

Curation and Digitization of the Greene Museum Fossil Collection  
Mentor: Stephen Q. Dornbos, Geosciences  
Poster Presentation, Easel 70

This project was centered mainly on the preparation of the Greene Geological Collection for upcoming work in digitizing the fossil collection. The work done in 2017 mainly consisted of the development of a catalog system, cabinet and sample reorganization efforts, preservation of historical documents, and general small-scale curatorial efforts.

**Adam Honts & Basil Hable**

A Hand-Held Optical Sensor for Bacteria Measurement  
Mentors: Marcia Silva, Civil & Environmental Engineering & Rudy Strickler, Biological Sciences  
Poster Presentation, Easel 189

According to the Environmental Protection Agency (EPA) Method 1603, the current standard method for detecting *Escherichia coli* (*E. coli*) bacteria in environmental water, generation of results takes 24 hours. *E. coli* is a common inhabitant of the intestinal tract and its presence in water is an indication of fecal pollution and possibly enteric pathogens. Therefore, evaluation of the water quality in nearly real time would be ideal for warning bathers. However, this membrane filtration technique is laborious and costly, besides it takes 24 hr for the development of colonies that grow on the surface of a membrane filter and cell counting. This project offers a solution to both the cost effectiveness, temporal, and spatial problems with the current EPA approved method for detecting if *E. coli* is in a water sample. This is achieved by using digital inline holographic microscopy (DIHM) techniques to produce images of *E. coli* and reusable materials to keep costs down. Our project also offers the potential of being able to know what kind of bacteria is in the water supply on site. We are currently in the process of compact and portable so that one can take and analyze samples anywhere.

**Haley Hornung**

Perceived Stress and Ambulatory Blood Pressure Dipping for Young Adults: The Buffering Roles of Childhood Socioeconomic Status and Engagement in Self-Selected Leisure Activities  
Mentors: Kayla Johnson, Psychology & Marcellus Merritt, Psychology  
Poster Presentation, Easel 99

Perceived stress (PSS) has been associated with dysregulated daily blood pressure. Perceived stress (PSS) has been associated with dysregulated daily blood pressure rhythms. Specifically, higher PSS is linked with less nighttime blood pressure (BP) dipping, a potential risk factor for cardiovascular disease (CVD). Childhood socioeconomic status (SES), assessed through highest parental education attainment, is associated with differential nighttime BP dipping. SES as a coping resource can carry long-lasting effects on health; that is, higher childhood SES provides an extra layer of protection as

one develops, whereas lower childhood SES is associated with less nighttime BP dipping in young adults, as well as higher heart rate (HR) and systolic BP during recovery. Thus, we are invested in studying how stress management interventions can help with BP and HR control, thereby reducing risks for CVD within the population of young adults from various SES backgrounds and PSS scores. Traditional stress management interventions have good short-term efficacy, but their sustainability is dubious, partly because they are hard to do and require substantial alterations to daily routines. The present study instead utilizes Self-Selected Leisure Activities (SSLAs), recreational activities that one finds intrinsically enjoyable and are performed with the express purpose of relaxation/mental escape. We predicted that PSS would be linked with less nighttime BP decline in general and at notably lower SES, but that these trends would be improved on a day in which one does an SSLA, versus another day when not doing an SSLA. Bivariate correlations showed that on a day in which one did an SSLA, PSS was linked with significantly greater nighttime BP dipping at higher, but not lower, childhood SES levels. Future studies need to uncover novel protective factors for less privileged persons. We are currently devising an SSLA-based intervention focused on maximizing the core psychosocial dimensions of SSLAs (e.g., distraction) that are most positively related to better health outcomes.

#### **Yuling Hu**

Power System Restoration Using Heuristic Search  
Mentor: Linfeng Wang, Electrical Engineering  
Poster Presentation, Easel 64

Due to the economic and reliability considerations, power system restoration attracts more and more attention. Much research has been carried out in this field so far, including black-start sequence, network reconfiguration, and load restoration strategy. This research is mainly focused on the load restoration for the distribution system using the heuristic search algorithm. The basic goal of distribution system restoration is to resume the power supply to the load points in the distribution system in the presence of system faults. Generally, the restoration problem is a non-linear optimization problem. Several factors are involved in this optimization problem. It is necessary to keep both the current and voltage within acceptable ranges, the power balance should also be maintained, and the radial network structure of the distribution system must be maintained, etc. The proposed restoration approach can effectively isolate the fault and restore as much load as possible after the fault occurs in the distribution system. The proposed algorithm is to maximize the load restored during the restoration process and minimize the number of switching operations at the same time. A power flow is performed to guarantee the proposed optimal restoration strategy does not violate all the operational constraints. A case study is performed on the modified IEEE 37-node distribution system, and some simulation results are given to illustrate the proposed algorithm.

#### **Alec Huber**

An Immunotoxicity Safety Study of MIDD0301  
Mentor: Alexander Arnold, Chemistry & Biochemistry  
Poster Presentation, Easel 86

Asthma is among the most common of health ailments, but established modes of treatment leave much to be desired, and invite novel pharmaceutical approaches. Evidence indicates the promise of orally administered, subunit-selective, positive GABAA receptor (GABAAR) modulators as a means of inducing the relaxation of airway smooth muscle (ASM) cells. In contemporary drug discovery, immunotoxicity studies are advised as a way of determining whether the administration of a drug candidate produces undesired immune system suppression or activation. Here, one such positive GABAAR modulator, the subunit-selective imidazobenzodiazepine drug candidate dubbed MIDD0301, was examined with regard to this immunotoxic aspect of its preclinical trials, in order to see whether chronic administration would evoke immune system activation. The compound was orally administered to a segment of a population of mice twice daily over a period of 28 days. Post mortem analysis of the treated mice, along with positive (vehicle) and negative (ad libitum) controls, was conducted at three points during this period, and consisted of the animals' total weights, the weights and histological profiles of the lymphoid organs (thymus, spleen, and Peyer's patches), blood serum protein electrophoresis, and the relative prevalences of cell types in whole blood. In all indicators examined, no statistically significant differences were observed between the treatment groups. Because the expected indicators (e.g. white blood cell and lymphoid tissue proliferation, increased  $\gamma$ -globulin presence) were unobserved, it may be concluded that chronic administration of the compound is safe, at least insofar as it fails to evoke an immune activation response. Before progressing on to other forms of evaluation however, it will be necessary to confirm that the drug fails to suppress an artificially induced immune response, an effort currently in the pilot stage.

#### **Mitchell Hummel & Matthew McDonough**

Fiber Optic Magnetic Field Sensor Based on  
Magnetostrictive Composites  
Mentor: Chiu Law, Electrical Engineering  
Poster Presentation, Easel 62

Our research entails the investigation of the applied magnetic field to magnetostrictive strain relationship of Terfenol-D composite sensors. The purpose of this research is to explore a way to sense magnetic fields with a novel device based on a magnetostrictive composite and an optical device, fiber Bragg grating (FBG). This method has many benefits over traditional ways in terms of enhanced safety and electromagnetic immunity while maintaining minimal loss in operation. Our goal is to explore the effects of the geometrical shape of a Terfenol-D composite on the mechanical strain that is transferred to an FBG attached to the composite and develop a method for quantifying the magnetic field based on the optical spectrum of the FBG.

**Majdulin Istiban & Hilda Martinez Ramirez**

Loss of Functional Cabin1 Impacts Jaw Morphology in Larval Zebrafish

Mentor: Ava Udvardia, Biological Sciences

Poster Presentation, Easel 105

Craniofacial abnormalities are among the most common congenital defects. Nonetheless, their underlying molecular factors are not well understood. We are interested in the role of the transcriptional regulator, Cabin1 in craniofacial development. Previous studies from our lab have shown that morpholino-mediated knockdown of Cabin1 in zebrafish led to reduced survival and defective development in craniofacial elements as early as three days post fertilization. To further investigate the role of Cabin1 in the craniofacial development we are using a Cabin1 knockout zebrafish as our model. We used two mutant strains in this study, each containing a frameshifting deletion that results in a premature termination after the first approximately 100 codons of the 3000 amino acid protein. In order to compare jaw development between wild type and mutant fish, we used Alcian Blue staining to visualize the craniofacial cartilage in six-day old larvae. We captured digital images of stained cartilage from over 187 of larvae, and used morphometric analysis (MorphoJ) to quantitatively evaluate the images. Our preliminary data, based on one mutant strain, suggests a subtle but reproducible difference between wild type and Cabin1 mutated fish. The most dramatic difference is observed between wild type and fish that are homozygous for the Cabin1 mutations. We are currently carrying out studies with our second Cabin1 mutant strain to test the reproducibility of this result. Future studies will investigate the functional implications of jaw abnormalities to prey capture and feeding behaviors.

**Loretha Jack**

Incorporating Freshwater Macrophytes Into the Silicate Budget for Estabrook Park Pond

Mentor: Erica Young, John Berges, Biological Sciences

Poster Presentation, Easel 170

The macronutrients nitrogen and phosphorus are known to limit primary productivity in freshwater ecosystems, but many important phytoplankton also use silicate. I examined the effect of Si on phytoplankton communities over the summer and determined that Si availability is important in shaping phytoplankton community composition. However, much of the pond is covered by rooted and suspended aquatic macrophytes, which account for much of the pond's primary productivity, and their role in silicate cycling is unknown. The aim of our research was to characterize the silicate dynamics in Estabrook Pond, incorporating phytoplankton as well as macrophytes and their epiphytic algae, to create an Si budget for this small ecosystem. Fluxes between pools were examined in a degradation experiment using the macrophyte *Myriophyllum* during fall. We collected macrophyte and water samples from Estabrook pond which we divided among six different containers and

stored in the growth chamber. We monitored silicate in three pools: Si dissolved in the water (dSi), particulate Si in the suspended community (pSi), and biogenic Si in the macrophytes (bSi). Over the course of the experiment, dSi was consistently low. bSi was initially high but decreased during the experiment. As bSi decreased, pSi increased suggesting breakdown of the macrophytes or detachment of epiphytes. Although the Si budget was not perfectly balanced, these findings suggest that aquatic macrophytes may have a strong influence over Si dynamics in Estabrook Pond along with diatoms and other Si-demanding cells within the phytoplankton.

**Miguel Jaimes**

Characterization of Oxidation Layer of Alumina

Forming Stainless Steels in Molten Salt Using Electrical Impedance Spectroscopy and Microscopy

Mentor: Ben Church, Materials Science & Engineering

Poster Presentation, Easel 135

One of the biggest challenges of concentrated solar power plants is the corrosion of the storage containers and pipes used to transport of molten salts which store the sun's heat energy. Stainless steels that are currently used for this process form a chromium oxide layer that is not very resistant to hot corrosion, but new alumina forming steel alloys show very high resistance due to a protective Al-Cr rich oxide layer. Properties of this oxide layer such as thickness, surface structure/ composition, and resistivity are of interest in this study. This oxide layer can be analyzed with electrical impedance spectroscopy (EIS), a technique that models the oxide layer's electric properties with a combination of resistors and capacitors. Composition and surface structure will be investigated through microscopy techniques such as confocal microscopy and scanning electron microscopy. An induction furnace will be used to melt a 60 wt% NaNO<sub>3</sub> 40 wt% KNO<sub>3</sub> salt solution and when keeping at 390 degrees Celsius, samples of alumina forming steel will be tested against a graphite reference electrode inside the molten solution while connected to a potentiostat that records EIS data. All data will be analyzed to determine if and how the thickness and composition of the oxide layer affect the corrosive resistance of the steel. This study may be of value to research currently being done on alumina-forming austenitic steel alloys at UWM's Materials Science and Engineering department if the results are deemed relevant.

**Tyler Jankowski, Ashwin Betrabet, Isaac Repinski, Kyle Brown & Sebastian Olaciregui**

Surface Alloying and Compositing During Manufacturing for Improving the Corrosion Resistance of Water Industry Components

Mentor: Pradeep Rohatgi, Materials Science & Engineering

Poster Presentation, Easel 8

Corrosion and wear limit the service life of mild steel components in contact with flowing water. Original finishes for reducing corrosion and wear are prone to damage over time, especially in dynamic contacts over

the long term. Stainless steel is often used to manufacture corrosion and wear resistant components for water industries but are significantly more expensive to manufacture. The purpose of our research is to develop a low-cost, in-situ surface alloy coating for cast mild steel to improve the performance and prolong the life of components used in water industries. This coating will have corrosion resistance comparable to stainless steel at a fraction of the cost.

### **John Janssen, Freshwater Sciences**

FRSHWTR 190: “Death & Life of the Great Lakes”  
Poster Presentations, Easels 32-45

Upon first seeing any of the five Laurentian Great Lakes (Superior, Michigan, Huron, Erie, and Ontario) people are astonished. The astonishment is because the Great Lakes appear oceanic. They often see large ships, many carrying iron ore to steel mills, others carrying grain, and some are international vessels carrying foreign cargo, tourists, and invasive species such as zebra and quagga mussels. The Great Lake's size gives them a human-based uniqueness in how we use them. This means they cannot be compared to either common lakes (Mendotas, no ships) or oceans (can't drink the water). Their uniqueness with regards to stressors has been well documented with both a local and an international context in Dan Egan's book “Death and Life of the Great Lakes” (Norton, 2017). Egan is a master of painting environmental portraits in words, and this School of Freshwater Sciences Special Topics course (titled the same as the book) has endeavored to illustrate the book via a series of Poster. Egan's book is written for an educated, but non-scientist public. The students are not science majors. Their Poster are an invitation to read Egan's book, appreciate what is at our beachstep, and understand the threats to a unique national, continental, and world resource.

### **Lena Jensen**

The Ethics and Practices of Caring  
Mentor: Arijit Sen, Architecture  
Oral Presentation, 12:40pm, Union 280

Stewardship and caring are concepts that appear frequently in scholarly discussions within professional disciplines such as nursing, psychology, and social work. Residents of Milwaukee's neighborhoods, too, refer to acts of caring as they describe community engaged practices. Yet, the meaning, use and references to these terms vary with the audience and their social context. In the Buildings, Landscapes, and Cultures (BLC) field school, I was part of a team of students in a community engaged public history research project called Picturing Milwaukee. We worked for five weeks in the Sherman Park neighborhood, where we conducted twenty interviews with local residents, business owners, and members of the Sherman Park Neighborhood Association. From there, I analyzed the practices of caring that these community members partake in. I identified four main acts of caring: working (when residents take care of streets, yards, and gardens), helping (when neighbors lend a helping hand to one

another or join a block watch group), discerning (learning and upholding shared forms of aesthetics and taste), and training (passing on to the new generations those care practices that have been instilled in one's lives). After a semester worth of research on nursing, psychology, and social work, I see the disjuncture between academic and grassroots use of the term “caring.” The academic realm confines it to something explicated on a page in a code of ethics, whereas the grassroots are applying the term in multiple facets. These grassroots ideas ultimately contribute to academic literature and provide a much more comprehensive look into this gap.

### **AnnDee Johnson**

Can Attention Select Auditory Objects?  
Mentors: Adam S. Greenberg, Psychology &  
Gennadiy Gurariy, Psychology  
Poster Presentation, Easel 56

Attention gates sensory input by selecting and enhancing the behaviorally relevant subset of incoming data. However, it is unclear whether attention is domain-general or domain-specific with regard to different sensory modalities. Research on attention (conducted most frequently in the visual domain), has demonstrated that attentional selection can act upon features, spatial locations, or objects. Evidence for the latter case (known as Object-Based Attention; OBA) has shown that attended objects garner enhanced processing compared to unattended objects, even when spatial locations are overlapping or equidistant. Our goal is to investigate whether OBA in the auditory domain operates analogously to the visual domain. To induce the percept of separate but simultaneous auditory objects, participants will hear two simultaneous streams of auditory tones (spaced by ~20 msec) segregated by sound frequency (i.e., one high frequency stream and one low frequency stream). On each trial, attention will be cued to one object via the spoken word cues “low” or “high”. Next, a change in amplitude will cue a specific frequency within that object (e.g., 500Hz, within a 250Hz – 750Hz object) while subjects listen for a repetition, to which they respond via button press. This target tone repetition can be either valid (the tone matches the frequency cue and is in the same, cued object), invalid-same (the tone does not match the frequency cue but is in the same, cued object), or invalid-different (the tone does not match the frequency cue and is in the other, non-cued object). If OBA functions analogously in vision and audition, we should observe significantly better performance on invalid-same versus invalid-different trials, indicating an advantage for attended objects. Conversely, equivalent performance in these conditions would suggest that auditory attention cannot select object information. If our hypothesis is supported, we will conduct subsequent studies to more fully understand auditory OBA.

**Madeline Kallenbach**

Effects of PTSD on Subcortical Volumes

Mentor: Dr. Larson, Psychology

Poster Presentation, Easel 100

The study at hand is a longitudinal one which observes individuals who have gone through a traumatic incident throughout a two-year period. Questionnaires are administered after the initial accident, two weeks after, and every three months after in order to see whether or not post-traumatic stress disorder (PTSD) develops in these individuals. In addition to this, cortisol levels are measured and magnetic resonance imaging (MRI) is taken to compare those who develop PTSD symptoms and those who do not. The main focus in cortical areas is to see the effects of the symptoms on the amygdala and hippocampus. The amygdala is found to regulate emotions in a typically functioning brain and has been found to be the central subcortical structure in those experiencing PTSD symptoms due to the fear learning responses they experience (Brown, 2013). The hippocampus is involved with memory recall as well as memory formation which is a recurring symptom in those with the disorder. There are few longitudinal studies on the changing cortical structures from a traumatic event. One study (non-longitudinal) observed the effects of bipolar disorder on children's amygdala and hippocampus. This study focused on the cortical areas of the control "healthy children" compared to those with bipolar disorder, some with trauma and others without. Those who experienced trauma were found to have smaller amygdala and hippocampus volume. By studying individuals long-term and using questionnaires alongside MRI, it is hoped we can find how the amygdala and hippocampus are affected in those who suffer a traumatic accident.

**Alex Kayser & Gabriella Cisneros**

Art Shay, Prolific Photographer: Editing a Full

Length Documentary

Mentor: Jenny Plevin, Film

Performing Arts Presentation, 12:00pm, Union Cinema

For the past year I've been assisting Doc- UWM in the production of a Documentary about Art Shay. Mr. Shay is a prolific Chicago based photographer who has captured some of the most historic events and figures of the 20th century. I've been tasked with studying the time in Mr. Shay's life when he served in the 8th Air Force as a bombardier navigator. During this period, Mr. Shay was under the command of Colonel James Stewart and took part in thirty bombing missions over Nazi occupied Europe. After his first combat tour Mr. Shay went on to fly unmarked planes into neutral Sweden to provide Red Cross supplies to the Americans stranded there. Once the war had ended Lt. Shay continued to serve in the Air Force, flying V.I.P.s around the world. On one of these flights his plane was caught up in a snowstorm and was forced to crash in Newfoundland. The photos that Mr. Shay took during this incident helped jumpstart his career after he was rescued. I've gathered these stories through hours of interview footage with Mr. Shay and

have tried to bring them to life with archival footage and the photographs personally taken by Shay during this tumultuous period. Hopefully once this project is completed the public will also be able to experience these important stories for themselves.

**Kaleb Keefe**

Cytochrome c Nitrite Reductase (ccNiR)-Catalyzed

Nitrite by Ferrocyanide

Mentor: Arsenio Pacheco, Chemistry &amp; Biochemistry

Poster Presentation, Easel 198

Cytochrome c Nitrite Reductase (ccNiR) is a periplasmic, decaheme homodimeric enzyme that catalyzes the six-electron reduction of nitrite to ammonia (ammonification). Under physiological conditions ccNiR catalyzes the process without release of intermediates. However, in vitro we have found it possible to trap putative intermediates, or to release partially reduced nitrogen species such as nitric oxide, by controlling the electrochemical potential at which reduction takes place. Such experiments provide valuable insights regarding ccNiR-catalyzed ammonification of nitrite. When the weak reductant ferrocyanide is used as the electron source, *S. oneidensis* ccNiR catalyzes the one-electron reduction of nitrite to nitric oxide. The reaction rate has hyperbolic dependence on nitrite and ferrocyanide concentrations, and linear dependence on ccNiR concentration. Presence of Ferrocyanide serves to reduce the dissociability of Ferrocyanide which improves the accuracy of the methods used. Kinetic studies also show that the rate of NO production is pH-dependent, and that an amino acid with pKa of 6.9, probably His268, needs to be protonated for the enzyme to be active. The mechanistic implications of these findings will be discussed in the context of earlier investigations of ccNiR.

**Jamie Kellicut**

So You Mean Well, You Found Us, Now What?

Mentors: Margaret Noodin, English &amp;

Patricia Torres Najera, Electa Quinney Inst.

Poster Presentation, Easel 137

American Indian youth have the highest rate of suicide among all other ethnic groups in the United States and is the second leading cause of death for American Indian youth aged 15 – 24 (NCAI, 2018). Even with the enactment of Wisconsin Act 31, that requires all public school districts and pre-service education programs to provide instruction on the history, culture and tribal sovereignty of Wisconsin's eleven federally recognized American Indian nations and tribal communities, there is a staggering amount of cultural injustices, inappropriate interactions and harmful stereotypes occurring daily across Wisconsin. This includes incidents that have happened right here on the University of Wisconsin-Milwaukee campus. These incidents leave lasting scars on our American Indian youth and have contributed to the percentage of American Indian youth who have left mother earth too soon by suicide. Through questionnaires, interviews and journals this preliminary

research project anticipates the need for more culturally relevant and respectful education for educators across Wisconsin at all levels in the educational system. This project will be used to develop an American Indian educational resource page that will be added to the Electa Quinney Institute website in hopes to bring about lasting respect and reverence for the American Indian nations and tribal communities within Wisconsin.

**Nia Keranova**

Examination of the Evolution of Finger-Style Guitar from 1967-1992

Mentor: John Stropes, Music

Oral Presentation, 12:00pm, Union 240

Over the past 50 years, finger-style guitar has emerged not only as a significant music but also as a legitimate focus for study and for scholarship. The University of Wisconsin-Milwaukee offers the only Bachelor of Fine Arts and Master of Music programs in the world in which a student may choose to specialize in finger-style guitar performance. Our program has attracted students from throughout the United States and from many other countries. In the past year, a remarkable cache of material has surfaced that provides new perspective for our research: Michael J. Lamb, an avid collector, has contributed more than 200 rare audio recordings of concerts from 1967-1992 including performances by Son House, Bert Jansch, John Fahey, Leo Kottke, Leon Redbone, John Hammond, and Michael Hedges. These materials have been digitized in the Conversion and Archiving Lab at UWM. They document a pivotal period in which finger-style guitar was recombining elements of vernacular music and art music. They present us with the opportunity to reconfigure concepts, substantive foci, and methodologies of ethnomusicology and to develop new pedagogical approaches. The analysis of these recordings illuminates the genesis and evolution of these compositions. Accurate written music for “Vaseline Machine Gun” by Leo Kottke has been developed and now provides substantial pedagogical foundation for the performance of this song. This research provides content for classes and studio lessons and material for further research and the continuing development of a unique component of the guitar program at UWM.

**Brodie Kerst**

Oshkosh E.R.

Mentor: Nikole Bouchard, Architecture

Oral Presentation, 12:00pm, Union 280

Oshkosh Wisconsin is historically known as an industrial city, but Oshkosh's industrial past has left much of the riverfront property in environmental disrepair. The specific waterfront site I'm studying is heavily contaminated and in need of millions of dollars' worth of dredging in order to make it even remotely worth developing on. After talking to the Oshkosh Urban Planner, Darryn Burich, a few things became apparent. The city is in desperate need of transforming the riverfront into a place to be and the ecological damage

done to the site requires a much deeper understanding of the complex environmental and social issues before development begins. My research project, Oshkosh E.R. (Environmental Relief), revolves around understanding the historical, communal and environmental context of the site to design a proposal that effectively addresses these issues. The project will be presented through a series of visual and physical experiments that explore different forms of representation within the realm of architecture.

**Molly Kiefer, Annie Peterson & Rebecca Whitty**

Applying Feldenkrais Lessons to a Dance Context

Mentor: Daniel Burkholder, Dance

Oral Presentation, 1:20pm, Union 240

Historically, dance training has been taught from an outward approach that values appearance over efficiency. The Feldenkrais Method (FM) is a somatic practice focusing on awareness and improving movement efficiency through emphasizing internal perception of movement. As an individual explores inner sensation derived from movement, the mover can learn from habitual patterns to uncover new, efficient ways of moving. In our investigation of Awareness Through Movement (ATM) exercises, we sought to create a paradigm of dance training focused on the principles of the FM. We performed and analyzed ATM lessons, subsequently categorizing the anatomical actions, patterns of connectivity, and somatic experiences. In categorizing the ATM lessons, we were able to translate the patterns and functionality discovered into a movement vocabulary applicable to dance training. These movement sequences offer an individualized approach to learning and executing movement. This research supports the idea that dance training would benefit from somatic-based teaching.

**Seth Kochheiser**

The Sociology of Intergroup Emotions and Support

Mentor: Celeste Campos-Castillo, Sociology

Poster Presentation, Easel 73

In the 2016 election cycle, people took Donald Trump's candidacy trivially. His popularity though continued to increase to a point where he gained enough support to lock in the Republican presidential nominee to be President. The polls leading up to the election showed his opponent, Hillary Clinton, was ahead, but Trump managed to win the Electoral College to secure the presidency. In this study, another research assistant and I watched the 2016 Presidential debates and read along with the transcript. We annotated the transcript by coding and analyzing the six primary emotions- love, sadness, fear, anger, joy and surprise-displayed by both candidates. During weekly meetings, we would discuss their codes and finalize them. As a result, we found that Trump displays significantly more emotion than Clinton. We also found that Trump and Clinton's emotions differed significantly. In particular, Trump displayed more anger than Clinton while a greater proportion of Clinton's emotions were joy than of Trump's. We believe that his exhibit of more emotions about issues like Clinton's emails led the

typical voter to sway Trump's way thereby increasing his popularity. If a candidate demonstrates an emotion about an issue that a voter feels, the voter could show support for that candidate due to a feeling of sameness.

#### **Zachary Komassa**

Searching for Pulsars with FAST

Mentor: David Kaplan, Physics

Poster Presentation, Easel 139

Pulsars are rapidly rotating neutron stars with intense magnetic fields and a regular emission of bright radio waves. The radio emission of pulsars is so consistent—like lighthouses in space—that they can be timed precisely like an atomic clock and used to detect gravitational waves, which is the goal of the North American Nanohertz Observatory for Gravitational Waves (NANOGrav). Along with Shana Li from Oberlin College, I traveled to China to conduct Pulsar Astronomy research and data processing with the National Astronomical Observatories of China (NAOC). We studied how to process raw pulsar data collected from large radio telescopes, including Arecibo Observatory in Puerto Rico, the Parkes Radio Telescope in Australia, and the new Five Hundred Meter Aperture Spherical Radio Telescope (FAST) in Guiyang, China. We worked to develop a functioning pulsar-search pipeline for NAOC and the new FAST telescope. This project aids the commissioning of FAST, and contributes to NANOGrav's pulsar timing array.

#### **Michelle Kondrat**

Using DRA to Decrease Problem Behavior and Increase Academic Behavior in a Child with Autism Spectrum Disorder

Mentor: Jeffrey Tiger, Psychology

Poster Presentation, Easel 155

Applied Behavior Analysis (ABA) Therapy is an empirically supported treatment modality to diminish problem behavior exhibited by children with developmental disabilities. Differential reinforcement is one strategy common to ABA approaches that involves (a) identifying environmental events that serve as reinforcers for the problem behavior, (b) withholding those reinforcers when problem behavior occurs, and (c) delivery those reinforcers for a more appropriate form of behavior. The current study was a data-based case study in which we applied this approach to the problem behavior of a 7-year old girl diagnosed with Autism Spectrum Disorder referred for aggressive behavior. Behavioral assessments indicated her aggression occurred most often when presented with academic demands. Therefore, we applied DRA by ignoring the occurrence of problem behavior and providing breaks with access to positive reinforcement (i.e., access to a tablet) following instances of compliance with an academic instruction and evaluated the efficacy of this treatment using a single-subject reversal design. Following a reduction in aggression and an increase in her independent completion of these academic tasks, we gradually increased the number of tasks to be completed prior to receiving a break and increased the complexity of tasks to be completed. These results replicated prior work and offer further support to this intervention modality.

#### **MacKenna Krupa**

Kenilworth Gallery Community Engaged Arts Initiative

Mentor: Kim Cosier, Art & Design

Poster Presentation, Easel 4

The Kenilworth Gallery Community Engaged Arts Initiative hosts collaborative art projects between community groups and PSOA faculty, staff, and students. The initiative utilizes university resources, space, artistic expertise, and strong partnerships to do hands-on community art projects. These projects explore varying themes including democracy and social justice. Our team researches how citizens from Milwaukee and the PSOA community learn from each other. This interaction allows participants to articulate the knowledge and skills they believe to be important to making socially engaging art. We are using case study research methods including field observations, surveys, and interviews to collect quantitative and qualitative data. Detailed analysis of this data will result in an expanded understanding of the ways community engagement projects are understood by participants. Results will be used to create feedback for continuous improvement of our programming as well as dissemination through publication and presentations that may have an influence on a wider audience.

#### **Nathan Krzynski**

Modified Ceramic Adsorbents for the Removal of Oxyanion Water Pollutants

Mentor: Yin Wang, Civil & Environmental Engineering

Poster Presentation, Easel 63

More than 2 billion people across the globe do not have the access to safe drinking water. Heavy metals and metalloids, such as the recalcitrant oxyanion pollutant Selenium (Se), are among the most widespread waterborne contaminants. Se is primarily used in the manufacture of glassware, production of electronic equipment, and in metal processing. Soluble forms of Se ions (i.e., Se(IV) and Se(VI)) are able to seep into groundwater, putting people as well as the environment at risk of exposure. Contact with significant amounts of Se has a wide range of negative health effects and in extreme cases can be fatal. This project focuses on the development of highly efficient and low-cost water filtration materials for the adsorptive removal of Se. Low-cost granular ceramic materials coated with Lanthanum (La) that exhibit a positive charge and strong interaction with the target Se, are used for the adsorption process. The adsorption of Se was studied as a function of time, particle concentration, total Se concentration, and Se speciation.

**Jared Kuschewski**

Phenological Observations in Downer Woods  
 Mentor: Mark Schwartz, Geography  
 Poster Presentation, Easel 156

The rate at which the earth's climate is changing is a rapidly growing concern in today's world. This project uses phenology, the study of seasonal plant cycles, to quantify the effects of climate change. Observations were taken at multiple forested locations across Wisconsin, with Downer Woods being the focus of this part of the project. Downer Woods has a permanent grid system, upon which are located 27 sites. Each site consists of 4 trees, which are the focal point of the observations. The two predominant species in these observations are white ash (*Fraxinus americana* sp.) and basswood (*Tilia americana* sp.), with a significant number of red oak (*Quercus rubra* sp.) and white oak (*Quercus alba* sp.), and a rather small numbers of boxelder (*Acer negundo* sp.), hophornbeam (*Ostrya virginiana* sp.), and hawthorn (*Crataegus* sp.). White ash, basswood, and oak are the dominant woody species that occupy the upper emergent and canopy forest layers. Boxelder, hophornbeam, and hawthorn are smaller, woody shrub-like species that occupy the midstory forest layers. The observations consist of recording leaf coloration in each individual tree, as well as leaf fall in each individual tree. Coloration was recorded as four different numerical values. These values were placed into 4 categories that were based on the percent of leaf coloration per tree. By observing the leaf change and leaf fall in Wisconsin forests, we can quantify plant-climate interactions and relate this seasonal data to the yearly climate trends that are being observed simultaneously. This past autumn there was an unusually early start to the coloring of basswood leaves, being the earliest that was recorded since observations began in 2007. It is data like this, coming in during a time of increasingly erratic weather patterns and seasonal changes, that may help show that climate change is indeed having a significant impact on the world we live in.

**Andrew Lascelle**

Flexible, Soft, User Friendly Analog Pressure Sensor  
 Mentor: Mohammad H Rahman, Mechanical Engineering  
 Poster Presentation, Easel 216

Force measurement in spasticity quantification is still looking for a soft non-invasive comfortable accurate pressure sensor. On the market, there are flexible force sensors available, but with these options, they are extremely expensive and are not comfortable for the user to wear. This pressure sensor would be attached onto a patient's arm in multiple locations. When a Physical Therapist goes to rehabilitate a patient and improve their range of motion, we will be able to know where and how hard they are pushing on their limbs. Using this data, we are then able to govern out robot with it in an effort to replicate the physical therapist's session, creating a rehabilitation robot. The sensor was made simply out very few parts. Two identical sheets of metallic fabric and sandwiched in between is a larger sheet of piezoresistive

fabric. This fabric has an internal resistance, and when a load is applied across it, the resistance gets larger. Using this we connected wires to the metallic fabric, and connected through a data acquisition box and into LabVIEW. Looking at the data, it is very accurate and scalable. By adding a wide range of known weights, we are able to scale the data. After this, we can apply a known weight and the output in LabVIEW gives us very accurately that actual weight. With the sensor calibrated, we now have a flexible soft non-invasive pressure sensor that can be applied to a patient's arm to acquire data. Next, we will be making multiple sensors and attaching them inside a flexible armband that the patient can wear for us to accurately know the position and magnitude of the force applied by the physical therapist.

**Alice Lecus**

Novel Porous Material for the Remediation of PCBs and Mercury from Green Bay Lake Sediments.  
 Mentor: Marcia Silva, Freshwater Sciences  
 Poster Presentation, Easel 192

Under the 1987 Great Lakes Water Quality Agreement, the lower Green Bay and Fox River estuary has been labeled an area of concern due to the contamination of mercury and polychlorinated biphenyls (PCBs) from industrial exploitation. These highly toxic compounds impose a great number of public health and environmental hazards for the Green Bay region. The highly abundant PCB in this region, Aroclor 1242, is well known for triggering carcinogenic responses in animals and mercury targets the central nervous system as well as vital organs. Furthermore, these compounds are extremely difficult to remove from the environment once introduced. Extensive remedial actions have been implemented to resolve the issue including dredging the Lower Fox River from DePere to Green Bay, a very invasive method that tends to resuspend sediment aiding in the further transport of pollutants. The goal of this project seeks to find an alternative solution to dredging using a modified novel porous material for the remediation of PCBs and mercury by diffusion.

**Donggwon Lee**

A Polynomial Based Far-Field Expansion for Treecode Algorithm  
 Mentor: Lei Wang, Mathematical Sciences  
 Poster Presentation, Easel 133

Do you believe that your computers do things so fast? You probably say yes. However, it depends on what fields we use computers in. Let me take an example of physics. In physics, they have tremendous data for research work, such as particle-particle interactions, like stars in a galaxy with different "gravity". When they do computational modelling, using those data in a naïve way, it consumes a large portion of computer processing time and memory, which we call "expensive" method. "How can we process them in a clever way?" One of the common operation is matrix-vector multiplication, which most students learn from a linear algebra course. My research uses

Fast treecode algorithms as a powerful tool to increase the speed of matrix-vector multiplications for some matrices that have special structure and are commonly used in physics and statistics. Treecode algorithms work by grouping particles into clusters whose effect on other, far-away particles can be rapidly approximated by using far-field expansion. In this project, we focus on the polynomial far-field expansion for the treecode algorithm, which has several potential advantages over the commonly used Taylor approximation. In other word, we want to make treecode algorithm more efficient and reliable.

#### **Kristen Leer**

Perceived Stress in Marijuana-using Adolescents and Young Adults

Mentor: Dr. Krista Lisdahl, Psychology

Poster Presentation, Easel 97

In Koob's and Volkow's three-stage model of addiction, stress is hypothesized to play several key roles. Indeed, experience of early stressful life events significantly increases the risk of developing substance use disorders, and recent stress increases alcohol consumption. However, few studies have examined perceived stress in marijuana (MJ)-using youth. We hypothesize that marijuana-using youth will report higher levels of perceived stress compared to non-users. Data was collected from 80 adolescents and young adults with (n=39) and without (n=41) regular marijuana use (55% male, 66% Caucasian; aged 16-25). A series of multiple regressions were run to examine whether MJ-users reported increased perceived stress while controlling for alcohol, nicotine, depressive symptoms, and gender. We also examined whether gender moderated these effects. MJ users did not differ from controls in their perceived stress levels. Notably, recent symptoms of depression significantly predicted perceived stress ( $\beta = .57, p < .01$ ); positive well-being ( $r = -.16, p < .01$ ) and social support ( $r = -.22, p < .01$ ), but not education. Social support was associated with anxiety ( $r = -.283, p = .01$ ) and well-being ( $r = .33, p < .01$ ) whereas education was only associated with well-being ( $r = .23, p < .01$ ). Mediation results are forthcoming. These findings suggest that education and social support intervention early in the life-course may lessen the impact of ACEs on adult mental health.

#### **Sarah Lehman**

Effects of Early Onset Marijuana Use on Executive Functioning Compared to Late Onset Marijuana Use

Mentor: Krista Lisdahl, Psychology

Poster Presentation, Easel 163

Marijuana (MJ) is one of the most popular recreational drugs used by young adults (Medina et al., 2007). Previous research has found that early onset MJ use has been associated with poorer performance in executive functioning tasks (Fontes et al., 2011). This study assessed whether early onset MJ use was associated with poorer performance in executive functioning compared with late onset MJ use. A sample of 53 adolescent and young adult MJ users, 26 with an early onset (17 years old) and

27 with a later onset (18 or older), were drawn from the community at the University of Wisconsin- Milwaukee as part of a larger study. A series of multiple regressions were run to examine whether early vs. late onset of MJ use demonstrated poorer executive functioning while controlling for alcohol and nicotine use. Early onset MJ users demonstrated marginally fewer commission errors ( $p = .07$ ), longer response time ( $p = .10$ ), and greater reaction time variability ( $p = .06$ ) on a continuous performance test (CPT-II). Early onset MJ users demonstrated slower and more variability in response to a continuous performance task, demonstrating poorer sustained attention and increased impulsivity compared to late onset MJ users. These findings support previous findings of increased executive dysfunction in early onset MJ users; although the findings were more subtle. This may be due to the fact that this sample had a relatively late average onset at over 17 years old. Future studies, like the Adolescent Brain Cognitive Development study (ABCD), are needed to examine this longitudinally.

#### **Nicole Lensmire & Eva Armour**

Exercise Increases Caspase-3 Expression in the Rat Hippocampus

Mentor: Rodney Swain, Psychology

Poster Presentation, Easel 136

Previous research emphasizes brain plasticity due to aerobic exercise. In the hippocampus, exercise accelerates neurogenesis, the proliferation of new neurons in the dentate gyrus and changes astrocyte morphology. Identifying the cellular and molecular events that underlie exercise-induced increases in hippocampal volume are critical to understanding how exercise facilitates cognition and protects the brain from Alzheimer's disease. Although markers for cell death differed across studies, all suggest elevated apoptosis following a single bout of exercise. Twenty, male rats were divided into two groups: inactive control (IC) and voluntary exercise (VX). VX animals had 24 hr access to a running wheel. Immunohistochemistry was used to label cleaved caspase-3, mature neurons, immature neurons, radial glia-like cells, and astrocytes. Our goal was initially to determine which of these cells were dying. Light and fluorescence microscopes were used for imaging. Unbiased stereology was used for quantification of labeling. Increased caspase-3 expression was found in VX animal's hippocampi in astrocytes and radial glia-like cells. There was no significance for caspase-3 in neurons and it was not associated with apoptosis. Our results add to the small body of literature that suggests activated caspase-3 can serve as a non-apoptotic role, outside of major events like development or insult.

**Robert Lindert**

Software Development for FRET-based Analysis of Protein-Protein Interactions  
Mentor: Valerica Raicu, Physics  
Poster Presentation, Easel 78

G-protein-coupled receptors (GPCRs) are the largest family of transmembrane receptors in eukaryotic cells. They respond to a variety of stimuli, which may be present outside of the cell, and hence are the target of more than 60% of modern clinical drugs. Many GPCRs have been proven to associate into homo-oligomeric complexes whose functional roles remain largely unknown. Association of GPCRs in living cells may be probed via detection of the changes in light emission caused by transfer of energy between fluorescent tags attached to the proteins of interest. The transfer process, called Förster Resonance Energy Transfer (FRET), relies on coupling between the transition dipole of a fluorescent “acceptor” (A) molecule and that of an optically excited “donor” (D) molecule when they are within 10 nm of each other. Raicu Lab has introduced a method called FRET spectrometry, which involves the use of laser light to excite the donor at its excitation maximum wavelength and determine the efficiency of energy transfer for each pixel in an image. Recently, we have expanded the method to allow scanning the sample at a second excitation wavelength, which more closely matches the acceptor excitation maximum. Two additional quantities can be measured as a result: the donor and acceptor concentrations at pixel level. The current analysis process requires use of several software packages and is labor intensive. The goal of the current project is to write new software that streamlines this procedure. In addition to speeding up the analysis process, the software will also reduce errors resulting from pairing the two excitation wavelength images incorrectly. The developed code is based on object-oriented programming, which facilitates database construction and maintenance, as the processed information is vast and diverse (e.g., 3D images, fluorescent tag data, fitting and analysis of the experimental data, etc.).

**Yuting Lin & Mohsen Manjili (UW-Milwaukee)**

Novel Porous Materials for Removal of Heavy Metals from Water  
Mentor: Marcia R. Silva, Freshwater Sciences  
Poster Presentation, Easel 197

Because of their high solubility in the aquatic environments, heavy metals can be absorbed by living organisms. Large concentrations of heavy metals may accumulate in the human body and cause serious health disorders once they enter the food chain. Therefore, it is necessary to treat heavy metal-contaminated wastewater prior to its discharge to the environment. Natural porous materials gained a significant interest, mainly due to their valuable properties as ion exchange capability. For previous year, the adsorption behavior of natural porous materials for the heavy metals, lead and mercury, were studied to establish a baseline for the removal of heavy

metals from drinking and waste water. Samples were examined under different conditions such as sorbent dosage, solution pH, and exposure time. Solution PH effect on removal efficiency has been investigated in acidic (pH=4), neutral (pH=7) and basic (pH=10) pH levels. All adsorbent materials showed highest adsorption capacities at neutral pH levels. New materials with potentially enhanced adsorption properties were developed by functionalizing the surface of the natural porous materials to fabricate the engineered material. The functionalized materials were characterized with N2 absorption Brunauer–Emmett–Teller (BET) method, Fourier-transform infrared spectroscopy (FTIR), Raman spectroscopy (Raman), thermal gravimetric analysis (TGA) and Energy Dispersive X-ray Spectrometry (EDS) techniques. Batch experiment was used to assess the efficacy for the removal of lead with the sorption kinetics and the adsorption isotherms being determined for the natural and modified porous materials.

**Connor Link**

The Effects of Urbanization on Groundwater Recharge in the Root River Watershed  
Mentor: Shangping Xu, Geosciences  
Poster Presentation, Easel 76

Urbanization, which leads to the loss of natural forest and agricultural land, plays a significant role on the health of a groundwater system through its effect on groundwater recharge, and alteration of pre-existing hydrological processes. The purpose of this research was to investigate the impact of land use change, particularly urbanization, on groundwater recharge within the Root River watershed. For this purpose, we examined the historical land use patterns within this watershed, and used the USGS program, GSflow, which is a coupled groundwater and surface-water flow model, to quantify the groundwater recharge rate. The model simulation results were then processed using GIS software and the streamflow data was incorporated into the delineation of the 100-year flood map. In future research, this modeling framework can be used to predict future changes in a groundwater system for a variety of urban environments.

**Mariah Linske**

Quantifying Changes in Dorsal and Ventral Hippocampus Immediate Early Gene Expression as a Function of Aging Related Cognitive Decline  
Mentor: James Moyer, Psychology  
Poster Presentation, Easel 185

Due to the growing portion of the population that is expected to reach old age in the coming years, incidences of aging-related neurodegenerative disorders like Alzheimer’s disease are also expected to increase. To determine areas of the brain that may be functionally impaired, the expression of immediate early genes (IEGs) such as c-Fos and Zif-268 were studied. Changes in the expression of IEGs within a neuron indicates that the neuron was recently activated. A combination of behavior and IEG-immunohistochemistry was used to study both

learning- and aging-related changes in key brain regions known to be important for learning and memory. In the present experiment, rats were subjected to either (a) trace fear conditioning, (b) trace fear conditioning followed by extinction, (c) pseudo-conditioning, or (d) were left naïve and thus remained in their home cage. Prior analyses illustrated that adult rats showed increased levels of c-Fos and Zif-268 in the prelimbic and infralimbic medial prefrontal cortex after training, and this increase was less pronounced in aged animals. Additionally, training resulted in an increased expression of c-Fos in the lateral amygdala for all age groups, while no changes were observed after extinction for aged or middle aged rats. In the dorsal and ventral hippocampus, adult and middle-aged rats generally showed an increase in c-Fos expression after training, but no increase was seen in aged animals. There was no significant increase of zif-268 expression across any region of the hippocampus or age group. No discrepancy between age groups and their ability to acquire the training was found, but variation in IEG expression suggests differences in brain function between groups. Ongoing research is studying other brain regions implicated in learning and memory, and other markers of neuronal activity. Studying aging-related changes in expression of IEGs in conjunction with their learning-dependent changes should allow for the identification of how information processing changes across the lifespan.

#### **Hugo Ljungbäck**

What We Can Learn from a History of Film Studies  
Mentor: Tami Williams, English  
Oral Presentation, 12:40pm, Union 250

While the earliest films were made and distributed in the 1890s, Film Studies did not emerge as a proper academic discipline until the late 1960s. Though there had already been film schools that taught students how to make films (Gerasimov Institute of Cinematography in Moscow, 1919; USC School of Cinematic Arts, 1929), the study of films as an academic discipline or from a humanities and social sciences perspective was established much later. While film history has been written and revised many times over, little attention has been paid to the historical development of Film Studies programs. This study develops a microhistory of one of the earliest Film Studies programs in the country, its aims and methods, and places it in the context of this emerging discipline. In particular, this study examines department and university records, course books and syllabi, screening schedules, and CVs, to outline the initial concerns of the field at its inception: what classes were offered; what topics were covered; what filmmakers and films were screened and discussed; what theorists and texts were read; what movements were grouped in the creation of a film history and what disciplines Film Studies professors emerged from. The study traces the evolution of these concerns across the fifty-year-old discipline's history, and compares the initial curricula (with a focus on film history, theory, and conceptual studies) to contemporary Film Studies concerns (such as interdisciplinary approaches, queer

theory, and new media). Through this comparative approach, we can critically examine how Film Studies itself has shaped the histories and theories offered through current curricula, and how the discipline has either validated or dismissed the works of filmmakers, theorists, and historians.

#### **Angela Lochner & Tasha Wade**

Recent Depression Symptoms Associated with Ecstasy Use and Reduced White Matter Integrity in Three Frontolimbic Tracts  
Mentor: Krista Lisdahl, Psychology  
Poster Presenter, Easel 179

Ecstasy, a common designer drug that contains 3,4-Methylenedioxymethamphetamine (MDMA), can cause feelings of euphoria, arousal, mild hallucinations and elevated mood in users. Use of MDMA among young people is a rising public health concern; 2.4 % of 8th, 10th and 12th graders reported using the drug at least once within the past year. Research has suggested that ecstasy use may be correlated with deficits in verbal memory and other neurocognitive processes. In our prior study, we found reduced white matter integrity in ecstasy users, especially in frontolimbic tracts. The current study investigated whether white matter integrity in these frontolimbic tracts were associated with symptoms of depression and anxiety. In the whole sample, increased MD in fmajor ( $p=.02$ ), right ATR ( $p=.04$ ), right UNC ( $p=.05$ ) were associated with increased symptoms of current anxiety. We also found that increased MD in famjor ( $p=.01$ ), fminor ( $p=.02$ ), left ATR ( $p=.37$ ), right ATR ( $p=.02$ ), right UNC ( $p=.02$ ), left UNC ( $p=.04$ ) were associated with increased symptoms of recent depression. This demonstrates that ecstasy use is linked with reduced white matter integrity, and this is associated with recent symptoms of depression and anxiety. These findings help elucidate potential underlying mechanism for increased mood symptoms in ecstasy users.

#### **Mollie Lund**

Eviction Defense Project  
Mentor: Tina Freiburger, Criminal Justice  
Poster Presentation, Easel 96

There are approximately 13,000 eviction cases in Milwaukee County each year and less than 1 percent of individuals being evicted have legal representation. Legal Action of Wisconsin has created the Eviction Defense Project to connect individuals being evicted in Milwaukee County with pro bono legal representation. This presentation will contain the preliminary results of the evaluation of the Eviction Defense Project. This will include information from client surveys as well as qualitative interviews with clients, court staff, and program staff and volunteers. Results indicate that clients are satisfied with the services they receive and believe their court outcomes were better because they received assistance from the Eviction Defense Project.

**Scott Litwin**

Glacial Sedimentology and Stratigraphy of Northern Illinois: Glacial Processes During Climate Fluctuations  
Mentor: John Isbell, Geosciences  
Poster Presentation, Easel 103

Towards the end of the Pleistocene Epoch, the Lake Michigan lobe of the Laurentide Ice Sheet extended across northern Illinois. During glacial maximum, the ice produced terminal moraines and extensive melt-water that deposited sediments in braided streams, lakes, marine channels, and deltas. Analyzing these deposits left behind on the landscape helps to understand the dynamic conditions that occurred along the front of this ice sheet as it began to recede. Additionally, these deposits help scientists to understand the transition from glacial to interglacial conditions and the processes that occur during periods of climatic changes. McHenry County, Illinois was a centerpiece during the last ice age, and has a vast amount of glacial driven depositional features produced from the Harvard sub-lobe of the Lake Michigan lobe. Recent studies at a gravel pit in Richmond, Illinois suggest multiple advancements of glaciation that left behind esker, channel fill, and braided stream outwash gravels. Lying on top of the gravels is a subglacially deposited diamict. Additionally, boulders that protruded out of the underlying gravels were sculpted into bullet-shaped clasts with glacial striations that indicate the direction of glacial flow as ice advanced across this area. Diamict-filled cracks in the underlying gravel suggest that the ice advanced over permafrost. Following ice advance, graben-like structures along the top of the diamict indicate stagnation of the ice lobe and collapse of the glaciated landscape as ice blocks covered in debris melted. Above the diamict, there is evidence of an outwash plain with intergraded fine sands and cobbles that further indicate glacial retreat during a warming climate. The majority of fine sands show ripple and cross-bedded formations that indicates the flow direction of melt water. The evidence found in this study, shows the dynamics of sediment deposition during glacial and interglacial periods. Data collected here can be compared and contrasted to other glacial impacted sites to try and understand the depositional processes and climatic trends during glacial periods.

**Mikael Luter & Jocelyn Kroetz**

Can Your Daily Commute Slow Climate Change?  
Itziar Lazkano, Economics  
Oral Presentation, 12:20pm, Union 250

Is it possible for Americans to reduce their daily pollution? Greenhouse gas emissions worldwide have increased drastically in the last 50 years. The transportation sector is the second largest emitter of carbon accounting for 27% of all GHG emissions. Cars, trucks, and busses emit 83% of all transportation emissions and, given that the average American spends 26 minutes in travel to work, it is urgent that we move toward cleaner transportation alternatives. Using data on fuel emission and consumption, we analyze taxes and regulations that might effectively reduce

GHG emissions from the daily commute. Specifically, we examine several plausible systems that have led to a substantial reduction in transportation emissions – China has added more road space and made public transit systems more abundant/accessible; the rideshare/carshare market is booming in the UK; and several countries have implemented a carbon tax system. Which is the best alternative for the US? What can we learn from data on emissions, fuel consumptions, and drive times? Everyday Americans can use this information as motivation for a transition to a cleaner, more efficient carbon footprint, ultimately encouraging policy makers to adjust legislation to reflect the shift in American values.

**Katherine Mac Donald**

NEURON as a Means to Reverse Engineer the Brain:  
A Computational Approach to Modeling Neurons a  
Action Potentials  
Mentor: James Moyer, Jr., Psychology  
Poster Presentation, Easel 7

Computational neuroscience is an interdisciplinary field that incorporates an analysis of brain functions in direct relation to information processing within the nervous system. By use of exploratory modeling techniques and mathematical application, the field of neuroscience has revealed a method of reverse engineering the brain by means of quantitative analysis. In exploring the capacity of NEURON, an open-source neuronal network simulation environment, a foundation for introductory theoretical and computational neuroscience has been implemented. The NEURON Guided User Interface (GUI) allows for an intuitive grasp on experimental data input and model construction. By introducing Python to NEURON, a breadth of analysis tools and familiarity of language can be made available for ease of the user. The research aims to broaden the perspective of computational neuroscience to the engineering discipline and to apply rudimentary computer science techniques, including persistency to the goal of sufficiently accurate computer models based in mathematical roots. This research project involves not only learning how to use NEURON to create computational models of neurons, but also to create a 3D drawing of a neuron from which neurophysiological data were experimentally collected. After generating the 3D reconstruction, I will then create a computational model that captures the neurophysiological characteristics of the neuron. Data from these types of studies will then be used to ask questions associated with how the intrinsic properties of neurons change during learning and memory, and how aging can impact these capabilities.

**Briana Magruder**

Functional Upper Extremity Workspace in Pre-Operative Versus Post-Operative Rotator Cuff Repair  
Mentor: Alyssa Schnorenberg, Occupational Science & Technology

Poster Presentation, Easel 98

An estimated 25% of US adults will experience a rotator cuff tear, negatively impacting their ability to perform daily functional tasks. About 300,000 rotator cuff surgeries are performed each year in order to increase range of motion (ROM) and enable return to the workforce. The purpose of this research is to identify the functional ROM of the glenohumeral (GH) joint before surgical repair and during the post-operative recovery period. Three subjects completed 3 trials each of simple ROM tasks, including abduction, external rotation, and flexion, in which they reached their injured arm as far as possible in the instructed direction. A pre-operative visit occurred 0-12 weeks before surgery, and two post-operative visits occurred at 9-12 weeks and 22-30 weeks after surgery. A 15 camera Vicon T-Series Motion Capture System tracked 27 reflective markers to collect upper extremity kinematic data of each of these motions. A custom upper extremity biomechanical model was then applied to calculate the three-dimensional angles of the GH joint during the task. Peak angles and the ROMs were calculated for each task, and group averages were compared across visits. It is expected that during the pre-operative visit, the injured arm will not be able to reach as far and have limited ROM, but over the course of the post-operative visits, the injured arm will improve. Little to no improvements may indicate the recovery period is longer than expected. Additionally, improvements seen here, but not in the performance of meaningful tasks, such as combing the hair, may provide insight to therapists regarding compensation and adaptation, or the mental state of the individual, which may be affecting their ability to perform such tasks. Redirection in therapy may benefit individuals that are not progressing during the recovery period and may allow them to return to their functional ability more quickly.

**Nathan Manning & Jacob Tretow**

Bicycle Tire Stability and Handling Testing  
Mentor: Andrew Dressel, Mechanical Engineering  
Poster Presentation, Easel 47

The objective of this project is to design a device to collect data on the mechanical properties of bicycle tires with the goal of validating Rotta's 2D model and enhancing the current bicycle model. In validating Rotta's 2D model, a better understanding of how bicycle tires behave will be achieved. This study will also take into account different parameters, such as tire size and construction methods. In addition, the data collected will enhance the current bicycle model and show how tire behavior influences bicycle stability and handling. By analyzing the combination of these two models, optimal tire design will be facilitated. Six constraints govern the device's design: accept tires with a 5-inch width and rims

with a diameter up to 29 inches, prevent wheel rotation about any axis, allow vertical and lateral movement, apply a vertical load to the wheel, measure vertical displacement and lateral force, and simulate various camber angles. The device uses a parallelogram design connecting the frame and fork together, thus allowing for vertical and lateral movement of the wheel but preventing rotation around any axis. At the base of the frame, a steel plate will be mounted on a hinge and rest on a brace. This hinge will allow the plate to tilt, simulating the wheel at various camber angles. The device will collect data using various PASCO force sensors, and the data will be compiled using DataStudio.

**Joshua Marquardt**

The Efficacy of Stromatolites as Paleomagnetic Recorders  
Mentor: Julie Bowles, Geosciences  
Poster Presentation, Easel 88

The geosciences subdiscipline of paleomagnetism plays an important role in understanding the history of the Earth. Geologic records of paleomagnetic fields can become corrupted over time by the perpetual, dynamic processes taking place on Earth; thus, locating ancient Earth materials capable of accurately recording magnetic fields is essential to understand field behavior over geologic time. Stromatolites are laminated sedimentary rocks, the oldest of which are at least 3.5 billion years old. In principle, their magnetic records could therefore tell us something about Earth's inner core formation. Stromatolites are thought to have formed in shallow waters via a bio-mediated process involving cyanobacteria. A microbial mat forms a sticky exterior film. In principle, as magnetic sediments fall through water they tend to preferentially align in the direction of the geomagnetic field; these sediments subsequently land on and are incorporated into the microbial mat, resulting in a continuous record of field behavior with a resolution of perhaps 5-20 years. This pilot study uses a stromatolite ~530 million years old, with an aim to determine the efficacy of stromatolites as paleomagnetic recorders. With the use of magnetic instruments housed in the UWM Paleomagnetism Laboratory, the magnetic directions recorded by the stromatolite were determined. I will assess the directional variability within the stromatolite and compare the directions to those determined from near-by rocks of the same age. If successful, this study will help uncover the paleomagnetic field direction from ~530 Ma as well as establish the reliability of stromatolites as paleomagnetic recorders.

**Lori Martello**

On the Wings of Dramaturgy

Mentor: Alvaro Rios, Theatre

Oral Presentation, 12:40pm, Union 240

STUPID F\*\*\*ING BIRD, Aaron Posner's modern-day adaptation of Anton Chekhov's 1896 play, *The Seagull*, was a UWM Spring theatre production. As the dramaturg, my primary focus was on Chekhov, *The Seagull*, and the socio-political climate of Russia before, during, and after *The Seagull*. I relied on English and Russian primary sources relating to Chekhov and Russia and gathered vast amounts of information including the social turmoil in 1890s Russia due to the assassination of the Tsar, Chekhov's personal connection to suicide and imbedded social and personal critiques and allusions. Along with historical Russian newspaper publications, I used personal journals and letters enabling me to understand significantly how certain elements led to Chekhov questioning his self-worth as a playwright and the future success of *The Seagull* as was then applied to SFB. Aspects of my research were implemented and brought to the present in UWM's production of STUPID F\*\*\*ING BIRD. Research adds uniqueness to a theatrical performance by bringing accuracy of relevant historical content into the production. For example, understanding the chaotic and decadent time of Russia gave a sense of the real atmosphere in which Chekhov wrote which was realized in the characters themselves in SFB. The cast and crew of SFB beautifully integrated their abilities and ideas with the historical content that is the foundation of SFB. In employing various components of my research into SFB performances, like archived Russian expressions and terminology, the minimalistic set and design that alluded to Chekhov's beliefs about theatre, the cast and crew paid homage to Anton Chekhov with their production of STUPID F\*\*\*ING BIRD. The role of dramaturgy, the way research and information are used from dialogue and costumes, to programs, makes brilliant and distinctive the production because the research will broaden and capture various features that enrich every aspect of a production.

**Theresa Mayland**

An Experimental Analysis of Verbal Behavior: Effects of Distracting Auditory Content on Measures of Responding in a Math Task

Mentor: Tiffany Kodak, Psychology

Poster Presentation, Easel 134

The purpose of the current study was to examine the function of mediating verbal behavior in promoting accurate and efficient responding in an arithmetic task. Undergraduate students served as participants in this study. Participants were given a simple three-numeral addition problem to solve. The problem was presented vocally in some trials and vocally and visually in other trials. During a one-minute response interval for two-thirds of the trials, an auditory stimulus was initiated that contained random numbers (Numbers condition) or a brief story (Passages condition). If the participant did not emit a correct response, they were asked to "try

again" until the correct response was emitted or one minute passed. Across conditions, we measured (a) mean accuracy of responses, and (b) mean latency to correct responses. In visual stimulus trials, mean correct responses and latency to a correct response were relatively similar across conditions. In trials with no visual stimulus, correct responses were reached most often in control conditions, and least often in the numbers condition. Also, in trials with no visual stimulus, the latency to a correct response was highest in the numbers condition, and lowest in the control. These results show that attending to one's own mediating verbal behavior promotes accuracy and efficiency in arithmetic tasks. Such attending may be a prerequisite skill in the development of complex verbal repertoires (e.g., adding, reading comprehension). Future research may include participants' accurate responding in a lag procedure.

**Marika McGhee**

Detecting Primordial Black Hole Microlensing Events

Mentor: David Kaplan, Physics

Poster Presentation, Easel 119

Massive Primordial Black Holes (MPBH) could constitute the majority of the dark matter, an idea revived by the LIGO observations of merging 30 solar mass black holes. In this model, the mass distribution of MPBH ranges from 0.01 to 100 solar masses, peaking perhaps at 50 solar masses. This project uses the Dark Energy Survey data to perform a microlensing measurement of massive compact objects at 10-100 solar masses. Microlensing occurs when MPBH passes in front of a background star, briefly brightening the output from that star. The key idea is that a microlensing event has a duration of roughly  $t = 2.5$  years and thus masses in the range expected for MPBH are observable in the DES. In this project, we created mock light curve events for stars in the Dark Energy Survey (DES). First, we reduce our sample size by removing galaxies and over-saturated objects. We then utilized the initial magnitudes, the observation times, and the calculated errors in our code. By using these data, as well as varying unknown parameters of the MPBHs, we create approximately 50,000 light curves per sampled star. These mock light curves will support in determining the efficiency of the current fitting algorithm, as well as any future algorithms. Our project will directly support the creation of efficiency maps which will help determine the number of actual events to expect within the DES.

**Michael McKinnon & Josh Kim**

Legacy of the 1969 and 1970 Ann Arbor Blues Festival  
Mentor: John Stropes, Music  
Oral Presentation, 12:20pm, Union 240

In 2011, the Finger-Style Guitar program at UWM began a research project which focused on the Avant Garde Coffeehouse, a Milwaukee music club which, from 1962-68, was the locus of the folk/blues revival in Southeast Wisconsin. James Barker, one of the co-owners, photographed the historic Ann Arbor Blues Festivals in 1969 and 1970. In 2012 we received negatives of 62 black and white photographs taken by James Barker at these festivals, and in 2017 we received a collection of 700 color slides. Together, these beautiful images represent a good portion of the leading electric blues guitar players of the time and many of the seminal acoustic blues guitar players who were still touring. In the past year, a remarkable cache of material has surfaced that provides new perspective for our research: Michael J. Lamb, an avid collector, has contributed audio recordings, programs, photos, and other ephemera of the 1970 Ann Arbor Blues Festival. These materials have been digitized in the Conversion and Archiving Lab at UWM, and a narrative has been developed which brings together audio recordings of the 1970 Ann Arbor Blues Festival and the powerful, unreleased photographic images. A comparative analysis of the technique of the finger-style performers at the 1970 festival gives us an appreciation of the contribution that country blues has made to contemporary finger-style guitar. This research provides content for classes and studio lessons and material for further research and the continuing development of a unique component of the guitar program at UWM. It deepens our understanding of the development of electric blues guitar in Chicago and the significance of the proximity of the Avant Garde Coffeehouse in Milwaukee and the Ann Arbor Blues Festivals of 1969 and 1970.

**Brandon Mikulsky**

Finding a New Treatment for Neuropathic Pain:  
Targeting the GABA<sub>A</sub> Receptor on Microglia  
Mentor: Alexander Arnold, Chemistry & Biochemistry  
Poster Presentation, Easel 22

Glial cells are the most abundant cell type in the central nervous system (CNS), within which they play a variety of physiological roles. One type of glial cell, microglia, have been found to be the primary immune cells within the CNS. Recent studies showed that microglia have a growing role in neurological disorders, such as Multiple Sclerosis, Alzheimer's disease, and neuropathic pain (NP). Earlier experiments in the Arnold lab demonstrated that imidazobenzodiazepines can reduce lung inflammation in asthma mouse models by selectively targeting the gamma aminobutyric acid type A (GABA<sub>A</sub>) receptors expressed on white blood cells, which share a common developmental lineage with microglia. Our collaborators have shown that targeting GABA<sub>A</sub> receptors on microglia within the spinal cord using imidazobenzodiazepines can reduce neuropathic pain, however details of this

mechanism are unknown. Currently, cell cultures of immortalized human and mouse microglia are being maintained in the Arnold lab to investigate the effects of imidazobenzodiazepines. We present the change of intercellular calcium upon stimulation with ATP and the reduction of nitric oxide (NO) in the presence of selective GABA<sub>A</sub>R agonists. These experiments will aid to better understand the anti-inflammatory properties of these compounds and to select potent and safe lead compounds for a more effective NP treatment.

**Ryan Majinski & Tory Clearwater**

A Detailed Study of Acid-Catalyzed Reactions of Carbonyl Compounds with Ethyl Diazoacetate  
Mentor: M Mahmud Hossain, Chemistry & Biochemistry  
Poster Presentation, Easel 54

Hydroxyacrylic acid esters are important precursors to a multitude of compounds and materials used every day. The synthesis of 3-hydroxy-2-arylacrylates, a subcategory of these chemicals, has been performed in the Hossain Laboratory since 2004. This set of precursors has now been used in the synthesis of several different pharmaceutical compounds, such as BRL-37959 and Naproxen. Both compounds have already proven to be effective non-steroidal anti-inflammatory drugs, with Naproxen currently being on the market. Recent work has improved this reaction and shown the scope to be much broader than originally believed. In this reaction of ketones and aldehydes with ethyl diazoacetate to form acrylates, our overarching goal is to substitute the aryl group as well as the aldehyde group to produce a large number of these 3-hydroxyacrylates. To achieve these results, we are optimizing the system temperature, the reaction duration, and the solvent and catalyst loading processes. Future work will study the kinetics of the reaction in order to elucidate the physical properties that drive the chemical shift. Once the reaction is fully understood and the conditions are optimized, it can be effectively used to form a broad range of products extending from medicinal compounds to synthetic materials. With the expansive range of substitutions this reaction allows for, the products made could support any number of marketable uses.

**Johanna Michlig**

Emerging Adults Reactions to the American Academy of Pediatrics Guidelines for Adolescent Media Use  
Mentor: W. Hobart Davies, Psychology  
Poster Presentation, Easel 114

Increased media consumption among children and adolescents has been associated with decreased physical activity, obesity, and poorer quality of sleep, and problematic Internet use. The American Academy of Pediatrics (AAP) released guidelines for young children, adolescents, and families regarding media consumption as an effort to promote healthier usage of media. As part of a larger study, 392 emerging adults, age 18- to 25-years-old ( $M=22.10$ ,  $SD=1.92$ ; 55% female; 78% White), provided basic demographic information, and rated each

of the AAP's 11 adolescent media guidelines on a 5-point Likert scale from “ridiculous” (1) to “reasonable” (5). Overall, emerging adults thought the proposed guidelines were “reasonable”. The guidelines regarding 1 hour of physical activity daily, 8 hours of sleep nightly, media-free family time, and sharing the guidelines with caregivers were rated most “reasonable” (all  $\geq 70\%$  rated as 4 or 5). Guidelines restricting screen access in bedrooms were viewed less positively (all  $\geq 26\%$  rates as 1 or 2). For the guidelines, no devices in the bedroom during sleep hours 48% of the respondents rated this a 4 or 5 with an average of  $M=3.53$ . No screens 1 hour before bed was rated as a 4 or 5 by only 42% of the respondents with an average of  $M=3.31$ . Emerging adults were generally supportive of the AAP guidelines, seeing them as reasonable and recognizing the need for structure in this area. The least support was seen for guidelines related to screens in the bedroom and screen time shortly before bed. These guidelines are research-based and shown to be effective in prompting more and better sleep; but arguably create the more inconvenience for youth and limit their privacy during screen use. Future work should investigate the effects of educating youth and parents about the rationale for these specific guidelines.

#### **Morganna Milgrim**

Body Talk

Mentor: Robin Mello, Theatre

Performing Arts Presentation, 1:00pm, Union Cinema

The primary focus of this research is to enrich my perspective as a playwright by gathering data on the topic of body-shame. Dr. Mello and I are conducting interviews with people of varying genders, ages, and walks of life in order to discover how each person experiences body-shame and body-ease. I will write a draft of a play which will prove to be richer and more truthful with the aid of this new data. That will then be workshopped and performed with a company in Helsinki, a city with a lasting tradition of theater that strongly impacts public discourse.

#### **Anna Miller**

Upper Limb Spasticity and Pain Quantification Using Motion Capture, EMG, EEG (Muscle Resistance) and Facial Expression

Mentor: Mohammad H Rahman, Mechanical Engineering

Poster Presentation, Easel 125

Many mechanisms of injury hinder the functions of the shoulder, elbow and wrist. The first phase of this experiment is to collect and analyze the biomechanical (position, velocity and acceleration) and physiological (EMG activity) measurements associated with a variety of upper extremity movements. Biomechanical signals and physiological signals will be obtained via EMG and motion capture systems. The output of these experiments will be translated into useful dynamic information, such as the torque of a movement and the relative spasticity at each given moment. The normative data will be

collected from healthy subjects and compared with data collected from subject that have experienced a stroke and have limited upper extremity function. This data will ultimately lay a foundation on which new diagnostic and rehabilitation methods can be effectively developed. The next phase of this experiment will be integrating the data base with EEG signals and Facial expressions information obtained from subjects completing the same movements. The data will then be integrated into a format that will enable the user to quantifiably explore the spasticity, range of motion and pain endured during a wide variety of upper extremity movements. This tool will allow engineers, physicians and occupational therapists to more fully understand the scope of the injury and coordinate cohesively to address it.

#### **Anna Miller**

Human Upper Extremity Kinematics and EMG Signal Analysis in Performing Daily Activity of Living

Mentor: Mohammad Rahman, Mechanical Engineering & Rasedul Islam, Mechanical Engineering

Poster Presentation, Easel 126

Many mechanisms of injury reduce the functionality of the shoulder, elbow and wrist. The human upper limb is responsible for performing a range of activities of daily living (ADL) from tooth brushing to opening a door. The purpose of the experiment is to collect and analyze the biomechanical (position, velocity, and acceleration) and physiological (EMG) measurements associated with a variety of upper extremity movements that perform ADL. Biomechanical signals while doing ADL will be obtained via motion capture systems whereas physiological measurements will use skin surface EMG electrodes. The output of these experiments will be translated into useful dynamic information corresponding to specific ADL, such as angular rotation, velocity and acceleration for shoulder, elbow and wrist. The normative data will be collected from healthy subjects This data will ultimately lay a foundation on which new diagnostic and rehabilitation methods can be effectively developed. This tool will allow engineers, physicians and occupational therapists to more fully understand the scope of the injury and coordinate cohesively to address it.

#### **Amanda Miller & Laura Danner**

Examining Genetic Drivers of Myelodysplastic Syndromes Within Whole Exome Sequences

Mentor: Peter Tonellato, Public Health

Poster Presentation, Easel 160

Myelodysplastic syndromes (MDS) are a group of biologically and clinically heterogeneous malignancies characterized by abnormal division of hematopoietic stem cells. Recurrently mutated genes drive pathogenesis in MDS and are closely associated with clinical phenotype. Research has demonstrated a high frequency and prognostic significance of mutations within 20 targeted genes in patients with MDS. The purpose of this study is to identify mutations within an expanded gene panel in a sample of patients with MDS and to predict

the deleterious impact of mutations within the most frequently mutated genes. We will perform analysis on whole exome sequence samples from 48 MDS patients from the Center for International Blood and Marrow Transplant Research using the Genome Analysis Toolkit version 3.6 best practices model. We will write a script to run the samples, calling variants from 192 genes previously indicated to potentially have a role in MDS pathogenesis. We will analyze single nucleotide variants, insertions, deletions, and structural variants within these coding regions and use SnpEff to annotate the genes and perform preliminary predictions of variant effects. We will perform biochemical pathway analysis on the most frequently mutated genes, using Condel, Provean and Ingenuity Pathway Analysis to refine predictions of the deleterious impact of mutations and structural variants within target genes. Results from this study could deepen understanding of genetic drivers behind the development of MDS and potentially identify novel opportunities for therapeutic interventions by revealing clinically deleterious disrupted biochemical pathways.

**Tessa Miskimen, Lauren Hopkins, Allison Nickel & Jenna Blujus**

Does Oculomotor Capture by a Fear Conditioned Stimulus Depend on Contingency Awareness?  
Mentors: Deborah Hannula, Psychology & Fred Helmstetter, Psychology  
Poster Presentation, Easel 11

Past research indicates that perceptually salient materials capture attention. Recently, we have reported that capture is not limited to perceptually salient items, but extends to materials that are distinctive by virtue of their learned aversive value. In our latest experiment, participants searched for a target stimulus defined by color during a training phase. On a given trial, the target was either red or blue. Participants were told to make a single saccade to the target location and that they would receive a shock if they were too slow. In reality, shock administration was predetermined. Specifically, shock was paired more often with one color than the other (e.g., red = 80% reinforcement, blue = 20% reinforcement). Here, the red circle becomes a conditional stimulus (CS+) and the blue circle a predictor of relative safety (CS-). Subsequently, in a test phase, participants searched for a target defined by shape (e.g., diamond among circles). Occasionally, one of the distractors was either the CS+ or the CS-, but shock was not administered. Results indicated that participants made erroneous saccades more often to the CS+ than the CS-, an effect that was evident even when participants could not report the training phase contingencies. After providing a summary of this work, we will identify some shortcomings of our approach and articulate a plan for a new experiment. One important design change entails trial-by-trial assessment of shock expectancy during the training phase. Previously, contingency awareness was assessed at the end of the experiment using a postexperimental questionnaire. This approach may be insufficiently sensitive to low levels of awareness present during training. As such, we will be able to make

more definitive claims about capture with and without awareness, which is important, as explicit awareness is a lynchpin component of some theoretical perspectives in the fear conditioning literature.

**Halley Minser**

The Effect of Lakeside Proximity on Insect Biomass  
Mentor: Peter Dunn, Biological Sciences  
Poster Presentation, Easel 72

Insect biomass has been declining over the past three decades. We want to know how insect biomass differs between a coastal and more inland location, know how insect biomass differs between a coastal and more inland location, focusing on temperature effects. Data were collected during 2016 and 2017 (April to June) at the Western Great Lakes Bird and Bat Observatory in Port Washington, WI and at the UWM Field Station in Saukville, WI. Insects were collected daily from a suction trap and sorted by size and taxonomy to calculate insect biomass. We did find a difference between insect biomass between the coastal and inland sites. Maximum daily temperature significantly correlated with biomass at both sites in both years. Wind and precipitation effects were found to be nonsignificant between sites. Temperature is predictive of insect biomass in inland and coastal locations. Insect biomass differs between coastal and inland locations as predicted.

**Kwendo Mwaniki**

Microbial Fuel Cell  
Mentor: Marcia Silva  
Civil & Environmental Engineering  
Poster Presentation, Easel 18

Due to the poor levels of sanitation in parts of the earth, waste management is a huge concern. Technologies today recover this waste as renewable energy. A prime example is a microbial fuel cell. It is a device converting chemical energy from organic material, to usable, electrical energy. The device contains two chambers, consisting of an anode and cathode respectively. Separating the chambers is a proton exchange membrane (PEM). The membrane is designed to keep chambers separate and to prevent an additional unwanted flux from the anode. However, the more the membrane is increased, the more resistance and, therefore, less power is generated. Each end of the anode and cathode are connected to an external circuit containing a Titanium wire, which is then connected to an Agilent 3458 A 8 ½ Digit Multi. This device measures voltage, resistance, current, and mostly importantly, power density. Selection of reagents are based mainly on the following: high conductivity, high surface area, and pore diameter. Due to the poor levels of sanitation in parts of the earth, waste management is a huge concern. Technologies today recover this waste as renewable energy. A prime example is a microbial fuel cell. It is a device converting chemical energy from organic material, to usable, electrical energy. The device contains two chambers, consisting of an anode and cathode respectively. Separating the chambers is a

proton exchange membrane (PEM). The membrane is designed to keep chambers separate and to prevent an additional unwanted flux from the anode. However, the more the membrane is increased, the more resistance and, therefore, less power is generated. Each end of the anode and cathode are connected to an external circuit containing a Titanium wire, which is then connected to an Agilent 3458 A 8 ½ Digit Multi. This device measures voltage, resistance, current, and mostly importantly, power density. Selection of reagents are based mainly on the following: high conductivity, high surface area, and pore diameter.

### Huy Ju Mun

Fabrication of Optically Transparent Nanofluidic Channels for Single Molecule Tracking  
Mentor: Jorg Woehl, Chemistry & Biochemistry  
Poster Presentation, Easel 29

“Nanofluidics” can be defined as the study of the behavior, manipulation and control of fluids confined in nanoscale structures in physics and as the design and fabrication of nanostructures involving the controlled movement of fluids in technology. My research purpose is to fabricate an optically transparent nanoscale channel with PDMS walls (polydimethylsiloxane, the most widely used silicon-based organic polymer). This is done by plasma “etching” or modifying the physical properties of the target by plasma, and analyzing interference patterns to determine the flatness of the channel. Previously SU-8 (originally developed as a photoresist for the microelectronics industry) was used to produce the channel, with the purpose of casting a thinner channel, however, the wall material of the channel was amended to PDMS. Manufacturing thin channels ensures that particles remain within the range of focus, allowing one specific molecule to be clearly examined. To fabricate the channel, oxygen plasma etching was introduced. The flatness of the channel was calculated under monochromatic lights (which have a specific wavelength and frequency) with a principle of light interference, especially Newton’s Ring and Air Edges, then the thickness of the channel was accurately measured by 3D confocal laser scanning microscopy. I have succeeded in constructing a nanoscale channel with PDMS by oxygen plasma etching and am still working on studying the efficient etching time for the channel and analyzing the precise roughness of the channels. The ultimate objective of this research is improving technology for the tracking and trapping of micro- or nanoparticles in a micro/nanofluidic device. This research, which is dealing with manipulating nanoparticles, would significantly impact the biomedical device industry, biotechnology, physical chemistry research and “lab-on-a-chip” research.

### Joshua Myszewski

Spectral Feature Extraction and Analysis in Human Electroencephalogram (EEG) Signals  
Mentor: Mohammad Rahman, Biomedical & Mechanical Engineering  
Oral Presentation, 1:20pm, Union 340

Ongoing research is being conducted in the field of Brain-Computer Interfaces for use in technology for the rehabilitation of disabled individuals. These interfaces typically use electroencephalography as it allows individuals with spinal cord injury to control mechanisms despite a lack of muscle tone and control through the use of potential produced by brain activity. This study explores various methods for extracting spectral features from EEG data as electroencephalography has a very poor signal-to-noise ratio which necessitates the use of signal processing methods such as the Fast Fourier Transform and Discrete Wavelet Transform to extract usable and identifiable features, which are then used to train various machine learning algorithms to more quickly identify features and classify the data in the future. This study used various feature extraction methods based on the Fast Fourier Transform and Discrete Wavelet Transform to identify muscular flexion in a healthy adult male patient and assessed the most successful and viable methods. Some methods used were able to achieve accuracy percentages above 75%, with the most accurate (Fast Fourier Transform without summation) reaching 88.2% accuracy in differentiating muscle flexion from a relaxed state. This is a significant finding due to the difficulty of interpreting and classifying a non-linear and non-stationary signal such as those found in electroencephalography, as well as its applicability to the development of systems for assisting in the rehabilitation of the disabled. Additionally, this study explored the use of the Discrete Wavelet Transform in order to identify spectral features in muscle flexion which is a novel method for this specific application of identification that allows for the process of feature extraction and analysis to be completed using less processing power and time, allowing for more robust brain-computer interfaces. The methods explored in this study could allow for notable advances in prosthetics and rehabilitation technology.

### Chelsea Nanfelt, Lilly Luft & Charlie Turchan

Divergent Fates  
Mentor: Yevgeniya Kaganovich, Art & Design  
Visual Art Presentation, Easel 46

A continued exploration of new media, materials, and processes for Professor Yevgeniya Kaganovich’s work with reclaimed plastic bags and wood based materials. Through the development of new techniques, we are assisting Professor Kaganovich in the production of her own work and helping to develop a template for material exploration in a new Art 473 class on the use of reclaimed materials.

**William Neave & Chase Ranicke**

Improved Methods for 3D Printing Magnetostrictive Composites  
Mentor: Chiu Law, Electrical Engineering  
Poster Presentation, Easel 215

This study focused on the production of the magnetostrictive filaments and the 3D printing with them. The research goals were to improve filament quality and magnetostrictive responses by finding more efficient ways for creating filament and developing optimal methods for 3D printing. For the fabrication of magnetostrictive filaments, Terfenol-D (a giant magnetostrictive material) powders were incorporated into an acrylonitrile butadiene styrene (ABS) thermoplastic matrix. The resulting filaments inherited the magnetostrictive properties of Terfenol-D with enhanced mechanical properties of ABS as well as improved alternating current responses owing to the reduction of eddy current by the ABS matrix. A new procedure for producing filament was developed based on lessons learned from previous methods and led to better control of filament properties and a higher success rate of fabricating quality parts with the modified 3D printer. Since the 3D printing process has shown improved magnetostrictive particle alignment, new printing patterns were developed to take advantage of this feature.

**Mark Nosonovsky**

Properties of Underwater Concrete  
Mentor: Konstantin Sobolev, Civil & Environmental Engineering  
Poster Presentation, Easel 12

Underwater concrete is a type of concrete which has properties that make it suitable for use in underwater conditions. Underwater concrete is primarily used in bridge construction as well as in underground tunnels or in water industry structures. Underwater concrete has a specific composition and requires a superplasticizer and a mix stabilizer to minimize the washout effects. To achieve a minimum amount of loss in the concrete ability, underwater concrete should be placed by using the tremie process, which avoids excess water from seeping into the concrete mix. Underwater concrete has a special method of installation which requires using a 20-40 cm diameter pipe to insert the concrete, with the bottom half of the concrete placed underwater to prevent water going back into the pipe. This research study tested the properties of various types of concrete in underwater conditions and recorded data on the properties which were measured. The measured properties included the viscosity of concrete, the density of concrete, the durability of concrete in underwater conditions. The hydrophobicity of the concrete was tested as well as the icephobicity to determine the water resistance of concrete. Two different types of concrete were measured, N-58 concrete and N-64 concrete. SIKA brand concrete was used to test both common variants of concrete. Results of this study show no immediate differences between N-58 concrete and N-64 concrete in underwater conditions, however an expected result is that one type of concrete will have better outcomes than the other.

**Uchechi Nwosu**

Analysis of How B cells Contribute to the Effect of Photobiomodulation Technique in Regards to Multiple Sclerosis  
Jeri-Annette Lyons, Biomedical Sciences  
Poster Presentation, Easel 112

Multiple Sclerosis is an autoimmune disease that interrupts the flow of information within the brain and between the brain and the body. People who are diagnosed with multiple sclerosis are usually diagnosed between the ages of 20-50. Multiple Sclerosis is more common in women, as disease is two to three times more common in women compared to than men. This study aims to explore how B cells contribute to the effect of photobiomodulation. Photobiomodulation is a therapeutic technique showing promise for the treatment of chronic inflammation and neurodegeneration. This study looks at how different light intensities affect the disease in the absence of B cells by measuring the amount of Interleukin-10 and interferon-gamma. The cells in this study will come from the lymphnodes of mice lacking B cells, which are referred to as the B cell knockout mice. The ELISA technique, using a spectrophotometer, will determine the amount of cytokine in cell culture supernatants. The amount of cytokine, as measured by absorbance of light by the spectrophotometer, is directly proportional to the degree of color change in the assay. The higher the absorbance, the higher the amount of IL-10 or interferon- gamma in the sample. With performing light treatment on the cells and comparing old data to new data, the anticipated results should demonstrate that B cells produce the IL-10 with the application of different intensities of light. The real world significance is that the study can express how the photobiomodulation technique decreases disabilities in Multiple Sclerosis patients, resulting in an improvement in the quality of life.

**Danielle O'Hagan**

Development of a Novel Porous Material for Removal of Ammonia from Water  
Mentor: Marcia Silva, Civil & Environmental Engineering  
Poster Presentation, Easel 122

Today's commercial fertilizers can cause stress on the environment, particularly stress on aquatic life when certain contaminants leach into the water ways. There are various ways ammonia can enter the aquatic environment, such as runoff from agricultural lands, nitrogenous wastes from animals, and municipal discharges among other things. Current methods of ammonia filtration can be costly, which causes a need for a new method to be developed. The focus of this research is on engineering a novel porous material for the removal of ammonia, which would be suitable for today's industries. The possible applications of a successful material would be in agricultural situations and municipal discharging.

**Danielle Olsen & Razan Assad**

Exploratory Study of Breast Cancer Risk Perceptions and Risk Management Among African American Women in S.E Wisconsin: Because Pink is Not the Only Color Associated with Breast Cancer  
Mentor: Sandra Underwood, Nursing  
Poster Presentation, Easel 79

While the burden of breast cancer borne by Black women is known to be significant, little is known about the perception and management of breast cancer risks in Black women. A study was therefore undertaken to: assess the breast cancer risk perceptions of Black women; assess the degree Black women discuss breast cancer risks and breast cancer risk management with their healthcare providers; assess the receptivity of Black women to breast cancer risk management interventions; and, their breast cancer screening risk management and screening practices of Black women. The study was undertaken using a cross-sectional comparison group design. Survey data reflective of breast cancer perceptions, family health history, health risk communication, breast cancer screening and breast cancer risk management practices were collected from a purposive sample of 800 Black women engaged in health-related and social service programs within S.E. Wisconsin using a 40-item investigator designed survey tool. Data were analyzed using descriptive statistics and inferential statistics. The Extended Parallel Process Model was used to guide the study design. While more than 75% of the Black women surveyed were assessed to have an increased risk for developing breast cancer, data analyses revealed significant deficits/gaps relative to their perceived risk, provider assessed breast cancer risk appraisal and recommendation relative to breast cancer risk management. When queried about the use of interventions to reduce risk if they were at increased risk for developing breast cancer, 87% expressed an interest in learning more about pharmacologic, surgical and behavioral breast cancer risk management interventions and clinical trials. Given the current science and the availability of evidence-based breast care, significant reductions in breast cancer morbidity and mortality among Black women should occur. However, this will only become a reality if education and outreach are strategically targeted to women who are at risk, in need and underserved.

**Ryan Olson**

Cadmium Arsenide: Alloyed Semiconductor Quantum Dots and Crystals - Fabrication and Electrical Properties  
Mentor: Nikolai Kouklin, Electrical Engineering  
Poster Presentation, Easel 104

Primarily focusing on carrying out vapor-transport growth and in-situ doping Cadmium Arsenide materials including thin films and bulk crystals. The fabricated samples are then subject to various tests including FTIR, PL, RAMAN, transport and other low-noise I-V measurements. The research also includes pre-fabricated Cadmium Arsenide alloyed semiconductor Quantum Dots in which are also subject to the same tests. Main

intention of the research is to gain insight into the crystal structure and electronic properties of Cadmium Arsenide samples and gain hands-on experience in the emerging area of topological insulators/new generation of quantum materials and their characterization.

**Pilar Olvera**

Promoting Positive Mental Health: The Protective Role of Education and Social Support in Reducing the Impact of Childhood Adversity  
Mentor: Colleen Janczewski, Social Work  
Poster Presentation, Easel 109

Numerous studies have shown a strong relationship between exposure to adverse childhood experiences (ACEs) and negative health, social, and behavioral outcomes throughout the lifespan. Although the effects of childhood adversity are well documented for negative mental health outcomes, less is known about its influence on constructs of positive mental health. The current study examines ACE's effect on two mental health outcomes: anxiety and positive well-being. Moreover, we examine whether social support and education attainment operate as protective factors to reduce the impact of ACEs on anxiety and positive adult well-being. The data is collected as part of the Wisconsin Alternative Response Project, which is an evaluation of the Child Protective Services (CPS) system in Wisconsin. The sample consists of 400 CPS-involved caregivers. First, the sample will be described using prevalence and means of study measures. We will then examine the relationship among ACEs, anxiety and positive well-being. Finally, we will conduct a mediation analysis to determine if education and social support mitigate the influence of ACEs on the study outcomes, while accounting for participant characteristics such as race, gender, and age. Preliminary results indicate that 35.0% of CPS respondents experienced four or more ACEs. ACEs were significantly associated with anxiety ( $r = .32, p < .01$ ); positive well-being ( $r = -.16, p < .01$ ) and social support ( $r = -.22; p < .01$ ), but not education. Social support was associated with anxiety ( $r = -.283, p = .01$ ) and well-being ( $r = .33, p < .01$ ) whereas education was only associated with well-being ( $r = .23, p < .01$ ). Mediation results are forthcoming. These findings suggest that education and social support intervention early in the life-course may lessen the impact of ACEs on adult mental health.

**Samuel Orlowski**

How Brazilian Municipalities Have Responded to Domestic Violence  
Mentor: Natasha Sugiyama, Political Science  
Poster Presentation, Easel 177

Women in Brazil have suffered from domestic violence for a long time but have made great strides as a nation moving closer towards gender equality. A law in particular was an important step for women's rights in Brazil that is named after a women's rights activist who's husband tried to murder her twice, leaving her paraplegic. The Maria da Penha law was made to reduce violence against women in

Brazil. The law also increased the punishment for those who commit domestic violence, created processes of removing the abuser from the home, and has the potential to issue restraining orders against offenders. The law was implemented in 2006 which leads to the question of how have Brazilian municipalities responded to the issue of domestic violence? While the law is national, the numerous resources that provide information and support to women are decided by local municipalities themselves. Brazilian municipality decisions on whether or not to provide these services are affected by many factors such as the political affiliation of the gubernatorial leadership, presence of women's rights groups, existence of a women's council, and their state capacity. Based on interviews of civil society and municipal leaders I found that civil society is an important aspect of women's rights because providing access to information to these women get them more involved, which can contribute to more resources being allocated to women's issues within the municipality. I also found that councils are important because they allow women to participate and provide local knowledge of the situation providing the councils the information they need to make real changes in these women's lives. State capacity was significant but showed that economic wealth doesn't necessarily mean that the municipality is adequately providing for those suffering domestic abuse.

#### **Emily Ortega**

Novel "Green" Solvents for the Removal of Toxic Dyestuffs from Wastewater  
Mentor: Mark Dietz, Chemistry & Biochemistry  
Poster Presentation, Easel 124

Dyestuffs constitute one of the most significant sources of water pollution. Of the more than one million tons produced worldwide each year, more than 10% is ultimately either discharged directly to the environment or lost during the coloration process. Most dyes are both toxic to aquatic life and not readily biodegradable, and as a result, there has long been interest in processes by which they can be removed easily and inexpensively from aqueous waste streams. Most commonly, dyes are adsorbed onto a solid support such as activated carbon (e.g., charred coconut husks). While effective, this approach can result in the generation of a new waste stream, namely, dye-laden sorbent. To avoid this, regeneration of the sorbent is required, but this can be time-consuming, difficult, and expensive. Solvent extraction, in which an aqueous solution of the dye is contacted with an immiscible organic solvent into which the dye can partition, has also been proposed as an approach to wastewater treatment. Most conventional organic solvents, however, are unacceptably toxic and/or volatile. In this work, we have investigated the use of a comparatively non-toxic ("green") alternative, butyl acetate (BuOAc), as an extraction solvent for dyestuff removal from water. Our results indicate that for certain dyes, solvent extraction with BuOAc may represent a viable alternative to adsorption-based methods for dye removal. In particular, efficient dye extraction and facile back-extraction (i.e., stripping / recovery) can be achieved by proper choice of aqueous phase conditions.

#### **Olivia Overturf, Jenna Marti & Josh Passon**

The World After Us  
Mentor: Nathaniel Stern, Art & Design  
Poster Presentation, Easel 111

This series of new media sculptures materially speculate on what our devices – phones and tablets, batteries and displays, etc – might become, over thousands or millions of years. Through research, experimentation, and craft, our team has tried (and failed) to turn phones into crude oil, coal, or other fossil fuels – and plan to put the results on exhibit, in beakers and tubes. We attempt to mimic geological time, as pressure and heat – through chemical interactions or specialized machinery – on laptops and tablets, and will display where that potential lies, as petrified-like LCDs or mangled post-exploded batteries, on pedestals in a gallery. We turn "dead media" computers into efficient planters for edible goods, food for mold, or seeds of their own growth – and show both those experiments, and their results, as images, videos, and sculptural forms. We have also turned ground phones into usable supplies, for example color for ink and pulp for paper, and put these to use in these new forms, as fine art prints. It is impossible for humans to truly fathom our planet on an Earth scale, or conversely from the perspective of bacteria. But we can feel such things, through art and storytelling – making our aesthetic encounters both conceptually and ethically vital toward new futures. At stake, whether in our everyday interactions or on a larger scale, are the (digital) relationships between humans and the natural world on the one hand, politics and commerce on the other.

#### **Nisrit Pandey & Kevin Slezak**

Mechanical Work And Recrystallization Zone on Centrifugally Cast Alumina-Forming Alloys Designed for Coking Resistance  
Mentor: Benjamin Church, Materials Science & Engineering  
Poster Presentation, Easel 181

In the petrochemical industry, hydrocarbons are cracked at very high temperatures to produce ethylene gas and other products. Steel alloys used in the pipes and cracking reactors need both superior corrosion and creep resistance as well as coking resistance. Recently, studies have shown that alumina-forming austenitic stainless steels have superior oxidation resistance making them suitable for a wide range of energy production, chemical, and process industry applications. A series of alumina-forming alloys produced via centrifugal casting process were received as sections of pipe. Following horizontal centrifugal casting, the cast tubes were pull-bored to machine the inner diameter. The inner diameters of the tubes were pull bored and the outer diameter was left in the as-cast condition. This production process used is identical to that used to produce production tubes for ethylene service. The project involves the analysis of the near-surface hardness and understanding if the boring (machining of the ID) is imparting cold work to the material that would potentially provide the means for

recrystallization near the ID of the tube. Samples were annealed at 500°C and 1000°C and compared to the as-cast pipe section alloy. Nanohardness tests were done to evaluate mechanical work on the inner diameters of the pipes during boring process as well as optical microscopy study of the recrystallization zone after heat treatment process to better identify corrosion-prone regions.

#### **Brandon Patterson**

Engineering Enzymes Involved in Non-Ribosomal Peptide Antibiotic Synthesis  
Nicholas Silvaggi, Chemistry & Biochemistry  
Poster Presentation, Easel 220

#### **Kathryn Pecha**

Monitoring Reverse Osmosis Water Filtration Systems  
Mentor: Professor Nathan Salowitz, Mechanical Engineering  
Poster Presentation, Easel 80

According to the World Health Organization, 2.1 billion people lack access to safe drinking water. Reverse Osmosis (RO) water filtration is one of the most effective technologies to purify water, even capable of desalination. Reverse osmosis water filtration systems apply pressure against osmosis pressure to pass water through membranes, removing contaminants. Flow sensing is an important measure to determine the efficiency of the filtration system. In our research on Monitoring Reverse Osmosis Water Filtration Systems, an orifice plate was created to fit within a pressure vessel at the end of a filter element. The orifice plate was laser cut out of acrylic with small holes to create a pressure difference in the water flowing through it. Cantilever beams cut in the plate were mounted with strain gauges which are used to back calculate pressure drop across the orifice plate. The calculate pressure is related empirically to flow rate. Testing of smaller orifice plates in smaller pipes led to the evaluation of the efficiency of using an orifice plate and strain gauges for flow sensing.

#### **Frank Pellegrini**

Protein Purification and Cation Exchange Protein Chromatography for Cytochrome C55<sub>4</sub>  
Mentor: Arsenio Pacheco, Chemistry & Biochemistry  
Poster Presentation, Easel 21

Cytochrome C554 is a naturally occurring monomeric protein that has 4 c-type hemes. C554 is an electron transport protein that has been reported to also have the ability to reduce nitric oxide to nitrous oxide. The bacterium *Nitrosomonas europaea* uses C554 as part of its pathway for fixing ammonia to nitrite. C554 is being studied in Dr. Pacheco's lab in conjunction with other proteins (HAO, ccNIR) that are also used in ammonia-nitrite interconversion by various bacteria. Being able to purify and optimize purification to obtain a high-yield of C554 is of high priority so that further studies can be done.

#### **Elizabeth Pempek**

The Baby Box Study  
Mentor: Jennifer Doering, Nursing  
Poster Presentation, Easel 61

In Milwaukee, African American babies die at a rate 3 times higher than white babies. The second leading cause of infant death is unsafe sleep. One proposed intervention to minimize unsafe sleep being used by several health systems and public health agencies is baby box distribution. The objective of this study is to explore the perception of baby boxes by caregivers of infants in Milwaukee and the surrounding area. This descriptive study recruited a convenience sample of participants who met the following inclusion criteria: 1) caregiver of an infant 0-12 months, 2) living in Wisconsin, 3) currently have a baby box. Potential participants were recruited via social media and recruitment flyers placed in baby boxes distributed by hospitals and agencies. Surveys questions were asked by phone and using an online Qualtrics link. Data collection is ongoing. To date, participant caregiver demographics include a mean age of 28 years (range 17 to 38), 14 years of education, and 50%white/43% African-American/33% Hispanic/7%unreported. Descriptive statistics and content analysis were used to analyze the data. All caregivers were mothers who reported receiving the box from Hospitals (25%), community center or neighborhood agency (18.75%), health department (6.25%), home visit (6.25%), as a gift (25%), or through personal purchase (6.25%). When asked where caregivers would have placed the infant had a box not been available 30 % said 'crib' or 'bassinet', 26% 'play yard', 8% 'in an adult bed with parent or another person'. 79% of participants reported that their babies are currently still using the baby box and 21% reported that their babies stopped using the baby box at an average of four months. Overall, baby boxes seemed to be positively received. Further research is needed to identify the effect of the baby box on safe sleep practices.

#### **Annie Peterson, Katelyn Altmann & Kelsey Lee**

Body and Place: Between The Form and Formlessness of Objects and Desire  
Mentor: Maria Gillespie, Dance  
Performing Arts Presentation, 12:40pm, Union Cinema

Human experience is provoked by the body's relationship to external structures and to space. Our project explores this ever-present relationship. We are interested in the negotiation between the body and the environment that occurs when navigating through space; both where and when relationships are formed between architecture and humans to create place. Exploring the paradigm of the moving body as it exists in space, while it is space itself, we intend to discover the possibilities of confinement and space, as well as how desire is constructed between the body and space. Through interdisciplinary collaboration, we are integrating the moving body with sculpture, architecture, and sound technologies to explore corporeality as it is performed, perceived, and consumed. This project deconstructs space through movement that interacts with sculpture, sonic, and spatial gestures to rescript through the body, space, and environment.

**Kim Phan**

Impact of Centering Pregnancy  
Mentor: Teresa Johnson, Nursing  
Poster Presentation, Easel 83

In 2016 Wisconsin's infant mortality rate was higher than the United States average. In 2011-2013, Racine, an urban community located in Wisconsin, had one of the highest infant mortality rates for Black infants in the state. The Black infant mortality rate in the county was 3x the national average. In response to this, a community-wide effort was made to reduce prematurity and infant mortality of Black infants. The purpose of this project is to increase breastfeeding initiation rates and decrease premature births, which is the leading cause of infant mortality, to improve outcomes in this community. The Centering Pregnancy model has strong theoretical underpinnings. The life course theory is used to explore the impact that group model intervention has on reducing risks of infant mortality through promotion of healthy birth outcomes through education and support among pregnant and parenting women and their families. CenteringPregnancy is a group model of prenatal care that teaches women the basics of taking their own blood pressures, weight, and recording the findings. After individual examinations, participants engage in group discussions of a wide range of pregnancy, childbearing, and parenting topics. Providing support for at risk women to exclusively breastfeed their infants in the context of complex lives and work environments is a way to help reduce infant mortality among at-risk populations. The breastfeeding initiation rate increased to 89.5%. Changes in study participants knowledge about pregnancy significantly changed in a positive direction. There have also been significant decreases in premature and low birth weight babies. Comparing CenteringPregnancy site specific results through well-formulated and rigorously conducted research are essential to develop this body of knowledge for multiple populations and communities.

**Sarah Philippi**

The Role of APOE Genotype, Sex, and 17 $\beta$ -Estradiol in Memory Consolidation in a Mouse Model of Alzheimer's Disease  
Mentor: Karyn Frick, Psychology  
Oral Presentation, 12:20pm, Union 260

The APOE4 genotype is the leading genetic risk factor for Alzheimer's disease (AD), and women APOE4 carriers are more likely than women who carry other APOE genotypes and men of any APOE genotype to develop AD. APOE4 status, combined with estrogen loss after menopause, places women at greatest risk of developing AD. Our lab and others have previously shown that the potent estrogen 17 $\beta$ -estradiol (E2) enhances memory in young and aging female mice. However, the interactions among APOE genotype, sex, and estradiol are not well characterized. To address this issue, two studies were performed. First, to examine effects of sex and APOE genotype on memory, 6 month-old gonadally-intact male and female expressing 5 familial AD mutations

(5xFAD-Tg) and gonadally-intact male and female expressing 5 familial AD mutations (5xFAD-Tg) and human APOE3 (E3FAD) or APOE4 (E4FAD) were trained on object recognition (OR) and object placement (OP) tasks to test object recognition and spatial memory formation. In both tasks, male E3FAD mice exhibited intact memory, whereas E3FAD females and E4FADs of either sex did not, suggesting preserved memory function in E3FAD males relative to females, and impaired memory in E4FAD mice of either sex. To test the extent to which E2 mediates memory consolidation in E3FAD and E4FAD females, ovariectomized female E3FAD and E4FAD mice were trained in the OR and OP tasks as above. Mice received a post-training infusion of E2 into the dorsal hippocampus and then memory was tested after a 4 or 24 hour delay. Preliminary data indicate that E2 may enhance object recognition memory in E3FAD females but not E4FAD females. Future studies will characterize the effects of APOE genotype, sex, and E2 treatment on hippocampal cell signaling and dendritic morphology.

**Anthony Pierson**

Effects of Bicycle Tire Pressure on Performance  
Mentor: Andrew Dressel, Mechanical Engineering  
Poster Presentation, Easel 13

The goal of this research is to determine how tire inflation pressure effects the performance characteristics of a mountain bike tire. Thoughts on inflation pressures vary throughout the bike community and the data collected from this research will give riders of all skill levels a solid guideline. The data will be collected on a treadmill like device where the tire will be fixed in place but, allowed to spin as a normal tire would. The angle of the treadmill, slip angle, will be varied about the vertical axis to  $\pm 5^\circ$ . This change in slip angle will produce a lateral force as well as a torque that will be measured. This will be the first part of the experiment. The second part of the experiment will be to vary the camber angle of the tire and measure the resulting lateral force and the torque created. The raw data collected during the full run will be transferred into MATLAB to create graphs, as well as a log of the run. After the testing is complete, we hope to see a trend in the tire inflation pressures and the performance of the tire

**Geethika Pillai**

Longitudinal Study of Problem Behavior in Children with Neurofibromatosis-1  
Mentor: Bonita Klein-Tasman, Psychology  
Poster Presentation, Easel 200

Neurofibromatosis type 1 (NF1) is a neurocutaneous condition that can potentially affect the brain, spinal cord, nerves and skin. Children with NF1 often have more difficulties with social-emotional functioning than typically developing children. Previous studies have suggested that school-aged children with NF1 have more problem behaviors than typically developing children. However, studies examining preschool-aged children

with NF1 have found similar levels of problem behavior as same-aged peers. Currently there are no longitudinal studies of problem behaviors in children with NF1, which may help us to better understand changes in problem behaviors over time. In the current study, a longitudinal examination of problem behaviors will be conducted to evaluate changes in problem behaviors from early childhood (ages 3-7) to the school-aged years (ages 9-13). The Behavior Assessment System for Children, Second Edition (BASC-2) was completed by parents to assess problem behaviors. The Internalizing, Externalizing and Total Problems scales on the BASC-2 were analyzed for 26 children at both time points. To Problems scales on the BASC-2 were analyzed for 26 children at both time points. To examine changes over time, correlational tests and paired samples t-test will be performed. Based on previous research, increased problem behaviors from the preschool to the school-age years are expected. Further understanding of problem behaviors in children with NF1 is vital as previous studies have indicated that children with NF1 who have greater internalizing and externalizing problems also have an increased risk of difficulties in school and poorer adaptive functioning.

#### **Mia Pillar**

Determination of Cathinones at Low Levels in Forensic Samples: Development of a Novel Flow-Injection  
Mentor: Joseph Aldstadt, Chemistry & Biochemistry  
Poster Presentation, Easel 201

The focus of my research is to develop a new method for measuring amphetamines. Specifically, we are studying cathinones, known as "bath salts" in popular culture. Flow Injection Analysis (FIA) and Nuclear Magnetic Resonance Spectroscopy (NMR) are the primary instruments that I am studying. In addition to learning about basic laboratory skills, I am learning about how to optimize the experiments to determine trace amounts of cathinone simulants in "street" samples. Cathinones can differ from each other by only small changes in their molecular structures, and are therefore problematic as "designer drugs". Hence, this type of illicit drug is ever-changing in an attempt to avoid identification from law enforcement, and there is thus a need to identify the different kinds of cathinones that are constantly being produced. I plan on using FIA, which is an automated, flow-based, kinetic technique, to measure the species of interest. Following my research on FIA, I will use NMR as an integral part in the identification of the specific molecular structures of the various cathinones. FIA is my first priority, and I am gaining a better understanding of the instruments being used to subsequently develop modifications of the basic methods that will lead to more rapid, sensitive, and selective quantification of the various cathinones.

#### **Nora Plant**

Archival Research and Metadata Collection  
Mentor: Tami Williams  
Poster Presentation, Easel 82

As the cinematic world continues to change and

advance in almost all aspects of the word, the means of preserving and achieving a deeper understanding must progress and transform with the time as well. The foundation of connection and networking that Domitor (the International Society for the Study of Early Cinema) and the Media Ecology Project thrives on is one that bids great success to all those who concern themselves with the importance of archiving. Domitor and the Media Ecology Project were started to collect films from the origin of film history and take advantage of the collaboration and engagement of archivists, researchers, professors, and students from all over. I began work researching archives and head archivists that had significant holdings on early cinema to invite them to contribute to the expanding network that is Domitor. Not only did this expose me to archives from around the world, but also incited my research and networking abilities. During my work with the Media Ecology Project, I was fortunate enough to be able to annotate and collect metadata on films from the early 1900's starring one of the first actresses to have a certain star power: Florence Lawrence. I was given the task of solely following Florence Lawrence's movements and actions in each shot. Through the compiled work of the many professionals on the various aspects of the films, a deeper analyzation and understanding can be achieved concerning the significance of Florence Lawrence and of the films overall. In addition to my digital work, I was invited to help with the 16mm film collection given to our department which was in need of repairs and improved preservation. Through my work in digital collections, comparative analysis, and restorative archiving, the history and understanding of film gains even more significance.

#### **Mark Poe**

Probing the Interstellar Medium by Monitoring  
Millisecond Pulsar Brightness  
Mentor: Joe Swiggum, Physics  
Poster Presentation, Easel 190

This research relies on the detection of radio signals emitted from millisecond pulsars, incredibly dense neutron stars that beam light from their magnetic poles as they spin hundreds of times per second. These signals are detected as regular pulses, corresponding to a pulsar's emission region regularly crossing our line of sight as it spins. The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) works to examine millisecond pulsar (MSP) signals in order to detect gravitational waves from a variety of sources, using large radio telescopes in West Virginia and Puerto Rico. The purpose of building the MSP flux density (effective brightness) database is to look for underlying distributions in the flux densities due to the signals' interaction with the ISM. To run the analysis, I pulled data from NANOGrav's database to construct my own for a subset of the MSPs. In addition to examining the structure of the ISM, these data also hold strong potential to be used for millisecond pulsar modeling and simulations. In this study I developed models for 10 millisecond pulsars' underlying flux distributions.

**Nikolaus Prusinski**

Galactic-Scale Star Formation-Driven Outflows at 1

Mentor: Dawn Erb, Physics

Poster Presentation, Easel 172

Intense star formation in galaxies results in powerful, galactic-scale outflows of gas. Because stars form from gas, these outflows have a strong effect on the evolution of galaxies, but the intricacies of the process are still unknown. We investigate the connection between galactic outflows and the structure of galaxies using two independent data sets covering a sample of galaxies between  $1 < z < 1.5$ . The Wide Field Camera 3 grism on the Hubble Space Telescope (HST) provides high spatial resolution spectroscopy yielding maps of the extent and strength of star formation, while absorption line spectra from the Keck Telescope at Mauna Kea provide the intensity of and velocity of the outflows. We present the correlations between star formation rate and outflow velocity, and how the outflow properties relate to the structure of the galaxies.

**Cierra Puls**

Descriptive Geometries

Mentor: Kyle Reynolds, Architecture

Poster Presentation, Easel 95

The primary purpose of this research project, titled “Descriptive Geometries” is to produce clear and concise diagrams and instructions demonstrating how to utilize descriptive geometry techniques in architectural drawings and projects. Descriptive geometry can be defined as a set of drawing methods which allow architects to depict complex forms in 2-dimensions. There are two phases to this research project, the first of which involves researching older, existing books which utilize descriptive geometry techniques and translating them into new diagrams which demonstrate how those techniques work and how to use them in an up-to-date manner. The second phase involves showing, through drawings, how those methods can be used in contemporary architecture. This research is important because descriptive geometry techniques are incredibly relevant in contemporary architecture and modern computer programs. However, there are no recent books or publications which explain how to implement these techniques in a contemporary manner. Eventually, the drawings and diagrams I produce will become part of an architectural publication which will clearly demonstrate how to do so, benefitting both architectural students and professionals alike.

**Atreyei Ray**

New Assays to Analyze the Thermodynamics of RNA

Binding to Enzymes that Remove RNA Caps

Mentor: David Frick, Psychology

Poster Presentation, Easel 187

Recently, the cofactor nicotinamide adenine dinucleotide (NAD) has been reported as a covalent modification of bacterial RNA. Given the central role of NAD in redox biochemistry, posttranslational protein modification and signaling, its attachment to

RNA indicates that there are unknown functions of RNA in these processes and undiscovered pathways in RNA metabolism and regulation. Analogous to a eukaryotic cap, 5'-NAD modification is shown *in vitro* to stabilize RNA against 5'-processing by the RNA-pyrophosphohydrolase RppH and against endonucleolytic cleavage by ribonuclease (RNase) E. This is where the nudix phosphohydrolase NudC plays an important role to decap NAD-RNA and thereby triggering RNase-E-mediated RNA decay. Nudix enzymes hydrolyze phosphoanhydride bonds linked to nucleotides. One subclass of Nudix enzymes cleaves dinucleotides to yield two nucleoside monophosphates. The prototype enzyme of this Nudix subclass is the product of the *E. coli nudC* gene (aka NudC or Orf257), which has been previously shown to cleave NAD(P)H, NAD(P)<sup>+</sup>, ADP-ribose, AppA, and NAD-capped RNA. Nudix hydrolases have been known to co-purify with nucleic acids. In this study, we have developed novel assays to analyze the thermodynamics of RNA binding to NudC, by proving that NudC binds to both single stranded and double stranded oligomers using techniques like fluorescence spectroscopy and native gel electrophoresis.

**Joshua Reed**

Microstructural Analysis of Centimeter Scale Shear

Zones Within the Grassy Portage Sill, Ontario, Canada.

Mentor: Dyanna M. Czeck, Geosciences

Poster Presentation, Easel 51

The Grassy Portage Sill (GPS), located in the Rainy Lake region of northwestern Ontario, is an approximately 2.7 billion year gabbroic intrusion that was caught within a major deformation zone related to granite-greenstone terranes formation. Deformation in the GPS was localized into some prime examples of local (cm scale) shear zones. Understanding the microscopic structure and mineralogy of these shear zones will provide a better understanding of shear zone dynamics. The Rainy Lake region is bounded by the Quetico Fault to the north which runs mostly east west, and the Rainy Lake – Seine River Fault to the south which runs diagonal of the Quetico Fault. Past research in the Rainy Lake Region show complex structural dynamics within the area of interest and show a overall dextral (right-lateral) zone with a component of shortening. Of interest to us are the localized shear zones, and as such we are analyzing a small scale shear zone within a previously recovered sample of a metagabbro from the Grassy Portage Sill. The shear zone of interest is approximately 1 cm in width and shows strong mineral banding inside the zone with isotropic mineral fabric outside of the shear zone. Fabric is the preferred orientation and alignment of the mineral crystals that make up a rock. Our sample was prepared into petrographic thin sections that span the deformation from outside the shear zone gradually into the deformed shear zone. Mineral abundance and microstructural features of the samples can be identified through thin section analysis. Comparing the mineral composition from one thin section to the next across the deformation gradient will indicate how the mineralogy and fabric of a rock reacts during shear zone formation.

**Jeriney Rhone**

Online Community Building Among People on the Autism Spectrum

Mentor: Celeste Campos-Castillo, Sociology

Poster Presentation, Easel 213

This study is looking at how online communities for people on the autism spectrum, specifically YouTube, can be a place of comfort. People should care about this because these communities can negate some of the stigma felt by people on the autism spectrum. By providing comfort, online communities serve as a support group of sorts for stigmatized individuals. To do this, videos are chosen and the comments are placed into excel sheets and then coded for themes by two research assistants. After this, we look for discrepancies in our coding and resolve those before finalizing the sheets. Some patterns we have been seeing in the comments of these videos are that other autistic people appreciate seeing other's like themselves on these types of platforms. Another pattern is people who have kids or loved ones who have autism and are using these videos to learn more about the topic. The videos are mostly people with autism sharing their experiences, which can validate experiences of other people who may not have the social skills to seek out others like them. While there still is a fair amount of trolling, the majority is people who themselves are on the autism spectrum complimenting and sharing their experiences. These patterns show that there is some community-building going on within these YouTube comments, which seems to show that these spaces can be good for people on the autism spectrum.

**Mark Richter**

Computer Based Strategies for Measuring Visual Connectivity and Spatial Integration of Building Layouts

Mentor: Brian Schermer, Architecture

Poster Presentation, Easel 17

I am working with Professor Brian Schermer through the School of Architecture and Urban Planning, to develop a computer based strategy for measuring ideas around visual connectivity, integration, and step depth. In addition, I have been making comparisons in relation to spatial qualities of particular building types. My primary focus is on the development of student unions. This is because there is an immense amount of people who use the union, and large amount of destinations within this particular building type. Using the 3D visibility graph analysis program, I have made connections and began to discover important destinations within the student unions. With unions being so large and complex, I have been figuring out how to make unused, and sometimes limited spaces, a more aware and important destination for students.

**Diana Rivera**

The Relationship Between the Structure of the Healthcare System and Health Inequalities: A Comparative Analysis of 21 Developed Countries

Mentor: Mustafa Hussein, Public Health

Poster Presentation, Easel 10

According to the World Health Organization, a health system is itself a social determinant of health. In other words, a health system can mold health differences within a population depending on its organizational structure in regards to the degree of public or private intervention. When there is a higher degree of public intervention, the health system structure tends to implement mechanisms that ensure a more egalitarian access to healthcare services e.g. universal access and financial protection to groups with lower socioeconomics. When there is a higher degree of private intervention, the health system tends to implement market-based solutions. This intervention requires that most individuals finance their healthcare services by purchasing private health insurance plans which can be unaffordable to certain groups. Thus, the implementation of different mechanisms influenced by the health system structure can mitigate health inequalities between the more disadvantaged groups. However, evidence that addresses if the type of health system structure can be a driver for health inequalities remains scarce. Therefore, the purpose of this research project is to find the relationship between the health system structure and health inequalities by income. Addressing this question can contribute to the improvement of the health systems across different countries and develop mechanisms that can mitigate health inequalities among different social classes. The plausible health system types according to Bohm et al are National Health Services (NHS), National Health Insurance (NHI), Social Health Insurance (SHI), Etatist Social Health Insurance (ESHI), and Private Health Insurance. Inequalities in health status were measured by income tertile (low/medium/high) and the health status was self-reported on a scale from 1 (poor) to 5(excellent). The data was retrieved from the International Social Survey Program's 2011 for 21 OECD developed countries. Our results show larger health inequalities by income in the Private Health Insurance, gradually decreasing to the NHS, ESHI, SHI, and NHI. Except for the NHS, the results show a tendency for smaller health inequalities when there is a higher public involvement in healthcare regulation and financing. Further research concerning the effects of the health systems engendering health inequalities and addressing the NHS's particularity will be needed.

**Maxwell Rodencal**

Learning Through Making: Simulation of Building Physics for Beginning Design Students

Mentor: Alex Timmer, Architecture

Poster Presentation, Easel 19

Although concepts such as form, proportion, sequence, and hierarchy have been introduced and learned by aspiring architects since as long as we can remember, there is little to no exposure to how we, as designers can think about atmosphere. This research is being done in order to develop a methodology in which students can learn about such concepts through experimentation and scaled built models that demonstrate the soft architecture

of a space. The process starts with designing building sections on a 3D designing software. These are then converted into 3D printed sections and tested as well as photographed. Once photographed, these are then edited and laid out through another editing software. Based on the research conducted so far, a methodology has been created in which students would be able to explore these ideas of air movement and flow. This research is extremely important because it can be used to help students understand and design using deeper thinking. These sections although extremely simple, are indeed very helpful tools to understand how one can design with airflow and simple building physics in mind.

#### **Augustine Rouamba**

Learning Cultural Safety and Humility Through An Inter-Professional Study Abroad Student Experience In Kenya

Mentor: Peninnah M Kako, Nursing  
Poster Presentation, Easel 212

In a globalized world, there is increasing need for professional students including nursing students to learn how to effectively work with persons of different cultures. In health care, there is increasing diversity in patient populations making the skill of cultural humility a necessity for culturally safe care. The purpose of this qualitative descriptive study was to evaluate the role of a short term inter-professional study abroad program in facilitating beginning awareness of cultural humility among 21 students from health care fields who took part in a short-term study abroad experience in Kenya. Methods: For this qualitative descriptive study, students taking part in a short-term study abroad focused on Community Health in Kenya were invited to take part. All 21 students agreed to participate. Prior to commencing the study approval was obtained from University of Wisconsin-Milwaukee IRB and study was approved as exempt. Class assignments of three staged self-reflection summaries, community teaching project evaluations, teaching observation field notes, and end of class standard course evaluation comments were analyzed to discover how students applied concepts of cultural attunement to learn cultural humility while interacting with communities of a different culture in a culturally safe manner. Thematic content analysis was used for data analysis. Through an iterative process, researchers coded and validated themes emerging from the data. Findings: From the students' reflections, community teaching project self evaluations, and end of class comments, students narrations spoke to all the aspects of cultural attunement. Students acknowledged the pain of oppression, acted with reverence, reported coming from a place of "Not Knowing, Engaged in acts of humility, engaged in mutuality, and reported attaining harmony, cooperation, and accord during the study abroad experience. The findings suggest that short-term study abroad experience where students engage with the community can be a valuable tool for beginning stages of becoming culturally humble. Attaining cultural humility is critical in providing culturally safe health care for diverse

populations stemming health care disparities.

#### **Valerie Rubalcava & Kelli Zeleski**

Innovation in Energy Storage Technologies: An Economic Analysis

Mentor: Itziar Lazkano, Economics  
Poster Presentation, Easel 91

Scientists and policy makers identify energy storage as a key solution to curbing greenhouse gas emissions that arise from burning fossil fuels. In this paper, we explore the economics of energy storage technologies. Specifically, we ask the following research questions. Which countries lead innovation in electricity storage technologies? What are the innovation trends for these technologies, and what motivates their invention? We study global patent data from 1963 to 2016 to answer these questions. We also use storage technology patents to observe trends in the most prevalent storage technology types. We identify current available storage technologies using engineering articles related to renewable, fossil fuel, and storage systems. Overall, we find that Japan is the most innovative country. In addition, we find that batteries have the most stable upward trend between years 1990 to 2010. Our analysis of energy storage innovation is helpful to professionals in a range of fields interested in directing public policies and research efforts towards more innovation and deployment of storage technologies.

#### **Rebecca Rubenstein**

Refugee Resettlement Study  
Mentor: Ken Jackson, Sociology  
Poster Presentation, Easel 89

This study aims to learn more about how residents with refugee background end up in their new home in Wisconsin, how they fare after resettling here, what factors help to predict their level of success in resettlement, what services from local organizations are most important and what gaps exist. Information from this study will help local resettlement partners provide better service to residents with refugee background, and help the people from our research sites to better understand the realities of life for people who have experienced forced migration and resettlement. After getting in contact with participating local refugees, the participants complete a pre-interview survey online, face-to-face, or in writing. Next, they are interviewed by members of the team in an open-ended style either online or in-person. If they choose to continue, they are given a camera and asked to take pictures based off a series of questions and then interviewed in a similar fashion about their photographs. Lastly, this information is coded into more measurable data to be reviewed and analyzed by researchers and published. The study will continue interviews until June 2018.

**Emily Ruder**

Throat Color Variation in Male and Female Eastern Grey Treefrogs  
Mentor: Gerlinde Hoebel, Biological Sciences  
Poster Presentation, Easel 211

Sexual dimorphism in morphology or color is widespread in the animal kingdom, and this pattern is frequently accentuated during the mating season. Male frogs reaching sexual maturity generally develop a vocal sac, which is primarily involved in the mechanisms of call production. However, in many species the throat area is also pigmented and conspicuous, suggesting that the vocal sac might act as a visual signal as well. Using digital photography and image processing software, we examined vocal sac color in Eastern Gray Treefrogs (*Hyla versicolor*). We collected mated pairs (i.e., sexually mature males and females) at the beginning and the middle of the breeding season, and measured the color as well as the spatial pattern of their throat pigmentation. We found that throat pigmentation is sexually dimorphic (males have darker throats), and that it increases over the course of the breeding season. These observations suggest that throat pigmentation has the potential to be a trait used in mate choice.

**Kevin Rymut**

Optical Imaging to Assess Metabolic State of Diabetic Wounds  
Mentor: Sandeep Gopalakrishnan, Nursing  
Oral Presentation, 1:20pm, Union 344

This study utilizes redox fluorescence imaging to quantitatively assess diabetic wound healing. Introduction: Given the increasing prevalence of diabetes worldwide, lower extremity ulcers and amputations are an increasing problem in individuals living with diabetes. It is critical to understand the underlying mechanisms of these debilitating wounds. In response to this need, we have developed two novel optical imaging techniques (in vivo fluorescence imaging and 3D Cryoimaging) to assess mitochondrial bioenergetics in diabetic wounds. Materials and methods: db/db mice and age matched C57BL/6j mice at the age of 20-22 weeks were used in the experiments. Mice were anesthetized and a 10 mm circular full thickness wound was prepared midline at the shoulder-level. In vivo images of metabolic indices (NADH and FAD) were captured on 1st, 2nd, 3rd, 4th and 5th day post-wounding and the mitochondrial redox-ratio ( $RR = \text{NADH}/\text{FAD}$ ) was quantified by calculating redox-ratio images. After 5 days, mice were euthanized, wound biopsies were collected and snap frozen in liquid nitrogen for later 3D cryoimaging of the volumetric mitochondrial redox state. Results: In vivo fluorescence imaging showed that in control wounds, the metabolic marker (RR) increased at day 4th (114% reduced) when compared to day 0 of wound formation; however, in diabetic wounds no difference in RR was detected during wound healing. 3D cryoimages showed that the mean volumetric redox state of diabetic wounds was 61% lower than that measured in non-diabetic

control animals. This reduction may be a result from the increased oxidative stress known to be present in diabetic wounds. Conclusion: These findings are consistent with reports of diabetes-induced mitochondrial dysfunction and oxidative stress in the organs and tissues of diabetic animals and humans. They extend the observation of mitochondrial dysfunction and oxidative stress in chronic wounds which are factors contributing to the profound delay in wound healing in diabetes.

**Matthew Ryther**

Assessment of Total Dissolved Carbon Dioxide in the Boundary Waters Canoe Area Wilderness as Compared to Lake Michigan  
Mentors: Russel Cuhel, Freshwater Sciences & Carmen Aguilar, Freshwater Sciences  
Poster Presentation, Easel 165

The Boundary Waters Canoe Area Wilderness (BWCAW) is part of Minnesota's Superior National Forest and extends into Canada's Quetico Provincial Park. It contains 20% of the freshwater in the National forest system and is composed of 1,090,000 acres of wilderness, glacial lakes, and streams. An important aspect of this area is the Laurentian Divide between the Great Lakes and Hudson Bay watersheds, runs northeast-southwest through the east side of the BWCAW. By studying this unspoiled area of freshwater and wilderness we are able to better understand not only its composition but also create a baseline to assess how stressors may effect it and surrounding freshwater bodies such as the Great Lakes and Hudson Bay watersheds in the future. To begin this long-term experiment, in July of 2017 I took a 7 day expedition by canoe through the eastern side of the BWCAW. Equipped with a 30ml syringe and disposable 0.2 micron filters I collected 16 samples over the course of a week; between eight lakes and one river. With previous experience of assessing total dissolved carbon dioxide via flow injection analysis and water sampling methods on Lake Michigan I was able to document the levels of dissolved carbon dioxide at each sample point. The samples ranged from 0.09mM to 0.44mM of dissolved CO<sub>2</sub> which is about 12x less than that of Lake Michigan at 2.00mM. I discovered that the entrance to the Loon river had much higher levels of CO<sub>2</sub> at 0.44mM; this is because the lake it is connected to allows motor boats and cabins while the others lakes are restricted to no motors. This is comparable to the Milwaukee river where CO<sub>2</sub> levels reach up to 5.00mM and decrease as you move further out into Lake Michigan.

**Marwat Salamin**

Aptamer-Based Probe for the Direct Detection of MMP-9 in Urine for Ureteropelvic Junction Obstruction in Infants  
Mentor: Shama Mirza, Chemistry & Biochemistry  
Poster Presentation, Easel 26

Ureteropelvic Junction Obstruction (UPJO) is a blockage of the kidneys and is the major cause of kidney failure in infants, affecting about 1 in 1,500 newborns. Early

diagnosis and treatment of UPJO have been proven to increase prognosis and kidney function. The disease is currently diagnosed using various radiological methods including diuretic ultrasonography, radioisotope renography, and excretory urography. These methods may require the use of injection of dye or radioisotope material which carry the risk of exposing patients to high levels of radiation. In addition, the radiological methods are not cost effective and are severely time consuming. Other methods of diagnosis of the disease may require an excisional biopsy, which is invasive to the patient and therefore is often rejected, further hindering early diagnosis. For this reason, new studies surrounding simple, time and cost effective, noninvasive detection through the use of biomarkers are of great interest. Biomarkers provide a possibility for developing such an assay for the detection of a protein linked to a disease. One of the five important biomarkers associated with UPJO is metalloproteinase 9 (MMP-9), a protein belonging to the MMP family that utilizes zinc-dependent hydrolases in the degradation of extracellular matrix. It is the elevated level of MMP-9 in patient's urine samples that can indicate a positive diagnosis for UPJO. RNA molecules known as aptamers bind to MMP-9 in the protein's presence, and are therefore used in this project for the detection of the active protein in urine. Aptamers provide a clinical advantage in the detection of MMP-9 because 1) they can be easily modified for practical use, 2) can be directly used in untreated urine, and 3) can be tagged for fluorescence measurements. The project is currently in the stage of optimization and uses Mass Spectrometry in parallel, which although is not cost-effective, is a sensitive analytical method that is used for the purpose of method validation. The ultimate aim of the project is to use aptamers in an assay for the detection of MMP-9 to provide a more sensitive, cost effective, operable, and noninvasive method of diagnosis of UPJO in a clinical setting.

#### **Hannah Sallmann & Gennadiy Gurariy**

Difficulty in Resisting Fat and Carbohydrate Cravings may be Linked to Poor Attentional Control

Mentors: Christine Larson, Psychology &

Adam Greenberg, Psychology

Poster Presentation, Easel 167

Variability in one's focus of attention, often called "zoning out," has been shown to impede effective task completion. Previously published research suggests that the controlled ingestion of fat and glucose may have short-term influences on cognitive performance; however, the effects of macronutrient intake on selective attention are largely unknown. Here, we hypothesized that subjects with greater stability of carbohydrate, fat, or protein consumption over a 10-day period would exhibit better attentional control (as measured by alerting, orienting, and distracter filtering) than subjects with more variable food intake. Measuring longitudinal fluctuations of attention can be difficult in a laboratory setting where the environment may reduce ecological validity. Therefore, our participants completed assessments "in the wild."

Twenty-eight subjects completed the Attention Network Test (ANT) on a tablet computer four times per day over 10 days, in addition to logging their food consumption on a diet-tracking app. Preliminary correlation analyses of macronutrient variance and ANT scores suggest a negative relationship between carbohydrate variance and filtering, such that increased carbohydrate variance correlated with a reduced ability to filter distracters. We also observed a trend toward significant negative correlation between carbohydrate variability and alerting, such that increased carbohydrate variability correlated with reduced alerting abilities, and this relationship was twice as strong for participants with high carbohydrate variance (versus those with low carbohydrate variance). In addition, higher fat variability correlated with worse distracter filtering. High fat variability also correlated with overall worse orienting, but among participants whose fat intake was most stable, an increase in fat variability correlated with better orienting. These results indicate a relationship between increased attentional control and low variability in fat and carbohydrate intake. Thus, people who regularly experience lapses of attentional control may have trouble regulating intake of high-sugar or high-fat foods when environment or emotional state triggers "junk food" cravings.

#### **Kaitlin Salter & Laura Ketelboeter**

Mechanisms Important for Rhizobial Colonization of Rice: The Role of Motility and Plant

Hormone Production

Mentor: Prasad Gyaneshwar, Biological Sciences

Poster Presentation, Easel 1

Rhizobia form nitrogen-fixing bacterial symbioses with legumes and contribute significantly to the global nitrogen economy. Rhizobia can also colonize and promote the growth of non-legumes such as rice. Therefore, rhizobial symbiotic relationships with plants can be used to increase the amount of fixed nitrogen available in agriculture and promote the growth of plant hosts. The mechanisms of rhizobial-legume symbioses have been extensively studied. Very little is known, however, about rhizobial interactions with non-legume plants. *Rhizobium* sp. IRBG74 forms a nitrogen fixing symbiosis with the aquatic legume *Sesbania cannabina*, as well as a growth promoting endophytic association with rice. *Rhizobium* sp. IRBG74 is a useful model to compare colonization and growth promotion mechanisms in legume and non-legume hosts. Rhizobial motility is crucial for colonizing plant hosts and production of the plant hormone indole-3-acetic acid (IAA) has been suggested to be important for plant growth promotion by *Rhizobium* sp. IRBG74. To further determine the role of motility and IAA production in rhizobial-rice interactions, *Rhizobium* sp. IRBG74 mutants in *motC* (flagellar motor protein) and *nifB* (nitrile hydratase) were constructed. The wild type and mutant strains will be inoculated onto *Sesbania cannabina* and rice seedlings, and colonization will be assessed using histochemical staining and microscopy.

**Matthew Sanville**

Cultivation of Lake Water Microorganism  
Through Modification of Existing Media.  
Mentor: Ryan Newton, Freshwater Sciences  
Poster Presentation, Easel 28

When attempting to study microorganism's isolation is very important, doing so is key to understanding their capabilities. Currently, most media is formulated to grow microorganism's that thrive in nutrient rich environments. Due to this, only a small amount of lake water bacteria has been cultured. My project is to create a new type of media that can be used to grow and isolate those microorganisms that live in lake water. This is done by taking a medium recipe designed for coastal ocean microbes and modifying it to reflect lake Michigan nutrient concentrations.

**Nicholas Scannell, Sucheta Roy & Assad Uz-Zaman**

Interactive Physical Therapy Rehabilitation by a Humanoid Robot (NAO)  
Mentor: Mohammad H Rahman, Mechanical Engineering  
Poster Presentation, Easel 55

The Bio-Robotics Lab at UWM works towards designing, developing, and controlling robots that assist in rehabilitation of physically disabled individuals. The introduction of an interactive humanoid robot to physical therapy practices enables multi-patient therapy and is intended to enable a more enjoyable experience by children and patients with mental disabilities. The humanoid robot (NAO, 25 degrees of freedom) integrated with motion sensor technology (Microsoft Kinect) programmed through Robotic Operating System (ROS) allows for direct interaction between robot and patient. The NAO robot walks the patient through preprogrammed rehabilitation exercises while detecting the patient's accuracy from the Kinect motion sensor.

**Jayson Schalk**

The Role of Actin Polymerization in GPER-Mediated Dendritic Spine Morphology in Female Mice  
Mentor: Karyn Frick, Psychology  
Poster Presentation, Easel 121

The hippocampus is a medial temporal lobe structure that mediates the formation of many types of memories and deteriorates in aging and Alzheimer's Disease. Estrogens are important neurotrophic factors, and the potent estrogen 17 beta-estradiol (E2) significantly increases dendritic spine density in the hippocampus. Dendrites of excitatory neurons in the hippocampus are covered in spines, which allow increased neuronal connectivity and therefore facilitate memory consolidation. Hippocampal spine remodeling is dependent on actin cytoskeleton reorganization, and increased actin polymerization is associated with an increase of dendritic spines. Previously, we reported that bilateral dorsal hippocampal (DH) infusion of the G-protein coupled estrogen receptor (GPER), G-1, significantly increased

the number of dendritic spines on apical dendrites of CA1 pyramidal neurons in the DH of female mice. We also examined the effects of G-1 on the actin-binding protein cofilin. Cofilin depolymerizes actin filaments, and therefore reduces the formation of dendritic spines. G-1 significantly increased cofilin phosphorylation, which inactivated cofilin. These data suggest GPER activation increases the number of dendritic spines through increasing actin polymerization. To confirm the importance of actin polymerization in GPER-mediated dendritic spine morphogenesis, we examined the effects of latrunculin A, an actin polymerization inhibitor. In our study, ten-week-old female mice were ovariectomized and received a bilateral DH infused of vehicle, G-1, E2, or Latrunculin A. Brains were collected after infusion, and neurons were visualized using Golgi staining. Spines were then counted using NeuroLucida. To examine the cellular mechanisms regulating actin polymerization, the dorsal hippocampus was dissected bilaterally after infusion, and phospho- and total-cofilin were measured using Western blotting. To confirm the necessity of actin rearrangement in GPER-mediated dendritic morphogenesis, we are currently determining the effects of latrunculin A on GPER-mediated hippocampal spine remodeling in female mice. These data support the critical role of actin polymerization in GPER-induced regulation of hippocampal function.

**Gaelle Sehi & Savanna Leigh Shuster**

New Assays to Analyze the Thermodynamics of RNA Binding to Enzymes that Remove RNA Caps  
Mentor: David Frick, Chemistry & Biochemistry  
Poster Presentation, Easel 187

Recently, the cofactor nicotinamide adenine dinucleotide (NAD) has been reported as a covalent modification of bacterial RNA. Given the central role of NAD in redox biochemistry, posttranslational protein modification and signaling, its attachment to RNA indicates that there are unknown functions of RNA in these processes and undiscovered pathways in RNA metabolism and regulation. Analogous to a eukaryotic cap, 5'-NAD modification is shown *in vitro* to stabilize RNA against 5'-processing by the RNA-pyrophosphohydrolase RppH and against endonucleolytic cleavage by ribonuclease (RNase) E. This is where the nudix phosphohydrolase NudC plays an important role to decap NAD-RNA and thereby triggering RNase-E-mediated RNA decay. Nudix enzymes hydrolyze phosphoanhydride bonds linked to nucleotides. One subclass of Nudix enzymes cleaves dinucleotides to yield two nucleoside monophosphates. The prototype enzyme of this Nudix subclass is the product of the *E. coli* nudC gene (aka NudC or Orf257), which has been previously shown to cleave NAD(P)H, NAD(P)<sup>+</sup>, ADP-ribose, AppA, and NAD-capped RNA. Nudix hydrolases have been known to co-purify with nucleic acids. In this study, we have developed novel assays to analyze the thermodynamics of RNA binding to NudC, by proving that NudC binds to both single stranded and double stranded oligomers using techniques like fluorescence spectroscopy and native gel electrophoresis.

**Sara Seidita**

Complex Transitive Mate Preferences In *Enchenopa binotata* Treehoppers (Hemiptera: Membracidae)  
Mentors: Rafael Rodriguez, Biological Sciences & Bretta Speck, Biological Sciences  
Poster Presentation, Easel 151

Mate choice is a crucial decision for females. Mate choice decisions are based on mate preference functions, which are curves that describe the relationship between the attractiveness of sexual ornaments and variation in their features. One possibility for how mate choice decisions relate to preference functions involves transitivity, whereby females always select the male with the preferred traits when in the presence of non-preferred or low quality males. A competing alternative — with support from humans and some vertebrates — involves intransitivity, whereby mate preferences may be reversed according to the suite of alternatives present. We tested the transitive and intransitive mate choice hypotheses with *Enchenopa binotata* treehoppers. Using vibrational playback stimuli that varied in frequency and whine length, we presented females with preferred and non-preferred males in the presence or absence of high quality and low quality decoy males. We found that females selected the preferred males over the non-preferred males regardless of the presence or quality of the decoy. These findings show that *Enchenopa* treehoppers use transitive mate choice.

**Abigail Sella**

Thermal Case Studies: Documentation and Representation  
Mentor: Alexander Timmer, Architecture  
Poster Presentation, Easel 174

The motivation of this study is to find and collect information on lesser known buildings in the Midwest that show different thermal cases in buildings. The Bristol Studio by Alfred Caldwell is an example of this as a building made solely of two by four boards and local stones. Digitizing the original technical drawings of his studio made it possible to build a 3D scale model of the building. The collection and digitization of the Bristol Studio will make it easier for students to find local projects that reflect the different thermal implications of building types.

**Katherine Sheridan**

670 nm Photobiomodulation in a Cell Model of Age-Related Macular Degeneration  
Mentor: Janis Eells, Biomedical Sciences  
Poster Presentation, Easel 81

Age-related macular degeneration (AMD) is the most common cause of vision loss with aging in developed countries. There are two forms of AMD, “wet” and “dry”. Although “wet” AMD which is caused by an overgrowth of abnormal blood vessels in the retina can be treated, there are no treatments for “dry” AMD. AMD is characterized by the loss of the retinal pigment epithelium (RPE). The RPE performs functions that are essential for maintaining retinal homeostasis and the loss of RPE results in photoreceptor death and blindness.

Photobiomodulation (PBM) by far-red (670 nm) light has been shown to act on mitochondria-mediated signaling pathways to preserve mitochondrial function, attenuate oxidative stress and prevent cell death in models of retinal disease and in small clinical trials. The long-term objective of our studies is to develop PBM as a stand-alone or adjunct therapy for the treatment of AMD and other retinal diseases. The objective of this proposal is to test the hypothesis that 670nm PBM will protect human primary RPE cells from cell injury and cell death induced by oxidative stress. Studies will be conducted in a cell culture model of AMD, human primary RPE cells exposed to oxidative stress by growing them in the presence of tertiary butyl hydroperoxide (TBPH). We will examine the ability of 670 nm PBM to protect against cell death and mitochondrial dysfunction. This study will improve our understanding of the mechanism of PBM in AMD and provide important information for FDA approval of this treatment modality.

**Aaron Sherman**

Design of Wind Turbine Airfoil Blades for Efficiency Testing  
Mentor: Ryoichi Amano, Mechanical Engineering  
Poster Presentation, Easel 52

The goal of this project was to design small-scale wind turbine blades for eventual power coefficient testing at the USR's Wind Tunnel Lab. Solidworks, a computer drafting program, was used to design four blades with different aerodynamic structures that can work with a pre-existing test setup. The blade shapes included leading tubercle, trailing tubercle, and winglet designs alongside a standard airfoil shape. The tubercle blades are a form of biomimicry and are designed to mimic the bumpy nature of humpback whale fins. Adding these large bumps, called tubercles, to the wind turbine blade has the overall effect of increasing max lift and decreasing drag. This tubercle effect is a recent discovery and its applications in airfoil design are still being researched. Designs with tubercles at both the leading and trailing edge of the blades were created for this project to study their overall effects on lift and drag through the channeling of flow over the airfoil. The winglet blade incorporated a vertical wing tip extension, known as a winglet. Winglets on airfoil blades decrease the induced drag on the blade by reducing wingtip vortices and have become popular among modern aircraft design since the 1970s. Future projects at the USR Wind Tunnel Lab may compare data collected from these blades to draw conclusions on the advantages and disadvantages of each design.

**Kirill Shmilovich**

Investigating Protein Hydrogel Mechanics through Force-Clamp Measurement and Validation with Dynamic Modeling

Mentor: Ionel Popa, Physics

Oral Presentation, 1:00pm, Union 340

Proteins are the workhorses of our bodies, whose specific three-dimensional structure correlates to their function within the body. Protein hydrogels are a new type of material made from an interconnected network of these proteins, which naturally embrace a variety of biomedical applications, from scaffolding for artificial tissues to controlled drug delivery systems. When these hydrogels are exposed to external forces, the protein structure unravels and extends in a process called protein unfolding, affecting the unique mechanical properties characteristic of protein hydrogels. Here, we present an experimental technique to measure the force response of protein hydrogels in conjunction with a theoretical model which considers the protein folding phenomenon to describe their measured mechanical responses. Scaling the size of the simulated hydrogel reproduces the probabilistic to deterministic behavior characteristic of single-molecule unfolding, while varying the applied force expectedly leads to increases in the total extension and associated rate constants. Using a custom-made force clamp rheometer, we probe the unfolding and extension response of protein hydrogels and compare these results with our simulations. Ultimately, this technique and model could become valuable resources for helping to design and produce biomaterials with tunable elasticity. These resources for helping to design and produce biomaterials with tunable elasticity. These biomaterials will find applications in mimicking tissues and organs within the body (such as the muscle contraction of the gut and heart), with the additional ability to controllably retain and release drugs from within their structure.

**Addie Skillman**

Re-examination of the Mendellian and Molecular Genetics of the Arabidopsis thaliana Salk\_026354 Line

Mentor: Heather Owen, Biological Sciences

Poster Presentation, Easel 145

Callose is a plant polysaccharide that surrounds pollen mother cells and separates developing microspores. The gene Callose Synthase 5 (CalS5) of Arabidopsis thaliana is responsible for synthesis of callose, which is associated with proper pollen wall pattern formation. A T-DNA insertion in this gene has been reported to be responsible for plants exhibiting reduced fertility and defective pollen walls. This mutant phenotype requires that both copies of CalS5 contain the T-DNA insertion, meaning the plant cannot carry a copy of “normal” (wild-type) DNA. A previous study has found that, contrary to published literature, polymerase chain reaction (PCR) using gene-specific forward and reverse primers that should not amplify a product in genomic DNA of mutant plants did amplify products. This should not have occurred in mutants with a T-DNA insertion that interrupts

the gene; these bands should only be present when a wild-type copy of CalS5 is present. This implies that knockout of the CalS5 gene may not be the cause of the pollen wall defect. To determine whether or not the T-DNA insertion is actually the cause of the defective pollen wall phenotype, flowers from mutant plants have been dissected to confirm pollen wall phenotype under differential interference contrast microscopy and photographed, and DNA has been isolated from these mutants. PCR amplification of mutant DNA using a combination of wild-type and T-DNA primers followed by gel electrophoresis will be performed. If products are formed, the sizes of the amplified products will be determined. If the T-DNA insertion is the cause of the phenotype, the wild-type primers will not show any bands, but a combination of wild-type and T-DNA primers will show a band. Understanding genes that function in pollen development is an important step in manipulating those genes for production of male-sterile lines commonly used in plant breeding.

**Hannah Smith**

Analysis of Vowels Associated With Stuttering

Mentor: Carol H. Seery, Communication Sciences & Disorders

Poster Presentation, Easel 120

In this research, stuttering was examined in association with vowel features. Past research has revealed that stutter events primarily occur at word-initial locations. Words consist of syllables that consist of an optional consonant onset and a rime which may be a single vowel or a vowel-consonant combination. The perceptual impression that stuttering blocks appear to be triggered at the location of the transition into the vowel of the rime gave rise to this investigation of the features of rime vowel locations where stuttering blocks occur. Although previous studies of stuttering locations examined word-initial consonants and vowels, no investigations were found of stuttering locations associated with the subsequent vowels of the rime into which consonant onsets must transition. Using transcriptions of speech samples (n=20) previously collected from children ages 4 to 12 in a larger project, the authors tallied the numbers of stuttering instances on rime vowel locations, classified by intended vowel position classes. Tallies were examined relative to the number of opportunities for the vowel classes in each sample, to create a proportional analysis of the stuttered vowel classes. Comparing these proportions, statistics revealed that some vowel features appear to be associated with stuttering at greater than chance levels. It is unknown whether the underlying mechanisms are related to acoustic or physiologic properties. With more knowledge about the nature of stuttering, hopefully better strategies will be found for speech management in the future.

**Melanie Smith**

Using Fieldworks Language Explorer (FLEX) to Study Phonological Change in the Dialect of Wermelskirchen, Germany  
Mentor: Garry Davis, Linguistics  
Poster Presentation, Easel 138

Previous research has shown that the historical dialect of Wermelskirchen, Germany, exhibits behavior that serves as a ‘missing link’ between German, and its related languages, Dutch and English. In standard German, pronunciation of the consonants p, t, and k, systematically changed to f, s, and ch, respectively (for example, contrasting English “to grip” with German “greifen”), while in the Wermelskirchen dialect these changes are only seen when the consonant follows a short vowel. The purpose of this project is to study how the software Fieldworks Language Explorer (FLEX) can be used to create a research tool to then study this change in consonant pronunciation from. Methodology of this project includes inputting data into FLEX that represents three different chronological stages of the dialect: one source from 1905, one from the 1930’s and 40’s, and one from 2005. By using FLEX to directly compare these three sources, there may be insight into how the dialect of Wermelskirchen developed through the years, and more generally how a language’s phonology changes over time. This project encoded a sample batch of data into FLEX and documented how the data must be inputted in order to make it searchable for research purposes. Ultimately, more data from each of the three sources will be inputted to create a well-documented resource for those studying phonological change in the German language, and a resource for those looking to use FLEX for similar purposes.

**Jasen Sonnen & Krist Schubilske**

Using Pupil Dilation to Investigate False Memories of Semantic Associates  
Mentor: Anne Pycha, Linguistics  
Poster Presentation, Easel 117

Previous false memory research has found that lists of words with phonological associates will produce significant false memory effects for recall and recognition. For example, when participants listen to a list of phonological associates to the word “cat”—such as “that,” “fat,” and “cab”—they often report that they remember hearing the word “cat,” despite the fact that they have not listened to that word. The present study replicated Sommers & Lewis (1999) false memory research, expanding on their investigations by employing the measure of pupil dilation. Pupil dilation measurements were used in order to consider false memory effects in conjunction to “pupil old/new” effects; these effects explain how a person’s pupils will respond to stimulus words—after listening to a list of words, people’s pupils dilate when they listen to a previously heard (“old”) word, but not when they listen to an unheard (“new”) word. We hypothesized that the “pupil old/new” effect would also occur for falsely remembered words, which we tested

using an Eyelink 1000 eye-tracker. The addition of the pupil measurements allowed us to address a concern that previous false memory research has not had the capacity to consider: we were able to distinguish listener responses to veridical words (words they had heard) from critical items (words they had not heard). The results showed that there is a significant difference in the Pupil Dilation Ratio (PDR) when participants previously heard a word compared to when they incorrectly recalled a word due to false memory. We also found that the pupil effect is greater only when participants had the (false) subjective experience of having heard the word. In Spring 2018, we will continue collecting data and create a follow-up experiment using semantic associates to test for pupil dilation in response to false memory.

**Elizabeth Spitzer**

Refining Crop Yield Estimates via Isotopic Analysis of Plant Water  
Mentor: Erik Gulbranson, Geosciences  
Poster Presentation, Easel 65

The mismanagement of water in agriculture largely contributes to water shortages along with the depletion of surface water and groundwater resources. As water is an increasingly scarce and valuable resource, this problem must be addressed. This research tests the hypothesis that transpiration of water in plants can be used to precisely estimate crop yield through the analysis of the isotopic composition of the water in the plant and soil. As transpiration only affects the isotopic composition of water inside a plant leaf, measuring the isotopic composition of plant roots and leaves allows measurement of the amount of transpiration that occurred. The amount of transpired water will be compared to crop yield to estimate the proportionality of transpiration and crop yield. Moreover, isotopes can be used as a chemical tracer of where plants take up water from soil. To test this hypothesis, crops with variable root morphologies (onion, wheat, and asparagus) were collected along with samples of the soil at different depths that each plant grew in. A custom-built cryogenic extraction line is used for the extraction of water in this study. If successful, expected outcomes include application of this method using aerial drone surveys over agricultural settings to provide precise geospatial information on crop yields for forecasting water and nutrient management systems. In refining this knowledge, more accurate irrigation strategies can be developed which will have an economic impact and better the resource management of water in agriculture. This is significant in drought prone regions and areas with complex topography where water is not easily accessible in the soil for plants.

**Perry Spott**

Development of Self-Healing Metal Materials and Composites

Mentors: Pradeep Rohatgi, Materials Science & Engineering, Volkan Kilicli, Materials Science & Engineering

Oral Presentation, 12:00pm, Union 340

Engineering materials have a limited practical life-span due to degradation over time, which can be caused by fatigue, wear, creep and environmental conditions. An ideal solution to this would be incorporating the self-repair function seen in biological processes into inorganic systems, or simply put, self-healing materials. While there are a number of self-healing methods, this study employed a hypoeutectic Al-Si aluminum alloy in tensile bar form. After forming microcracks throughout the material, the bars were heated above the eutectic melting temperature, so any cracks in the interdendritic region would be filled by the Al-Si mixture. The results of this experiment were gathered by placing the samples under tensile strain until fracture. Originally these trials, when compared to the fracture point of undamaged "virgin" samples, showed a strength retention of up to 45% and recovered 89% of total elongation, but by artificially aging the bars post-healing we were able to retain up to 75% of original strength. These results show a clear improvement to the productive life-span of the material, but they are representative of a healing system which has not fully reached its potential. Microstructure analysis showed some cracks unfilled. If the activation of the healing agent can be correctly distributed this could be applied to any number of issues. By employing self-healing materials in any industry such as aerospace, automotive, or even building materials, the life-span of critical structures can be increased, and maintenance can be greatly simplified. Just by applying the catalyst fracture and damage repair can be initiated.

**Alyson Stadler**

Effects of Climate Change on Bird Phenology and Population Trends

Mentor: Peter Dunn, Biological Sciences

Poster Presentation, Easel 60

Climate change is affecting the phenology, or timing of breeding, of many different organisms. Previous research on birds has suggested that warming temperatures might lead to a mis-match between the timing of food they need to feed their young (ie, insects) and when they start to breed (lay eggs). Insect are emerging sooner in the spring as a response to climate change, so there is concern that birds may not 'keep up' with this advancement and may miss the peak of food abundance. In this project I conducted a literature search and meta-analysis across bird species to determine if: 1) the timing of laying is advancing, 2) changes in laying date lead to changes in clutch size and 3) changes in phenology are associated with changes in population size. I found that laying dates have become significantly earlier, but clutch size has shown no significant change, nor is there any correlation between laying date and changes in population size. Thus, it appears that phenology is changing, but to date it does not appear to be causing mis-matches that could decrease productivity and lead to smaller populations.

**Jason Steffke**

Survival Analysis for Fatigue Reliability Assessments

Mentor: Habib Tabatabai, Civil & Environmental Engineering

Poster Presentation, Easel 66

This research seeks to determine the remaining service life of a bridge or steel member under fatigue loading. The fatigue of engineering materials under repetitive loading affects the durability and design of components and systems in a wide range of engineering-related applications including civil, mechanical, aerospace, automotive and electronics. This is important because fatigue failure is one of the most common types of failures in steel structures. These failures can have catastrophic results and have been estimated to cost the US over \$100 billion annually. This research employs a probabilistic approach to fatigue life that utilizes survival analysis, reliability of structures and influencing factors such as stress state, stress range or peak stress, surface conditions, temperature and environmental exposure. Using this probabilistic approach, the research seeks to systematically address all of the factors that contribute to fatigue on a single mathematical platform. This includes using advanced analysis techniques developed for and used in medical research and utilizing these techniques for engineering applications. This research will use these techniques to address the remaining service life and load sequence effects in a probabilistic manner. The research aims to develop, apply and verify survival analysis techniques to the engineering fatigue problem associated with cyclic loading of a wide variety of engineering components.

**Michael Stefik, Nicholas DiPasquale & Mandana Saravini**

Study of the Heat Transfer Effects that Internal Cooling Passages Have on Gas Turbine Blades

Mentor: Ryoichi Amano, Mechanical Engineering

Poster Presentation, Easel 161

Gas turbines have applications in jet engine propulsion and energy-generation for land-based systems. Thermal efficiency has become a crucial factor when designing a gas turbine. To increase thermal efficiency, the gas turbine blades need to be able to withstand hotter temperatures for extended periods of time. Having an optimized cooling passage system is important because it can keep the turbine blades at acceptable operating temperatures while also helping increase turbine power and fuel economy. This study utilizes a two-pass channel attached to a rotating shaft to simulate a cooling duct within a gas turbine blade. The bottom surface of the channel is heated with a constant heat flux while the air velocity and rotational speed of the shaft are varied to understand how these variables affect the heat transfer within the channel. The experimental temperature profiles were then compared to computer simulations to validate the numerical heat transfer predictions. The study found that heat transfer within the two-pass channel is affected when varying the Reynolds Number and rotational speed of the test channel. Heat transfer

was significantly increased when the rotational speed of the channel increased. This increase in rotational speed caused rotational effects such as centrifugal and buoyancy forces to occur. These forces caused air turbulence which increased the heat transfer throughout the test channel. The findings will play a significant role in future research on the topic of gas turbine blade cooling and the design of gas turbine blades in the future.

**Brenna Stoddard & Antionett Jackson**

Seasonal Fluctuation in Cytoskeletal *Vibrio mreB* protein  
Mentor: Charles Wimpee, Biological Sciences  
Poster Presentation, Easel 53

This laboratory has studied bioluminescent bacteria in the Boca Ciega Bay of Florida for many years. Most of these bacteria are in the genus *Vibrio*. However, most *Vibrio* species are not bioluminescent. We have recently started collecting total *Vibrios* (i.e., not just bioluminescent ones), with the intention of following seasonal changes in the microbial community. This project involves characterization of total cultured *Vibrios*, using gene sequences for identification. The surface water *Vibrio* community collected in December 2017/January 2018 is being compared to *Vibrios* collected in August 2017 from the surface water and sea grass. We have seen seasonal fluctuations in bioluminescent *Vibrios*, but this is the first comparison of the *Vibrio* community as a whole in a seasonal context. *Vibrios* were cultured on TCBS agar, and DNA from individual colonies was subjected to sequence analysis. The *mreB* gene (encoding a ubiquitous cytoskeletal protein) was amplified using the Polymerase Chain Reaction (PCR), followed by DNA sequencing and homology searches using the BLAST program available through the National Center for Biotechnology (NCBI). Sequence comparisons and diversity data will be presented.

**Nathan Tennies**

Areal Abundance Assessment of Aquatic Angiosperms with Aquanauts, Acoustics, and an Acute Angled Appliance  
Mentor: John Janssen, Freshwater Sciences  
Poster Presentation, Easel 25

Aquatic vascular plants, like Eurasian Water-Milfoil (*Myriophyllum spicatum*), play many important roles in freshwater ecosystems. They provide important habitat for fish and macroinvertebrate populations and act as regulators of environmental phenomena like water turbidity and wave action. Fish habitat in the Milwaukee Estuary is characterized by localized areas of developed habitat with large expanses of little cover. Due to this, there is room for improvement of local water bird forage and recreational fishing. Characterization of the plant populations and their distributions is of key interest for potential management strategies. The survey was done throughout July and August of 2017. Shallow areas of the estuary (less than 8 meters deep) were traversed with small boat and populations found visually and through use of traditional sonar. If a population boat sized or larger was found, the center would be approximated and the plants rake sampled from it. The sampling locations were marked

with GPS. There were three unique areas in the Milwaukee Estuary: Veterans Park, the Summerfest Lagoon, and Southshore. Veterans Park was characterized by sparsely distributed groups of *Potamogeton richardsonii*. The Summerfest lagoon was characterized by dense plant beds and a population mainly of *Elodia canadensis* and *M. spicatum*. Southshore was most diverse in terms of plant species, four of them had high abundances (*E. canadensis*, *M. Spicatum*, *Potamogeton crispus*, and *Potamogeton* spp.). With this information, Southshore and the Summerfest Grounds seem to be good potential locations for habitat development. The results from these surveys provide a baseline that can be used for future projects in the estuary. With a rough map, new studies could be done with higher resolution techniques, such as dive transects/quadrats or the use of echo-sounding equipment. This could result in better management, meaning a potentially more productive ecosystem.

**Kathryn Tercher**

Characterizing Balance in Children with Ehlers Danlos Syndrome (EDS) Using Bertec Balance Advantage  
Mentor: Alyssa Schnorenberg, Occupational Science & Technology  
Poster Presentation, Easel 110

Balance, an essential part of daily activities, requires complex coordination of the central nervous system and musculoskeletal system to maintain the body's center of gravity within its base of support. Ehlers-Danlos Syndrome (EDS) is a genetic connective tissue disorder with hypermobile type (hEDS) as one of the most disabling forms with respect to musculoskeletal function. hEDS is associated with joint hypermobility and instability, which make balancing during even simple daily tasks such as walking or stair climbing difficult or painful, significantly impacting quality of life. However, there is a lack of research that addresses how and to what extent balance is affected by hEDS. This study will investigate balance in children with hEDS. Three children between the ages of 8 and 18 will undergo a balance assessment using a Bertec Balance Advantage – Dynamic CDP system. Specifically, the Motor Control Test (MCT) will be completed, in which a subject tries to maintain balance while standing on a force plate that translates one-half, one, or two inch(es) in either the backwards and forwards direction. Data will be collected regarding the subject's latency, or their reaction time (ms) to the translation. Since the reaction is an involuntary response, the results will provide information on the autonomic component of postural control. The data will be compared to healthy controls within the Bertec system database (age, weight-, height-, gender-matched) to find statistical differences indicating an issue in their central nervous system affecting latency. We expect to see an increase in latency time in the hEDS subjects due to their associated balance issues as compared to the healthy subjects. The information found in this study may be helpful for future diagnostics and therapeutic planning in clinical practice.

**Cory Thompson**

High Individual Variation but No Plasticity in the Web Architecture of *Latrodectus hesperus* Black Widow Spiders (Araneae: Theridiidae)  
Mentors: Rafael Rodriguez, Biological Sciences & Clint Sergi, Biological Sciences  
Poster Presentation, Easel 214

A spider's web architecture is an extended phenotype and direct product of behavior. Variation within web architecture may be the result of genetic dissimilarities or variation in individual experience. We analyzed variation in *L. hesperus* web architecture by testing two hypotheses: (i) intrinsic individual differences, which predicts a high degree of repeatability; and (ii) plasticity, which predicts the impact of experiences of the site of prey capture. We used treatments involving alterations in feeding regimen: sheet-feeding only, gum-footed feeding only, and alternating between sheet and gum-footed strands equally. We found considerable consistent individual variation and no plasticity, suggesting that differences in web architecture are due to genetic variation or to longer-term experience of prey capture. Keywords: Phenotype, plasticity, spider web, *Latrodectus*, behavior.

**Nathaniel Thorngate-Rein & Zachary Zawada**

Exploring the Interactions of a Non-nodulating Legume Honey Locust with *Rhizobium etli* and *Sinorhizobium meliloti*  
Mentor: Gyaneshwar Prasad, Biological Sciences  
Poster Presentation, Easel 74

Many plants in the family Fabaceae (legumes) are notable for forming nodules to host symbiotic nitrogen-fixing rhizobia. The bacteria provide plants with their primary source of nitrogen, while the plants provide a favorable environment for bacterial growth and nitrogen fixation. However, many legumes do not nodulate and not much is known about their potential to form symbiotic relationship with rhizobia. We are studying the interactions between *Rhizobium etli* (nodulates common bean) and *Sinorhizobium meliloti* (nodulates alfalfa) and the non-nodulating legume *Gleditsia triacanthos* (honey locust). Common bean and alfalfa grow in the same soils as honey locust and it is possible that their symbionts can also interact with honey locust. To study the interaction, we have marked these rhizobia with GUS. GUS staining of honey locust seedling roots revealed that wild-type strains of *R. etli* and *S. meliloti* are able to colonize the seedlings' roots and root hairs, demonstrating the potential for legume-rhizobial symbioses without nodulation. Root fragments displaying significant colonization were fixed in glutaraldehyde for future analysis and comparison to other GUS-stained samples. Additionally, honey locust seedlings were inoculated with *R. etli* mutants deficient in genes required for nodulation ( $\Delta nod$ ) and nitrogen fixation ( $\Delta nif$ ) and their effect on honey locust growth is being determined.

**Kaitlin Trokan, Taylor May Hagenbucher & Victor Hoel**

M3: Milwaukee Public Schools Graduates Attending UW-Milwaukee: Improving Curricular Alignment, Retention, and Graduation Rates  
Mentor: Vicki Bott, English  
Poster Presentation, Easel 188

M3 is the educational initiative that partners Milwaukee Public Schools (MPS), Milwaukee Area Technical College (MATC), and UW-Milwaukee (UWM) with goals to increase post-secondary education success rates. The primary goal of this study was to understand MPS graduates' levels of preparedness upon matriculating at UWM with emphasis on math, English, and science. There were three focus groups conducted in Fall 2017 with approximately eight students in each focus group. While all graduates of MPS were invited to participate in the focus groups, the participants were largely comprised of graduates from Rufus King High School, Ronald Reagan High School, and Riverside University High School. There are three more focus groups planned for April 2018 and will include students not from Rufus King, Reagan, and Riverside. The goal is to gain data from a wide range of student experiences from a diverse amount of MPS high schools. Students from the Fall 2017 focus groups felt they were mostly prepared in math, English, and science; however, students described many challenges adjusting to the cultural environment at UWM. These results were compiled and shared with the heads of the English, math, and science departments at MPS, MATC, and UWM; the same will happen with the results of the April 2018 focus groups. The goal is to use this research to improve the student experience at UWM and to align curriculum among MPS high schools and UWM.

**Dulay Trujillo**

Separation of Arsenic Species (As(III) and As(V)) Using Ion Exchange Method  
Mentor: Yin Wang, Civil & Environmental Engineering  
Poster Presentation, Easel 16

With growing news about contaminated drinking water there is urgent need for people to be aware of different types of contaminants. One contaminant in particular, arsenic (As), is among the primary drinking water pollutants in the United States and abroad. As is one of the World Health Organization's (WHO) 10 chemicals of major public health concern. In the US, As is widely observed in groundwater. For example, in Wisconsin's Fox River Valley, >18% of private water-supply wells have detected As contamination. As can be commonly present in drinking water sources in two oxidation states, As(III) and As(V). As(III) is more toxic and mobile than As(V), and is more challenging to be removed via various water treatment processes, even using Reverse Osmosis. However, the current drinking water standard only regulates total As (i.e., sum of As(III) and As(V)), and does not distinguish As(III) from As(V). The objective of this project is to advance the methods for selective determination of As(III) and As(V) in drinking water,

respectively. We examine a set of methods, their detection limits, best working ranges, and the interference with coexisting ions in natural water matrices.

### **Caige Tubic**

Biotic Recovery of Early Triassic Crinoids  
Mentor: Margaret Fraiser, Geosciences  
Poster Presentation, Easel 147

The Permian-Triassic mass extinction was the most catastrophic loss of life in history. It also represents a major shift in the biota of earth. Ninety six percent of marine species went extinct and the few survivors had to adapt to the harsh post-extinction climate. The extinction was caused by massive volcanism in modern day Siberia which released CO<sub>2</sub> into the air. The increased carbon dioxide is hypothesized to have caused massive global warming. This global warming led to an acidification of the ocean, and many marine invertebrates were unable to survive and went extinct. The biotic recovery of invertebrate organisms after the extinction required new and inventive ways to process the extinction pressures. *Holocrinus* is an important fossil, as it represents the sole survivor of this mass extinction and led to the entirety of all modern crinoids. Many factors of *Holocrinus* may have been essential to it being able to bear the extinction pressures; the ability to move when other crinoids could not is the primary hypothesized form of survival. Early Triassic crinoids lived in oxygen-rich reef and shallow ocean settings. Being able to relocate to these environments during times of high carbon dioxide in the atmosphere could have their key to surviving this extinction. Based on the Crinoid skeletons, or ossicles, the surrounding sediments, and other surviving reef dwellers, we can extrapolate more on the biotic recovery of crinoids in the Early Triassic.

### **Erin VandenBosch**

Perceptual Emphasis of Visual Field Meridians  
Modulates The Object-Based Attention Shift Direction  
Anisotropy  
Mentor: Adam S. Greenberg, Psychology  
Poster Presentation, Easel 84

Object-based attention (OBA) serves to prioritize attended objects over unattended objects. Our previous research showed that shifting attention across the visual field meridians is more efficient horizontally than vertically (i.e., Shift Direction Anisotropy; SDA), and suggests that the meridians play a critical modulatory role in the orienting of OBA. Our goal here was to causally implicate the meridians by manipulating their perceptual visibility to determine whether “meridian emphasis” impacts the SDA. Participants were presented a gray L-shaped object composed of a horizontal and vertical rectangle joined together at a 90-degree angle on a black background. Following a spatial cue at the object vertex, a target (“T”) appeared at either the cued location (“valid”) or at one of two non-cued locations equidistant from the cue in the horizontal (“invalid-horizontal”) or the vertical (“invalid-vertical”) component rectangle. Non-target letters (“L”) appeared as placeholders at the two non-target locations.

Participants performed a detection task and RTs were recorded. Horizontal and vertical meridian perceptual visibility was emphasized by placing white visible lines on the meridians (Experiment 1) and creating illusory contours at the meridians (Experiment 2). In Experiment 1 (N=28), a significant SDA (~69 ms) was found when the vertical meridian was emphasized, but not when the horizontal meridian was emphasized. In Experiment 2 (N=14), a significant SDA was found when the vertical meridian was emphasized (~80 ms) as well as when the horizontal meridian was emphasized (~64 ms). Together, these results show that emphasizing the perceptual visibility of the horizontal meridian can selectively eliminate the SDA by reducing competition for attentional resources along the vertical meridian, depending on the strength of the meridian emphasis. These data suggest that object-based attention is sensitive to strong manipulations of the meridians, but not weaker ones.

### **Nicole Vigon**

Temporal-spatial Parameters of Gait in Youths with  
Hypermobile Ehlers-Danlos Syndrome  
Mentor: Brooke Slavens, Occupational Science &  
Technology  
Poster Presentation, Easel 191

Hypermobile Ehlers-Danlos Syndrome (hEDS) is a disorder that affects connective tissues, primarily the skin, joints, and blood vessel walls. Symptoms include overly flexible joints that can dislocate, creating joint instability and problems with balance. There is currently a lack of knowledge on the effect of these symptoms on the gait of youths with hEDS. This study will fill that gap by quantifying temporal-spatial parameters of gait in children. Participants, ages 8-18 years old, with hEDS, will be recruited from the Genetics Center at Children’s Hospital of Wisconsin. The subjects will undergo motion analysis using a 15 camera Vicon system and 14 retro-reflective markers following the Vicon lower-extremity Plug-in Gait model. The subjects will walk on 4 force plates, embedded in and level with the lab floor, at both a self-selected and a slow pace. Data from the motion analysis will be labeled, filtered, and modeled using Vicon Nexus software. Temporal-spatial parameters, such as stride length, step width and double vs single leg support time will be calculated for 3 gait cycles per subject for each task. The group average of the hEDS participants will then be compared to healthy gait data from the literature. Identification of differences between those with hEDS and healthy individuals may provide insight to balance issues while walking and thus the potential for fall risk and the development of pain and injury increase over time. With this knowledge physical therapists may be able to work with hEDS patients to improve balance, effectively decreasing their risk of fall and injury. This study is a part of a larger ongoing project to define the biomedical phenotype in youths with hEDS to increase our understanding of the disease to improve diagnosis and treatment planning.

**Matthew Vogt, Max Sabitov, Gus Greiling & Ronald Salmon**

Can Wealth and Nature Coexist?

Mentor: Itziar Lazkano, Economics

Oral Presentation, 12:00pm, Union 250

Economic development has moved 3 billion people in China, India, Brazil and other developing countries out of poverty. A negative consequence of this rapid income growth is the extensive release of carbon emissions that cause human induced climate change. Wealthy countries such as the USA, Japan, and Sweden try to reconcile income growth with environmental concerns by transitioning away from dirty fuels like coal, and fostering the use of renewable energy like the wind or solar energy. While these efforts may slow down pollution in the richest countries, they are insufficient to tackle global climate change. How can densely populated developing countries, with a growing middle-class, promote an energy transition that reconciles between their economic development and the global concern for climate change? We study this by analyzing global data on wealth, population, carbon emissions and other parameters like culture and technology. We build graphs and use statistical regressions to understand significant cultural and social factors related to climate change. Global leaders, such as the United Nations, can use our findings to steer policies towards sustainable development in China, India, Brazil and other developing nations.

**Chelsea Volpano**

Evaluating Potential Sediment Transport Pathways Along the Southwestern Lake Michigan Coast Through Sedimentological, Geochemical, and Stratigraphic Analyses

Mentor: J. Elmo Rawling, Geosciences

Poster Presentation, Easel 148

Many coastal geologic studies have been conducted along the shores of Lake Michigan over the past several decades, yet littoral sediment transport rates and pathways remain elusive. The absence of these data has resulted in costly and inefficient sand management along southwestern Lake Michigan. Here, we present preliminary sedimentologic data that serves as a first-order attempt to trace sediment pathways throughout this region. We collected grab samples along thirteen nearshore transects in SE Wisconsin and NW Illinois that extended from the 2m isobath to the 10m isobath (approximately 1.5 km offshore). In addition, samples were collected on land from mid-Holocene strandplain deposits, late Pleistocene glacial deposits, and modern beaches. Samples were analyzed for grain-size distribution by laser diffraction and geochemistry of 43 elements with portable X-ray fluorescence (pXRF). The modal grain size distribution in the nearshore ranges from a minimum of ~90 to a maximum of ~750 micrometers. In Wisconsin, the average nearshore modal grain size is ~200 micrometers, and in Illinois it is ~275. A distinct coarsening of the modal grain size by ~100 micrometers was recorded at the state line, south of Winthrop Harbor.

Variability within transects was highest for the two northernmost transects located near the Pike River, the only unmanaged stream along this reach of shoreline. The modal grain size of sand collected on land averaged about 300 micrometers, with a maximum of 500 between two beach ridges. Where sampled, nearshore samples are finer than the adjacent samples exposed in bluffs on land by ~160 micrometers. Preliminary pXRF results suggest differences between nearshore samples in Wisconsin and Illinois. Samples collected on land in Wisconsin are more similar to the nearshore samples of Wisconsin than either are to the samples in Illinois. Terrestrial and nearshore samples in Wisconsin have higher concentrations of Al, Fe, Ca, K and Mg relative to the nearshore samples in Illinois. These data build the foundation for future research collaborations between the Wisconsin and Illinois Geological Surveys, which are ultimately aimed at comprehending and modelling the dynamic nature of littoral transport along southwestern Lake Michigan.

**Audrey Waln**

Her Stories: Day Time Soap Opera and US Television History

Mentor: Elena Levine, Journalism, Advertising & Media Studies

Oral Presentation, 1:00pm, Union 250

Professor Levine's project is centered around the daytime soap opera and its long history. Her book-in-progress, *Her Stories*, examines the genre as central to US TV history. The project seeks to understand the influence of this long-running genre on the economic and cultural place of American television, and the relationship between the genre and its audiences. One part of my position was preparing the book manuscript for publication and another was organizing a collection of source materials on the subject to be shared with a wider audience. First, I helped to compile the bibliography for the final book manuscript. Another part of my work dealt with organizing soap opera magazines, dated from the 1980s through the 2000s. Through WorldCat, I searched for collections of these magazines at libraries in the US, and found that there is no collection as complete as Prof. Levine's. Professor Levine is working on organizing and cataloging these thousands of magazines to help others access some of the resources she used. Upon completion, others would be able to come in and explore this huge source of information. People would be able to learn about the history of this genre and continue to explore it. Through the magazines, researchers can learn about the programs and the ways they were promoted, but also can see audience responses (such as in letters to the editor) and criticisms of stories and business decisions. It is also possible to see differences in how different magazines discussed soap operas and how the programs changed over time. My work was just the beginning of cataloging and making sense of this large collection. By participating in this position over the summer, I was able to witness the many needed sources that have to be compiled when writing a book for a broad audience.

**Elizabeth Wanninger, Lisa Rafalski & Hana Kursel**

Effects of Simple Motor Movement on Physiological Activity

Mentors: Ray Fleming, Psychology &

Alese M. Nelson, Psychology

Poster Presentation, Easel 57

Emotion regulation refers to one's ability to adapt and regulate emotional responses to situational demands. These adaptive and regulatory patterns vary depending on individual and contextual differences. For example, slow finger-tapping reduces physiological arousal produced by stressful stimuli. The present study was conducted to determine whether rhythmic movement of fingers, tactile feedback from tapping, or combination of the two will produce the reduction in stress. Participants begin by completing measures including the Positive and Negative Affect Schedule (PANAS). Next, participants are fitted with physiological equipment to measure electrocardiogram (ECG), respiration, and skin conductance levels. A 5-minute resting baseline is recorded, followed by presentation of images intended to induce stress. After the first presentation of images, participants complete the PANAS for a second time and are randomly assigned to one of seven finger-tapping conditions. These include: (1) control - no tapping, (2) steady tapping on a flat surface, (3) steady tapping finger movements in the air, (4) steadily being tapped by a device (5) slow tapping on a flat surface, (6) slow tapping finger movements in the air, and (7) being tapped slowly by a device. Participants then complete a 10-minute training on how to tap in accordance with their assigned condition. Following training, participants view a second set of images (while tapping throughout) followed by a third completion of the PANAS. A final 5-minute physiological baseline is then recorded, followed by debriefing. During the second (post-training) set of images, all steady tapping conditions are expected to produce greater sympathetic activity (indexed by heart rate variability) compared to controls. Compared to steady tapping and controls, greater parasympathetic activity is expected for all slow tapping conditions. Greater parasympathetic activity is expected for participants being tapped slowly by the device (Condition 7) than for participants slowly tapping in the air (Condition 6).

**Heather Waters**

Cabin1 is Vital for Growth and Survival of Larvae Zebrafish

Mentor: Ava Udvadia, Biological Sciences

Poster Presentation, Easel 6

DiGeorge syndrome is a pediatric disorder in which patients with multigene deletions on the long arm of chromosome 22 present with craniofacial deformities in addition to a host of other symptoms. We have developed a zebrafish model to test the function of Calcineurin binding protein 1 (Cabin1), a gene found within Chromosome 22 deletions in a subset of DiGeorge patients. In our previous studies, reduced expression of Cabin1 was observed to result in craniofacial deformities and

reduced survival (Hammond-Weinberger, 2012). We have since generated zebrafish with CRISPR/Cas9-targeted mutation Cabin1, to more comprehensively investigate the effect of Cabin1 gene knockout on development. Based on our previous studies demonstrating jaw defects with reduced Cabin1 expression, we hypothesize that Cabin1 deletion mutants will have reduced growth and survival. Here we present the results of a blinded 30-day survival study to compare survival between the wild-type and Cabin1 mutant zebrafish over a period of thirty days. Each day, we documented survival, eating behaviors, swimming patterns, and morphological development of the fish. The length of surviving zebrafish was measured at the termination of the experiment to determine the effects of the Cabin1 mutation on growth. Our initial experiments support our hypothesis and we are currently testing a second Cabin1 mutant strain for reproducibility.

**Jennifer Wendlick**

Early Vertebrate Brain Formation Requires Wnt5b & Microtubule Mediated Tissue Folding

Mentor: Jennifer Gutzman, Biological Sciences

Poster Presentation, Easel 150

Congenital brain defects can lead to physical or mental disabilities and are among the most common birth defects, occurring in 1 to 2 out of every 1000 live births. Determining how the brain acquires its shape during development is critical for elucidating the etiology of these defects. To understand formation of brain structure, we use the zebrafish model to study the mechanisms that regulate the first fold in the neuroepithelium, the highly conserved midbrain-hindbrain boundary (MHB). We have identified several cell shape changes that are required to form the deep constriction in the neuroepithelium, the MHB constriction (MHBC). One mediator of these cell shape changes is Wnt5b, which is specifically expressed in this region during the onset of morphogenesis. Using wnt5b knockdown, cell shape was analyzed by live confocal imaging of membrane GFP-injected embryos. We developed a new morphometric technique to analyze these data using digital sectioning to reveal 3D cell shape. With this analysis, we have uncovered a role for Wnt5b in mediating anisotropic, or polarized, cell shape to fold the neuroepithelium. Data from 2D gel analysis indicated that Wnt5b regulates  $\alpha$ -tubulin levels at the MHB.  $\alpha$ -tubulin is one of the monomers of microtubules, and its regulation modulates overall microtubule dynamics. To test the role of microtubules during tissue folding, colchicine was used to destabilize microtubules and MHBC cell shape was analyzed. We found that destabilization of microtubules disrupts cell shape and MHB folding. To test whether Wnt5b-mediated cell shape was microtubule-dependent, paclitaxel was used to stabilize microtubules and was found to rescue the cell shape defects that result from wnt5b knockdown. Overall, our data suggests that Wnt5b is crucial in regulating microtubule dynamics to control cell shape. This mechanism may be important for shaping other Wnt5b expressing cells and tissues throughout development.

**Lucas White**

The Use of Differential Reinforcement of Compliance and Task Chaining to Increase Task Quantity and Complexity

Mentor: Jeffrey Tiger, Psychology

Poster Presentation, Easel 171

Applied Behavioral Analysis Therapy uses reinforcement to increase desire to complete Applied Behavioral Analysis Therapy uses reinforcement to increase desire to complete certain tasks, such as rewarding a polite request for play time, with actual play time and attention. This would be an example of low-work required reinforcement, in which only a proper request had to be made for reinforcement, no other tasks or waiting schedules are required. Low work tasks are normally used to increase desire and awareness of a reinforcement, so the participant will know that, when done correctly, a reinforcement will be delivered and it is a reinforcement that is of value to them. In this treatment however we tried to gradually increase complexity of the task, so as to require more work to achieve the reinforcement. Other experiments have used this gradual buildup of task complexity, called task chaining, but none have focused solely on task chaining and its effects on problem behavior and rates of compliance. In this experiment a differential reinforcement of compliance (DRC) was first used to decrease escape tendencies for the participant and increase awareness of reinforcement for completion of tasks. These tasks were the low work tasks and were mostly concerned with improving task compliance to acceptable levels. Once reinforcement was readily contacted task chaining was introduced to slowly create more difficult requirements to achieve reinforcement. The use of a DRC and chaining tasks was shown to not only decrease problem behavior, but also resulted in the increase of complex skills through the increase in task complexity. This would demonstrate the viability of a DRC-Task Chaining procedure to not only decrease the problem behavior of patients, but also increase their complex task skills over the course of treatment.

**Rebecca Willer**

Impact of Service Learning Programs on Undergraduate Students Working With Older Adults in Long-Term

Care Settings

Mentor: Sabine Heuer, Communication Sciences & Disorders

Oral Presentation, 12:00pm, Union 344

Almost 1.4 million older adults reside in long-term care (LTC) settings where speech-language pathologists (SLPs) serve this fastest growing segment of the U.S. population. Future SLPs are often unprepared in their programs to serve people with dementia (PWD). To help solve this issue, Mahendra et al. (2013) reported the implementation of an Awareness-Application-Advocacy (AAA) service-learning model for graduate SLP students to evaluate service learning's impact on student knowledge of dementia. The goal of this study is to deduce if service learning in LTCs changed

undergraduate students' attitudes toward PWD, while also determining if themes from students' reflective journal entries reflect the AAA framework. Twenty-four UG students participated in service learning for one semester. Students received training in TimeSlips in order to engage LTC residents in improvised storytelling. Students completed pre- and postassessments on the Dementia Knowledge and Attitudes Ratings Scale (DAS) and completed five reflective journal entries. These outcomes were analyzed to determine if there were any changes in students' attitudes and awareness towards PWD in response to the service learning. DAS results revealed a significant positive change in attitude. In addition, the journal analysis indicated that students benefited from service learning, felt more competent, and exhibited a more positive attitude toward PWD.

**Tamia Williams**

Trypan Blue and Ischemia: A Measure of Cell Viability

Mentor: James Moyer, Psychology

Poster Presentation, Easel 168

According to the National Institutes for Neurological Disorders and Stroke (NINDS), ischemic strokes account for 87% of all strokes. Ischemic strokes result when blood flow to a region of the brain is disrupted, which thus deprives neurons within the affected brain regions of valuable oxygen and nutrients. To study the way in which strokes affect the brain, various cell culture, *in vivo*, and *in vitro* methods have been developed. Such models enable scientists to evaluate the cellular mechanisms that contribute to ischemic cell death as well as explore the efficacy of various treatments. Our lab uses an *in vitro* technique in which brain slices from a rat undergo oxygen and glucose deprivation or OGD. This is done by briefly replacing the normal oxygenated artificial cerebrospinal fluid (aCSF; bubbled with 95% O<sub>2</sub>/5% CO<sub>2</sub>) with, glucose-free aCSF (bubbled with 95% N<sub>2</sub>/5% CO<sub>2</sub>). After 5-min of OGD, reperfusion is accomplished by placing slices back into an oxygenated aCSF solution, which mimics (in a controlled setting) the basic events associated with an ischemic stroke. Slices are then subsequently fixed with formalin. In order to quantify cell death associated with OGD, trypan blue is included in the aCSF during reperfusion. Trypan Blue is not able to pass through the semi-permeable membrane of living cells and consequently is only taken up by dead or dying cells whose cell membrane has begun to break down and become leaky. Thus, it is possible to assess cell death by counting dead or dying cells that are stained with Trypan Blue. This technique is often referred to the "Trypan Blue exclusion" test for cell viability because healthy, viable cells remain unstained. This preparation allows us to study possible therapeutic agents that could have neuroprotective effects on ischemic strokes.

**Noah Wolfe**

The (inductive) Benefit of Being Far Out: The Influence of Spatial Proximity on Diversity-Based Reasoning  
Mentor: Christopher Lawson, Educational Psychology  
Poster Presentation, Easel 69

Inductive reasoning – using evidence about a specific case to arrive at a general conclusion – is governed by a set of principles that help individuals make sense of the available evidence. This study examined one principle, the diversity principle, which dictates that when making a prediction we should prefer to rely on diverse samples of rather than homogenous samples. We explore the extent to which specific task features – spatial properties of evidence – impacts diversity-based reasoning. Forty-four undergraduates generalized properties attributed to exemplars, presented either in close proximity (no separation between exemplars,  $N=20$ ) or spatially distant (each exemplar separated by about 18 cm,  $N=24$ ) to a range of other targets. A mixed ANOVA (Condition by Targets) revealed a main effect of Condition,  $F(1,42)=4.56$ ,  $p=.01$ ,  $\eta^2=.24$ , which was qualified by a Condition by Target interaction,  $F(1,42)=3.98$ ,  $p=.03$ ,  $\eta^2=.19$ . Simple effects analyses revealed that there was a higher rate of projections when exemplars were spatially distant than when they were in close proximity. These results indicate that the way evidence is presented influences the degree to which individuals are willing to generalize from diverse samples. This finding contributes to a growing body of evidence highlighting several ways in which features of evidence presentation influences inductive decisions (Lawson, 2017; in press).

**Sarah Wright, Anna Emerson, Maggie Franzen & Riley Mahr**

Models of Learning, Education, and the Role of Immersion in Pedagogy  
Christopher Willey, Art & Design  
Poster Presentation, Easel 30

The Immersive Media Lab started in February of 2017 with a critical focus on the implications of virtual and augmented reality on our society, specifically education. Our mission has always been to explore the possibilities of this media and put UWM at the forefront of its application. Through cross-disciplinary projects, such as the “MoonPhases” STEM teaching tool- a hands-on spatial simulation-- and “Ephemeral Forest” interactive exhibition, our team has begun to establish a framework for understanding the potential this media has as a tool for learning. The support we’ve garnered has taken our research to the next level, zeroing in on the capabilities of immersive media as a tool for mentors and educators everywhere, and allowed for everyone on this team to focus specifically on different facets of this larger issue. “Education” is a large undertaking, and the first step is supporting our teachers. Our team is tempering this media as a tool to empower educators, exceed the “standard of learning,” and help bridge the educational gaps.

**Kang Bao Xiong**

The Relationship of Parenting Styles and Obesity with Special Needs Children  
Mentor: Michele Polfuss, Nursing  
Poster Presentation, Easel 132

Children with special needs have a higher prevalence of obesity compared to typically developing children (TD). Parenting styles in TD children are related to the child’s weight. The relationship of parenting styles to a child’s weight status has not been studied in children with special needs. Study aims: 1.) Examine parenting styles used by parents of children with Spina Bifida (SB) and Autism. 2.) Examine the relationship of parenting styles to child’s weight status and determine if different based on child’s gender. This cross-sectional study included 330 parents of children with SB or Autism. This sample was recruited nationally by parent groups and organizations. Participants completed an online survey including the 32-item Parenting Styles and Dimension Questionnaire regarding parenting and self-reported their child’s height and weight. Descriptive analysis and ANOVA were used to explore relationships between parenting style and child’s weight status and child gender. Parents of children with SB ( $n = 164$ ) and Autism ( $n = 166$ ) demonstrated similar parenting styles with the majority exhibiting authoritative ( $M = 4.11$ ) followed by permissive ( $M = 2.26$ ) and authoritarian ( $M = 1.67$ ). Children (male = 230; female 100) had similar rates of overweight/obesity: SB = 33.4%, Autism = 38.6%. No significant differences between the child’s weight category based on the parenting styles (authoritative  $p = .597$ ; authoritarian  $p = .513$ ; permissive  $p = .090$ ). Permissive parenting was increased in obese male children as compared to the normal/healthy weight child ( $p = .042$ ), but effect was small (.037). Authoritative parenting was primarily used. Although no relationship between parenting styles and child’s weight was present, a difference in parenting style for obese males was evident but only small effect. Further research should examine other factors that may influence weight status in children with special needs.

**Tiffany Xiong**

Heritage Language Maintenance Among Second and Third Generation Hmong-Americans  
Mentor: Dr. Chia Youyee Vang, History  
Poster Presentation, Easel 59

While the Hmong ethnic group makes up over 299,000 people in the United States, there is little exploration of the Hmong heritage language (HL). The Hmong HL writing system is based on the Romanized writing system; however, the Hmong HL stems from their oral storytelling and the Hmong paj ntaub story cloth. The Hmong’s support and partnership with American forces in Laos during the Vietnam War led to their resettlement across the United States including Milwaukee. The nature of the HL maintenance for Hmong-Americans highlights the decline of the HL among immigrant children due to their attitudes about its relevance in their lives. While there has been a decline of HL use, there has been

an emergence of Hmong-Americans' interest in HL. This study explores the attitudes of second and third generation Hmong-Americans and their perspectives on the HL and its maintenance. An analysis of online and paper surveys provide insight to the Hmong Americans' perspectives. The survey was sent through email to Hmong students who attend UW-Milwaukee and posted on Facebook on various personal pages and Hmong language pages. The findings were based on questions which asked research participants to elaborate on their value and interpretation of the Hmong HL in their life. There were 247 participants in the paper and online surveys. Outcomes unravel essentials at the heart of second and third generation Hmong-Americans' attitudes about the HL maintenance. Their attitudes reveal the language as integral to personal and collective identity, history, and culture. These attitudes also display their engagement and exposure to cultural and HL settings as a result of their interpretation of the HL value. Through these findings, this research conveys the importance of Hmong HL in stitching together the fabric of second and third generation Hmong-American identity.

**Miri Yoon & Yundan Chen**

Exposure to Advertisements and the Use of Electronic Nicotine Delivery Systems (ENDS) among Young Adults

Mentor: Seok Hyun Gwon, Nursing  
Poster Presentation, Easel 90

Americans are attracted by an emerging tobacco product called an Electronic Nicotine Delivery System (ENDS), electronic cigarette, or vape. The prevalence of lifetime use and current use of ENDS are 35.8% and 13.6%, respectively in 2013 and 2014. ENDS marketing expenditures in the U.S. noticeably increased these days. Little is known about the influence of advertisements or promotional images for ENDS (APIE) on the use of ENDS among young adults. The objectives of the study were to examine the prevalence of ENDS use among UWM students and associations between frequencies of APIE, and the ENDS use rate. This study uses a descriptive correlational design using paper-and-pencil questionnaires and online surveys that are being collected cross-sectionally. To date, we collected 136 samples. Descriptive statistics and chi-square test were used to analyze the data. A total of 26.3%, 20.3%, and 20.3% of the participants reported frequent exposure to APIE in brick and mortar, vape shops, and online, respectively. A total of 36.1%, 37.6%, and 34.6% of those reported occasional exposure to APIE in brick and mortar, vape shops, and online, respectively. The ENDS use prevalence was 26.2%. There was a statistical difference in the ENDS use depending on frequencies of exposure to APIE from vape shops, but not on the internet and in brick and mortar. The prevalence of ENDS use in UWM students was much higher than that reported in previous literature. Frequencies of exposure to APIE were significantly associated with ENDS attitude and behavior. There is a need to conduct longitudinal research to identify causal effects of APIE on the ENDS behavior among emerging

adults. We may need to consider regulations of APIE in vape shop settings for the prevention of the ENDS use among young adults.

**Kaitlyn Zacharias**

Thousands of Forms, Thousands of Stories: The Digital Foundation of Postmortem "Life" at Milwaukee County Poor Farm Cemetery

Mentor: Patricia B. Richards, Anthropology  
Poster Presentation, Easel 159

The research presented documents the importance of an integrated approach to successful analysis of individuals excavated from the Milwaukee County Poor Farm Cemetery (MCPFC). More specifically, two case studies are used to explore the role of burial paperwork and photographs in osteological analysis. From 1882 through 1925, the indigent, institutionalized, and unclaimed were buried at the MCPFC. Archaeological excavations occurred at the Milwaukee County Institutions Grounds Froedtert Tract (site # 47 MI 527) in 1991-2 and again in 2013. The University of Wisconsin-Milwaukee (UWM) Archaeological Research Laboratory has final disposition of all materials recovered from the 1991-92 excavations, and of particular relevance to this project, the excavation notes, photographs, and human remains. Completed osteological analyses include inventory, biological profile, pathology, and taphonomy assessments. These assessments were completed according to standard osteological methods as outlined in the UWM-Cultural Resource Management (UWM-CRM) Human Remains Analysis Manual. Given the central role of the burial paperwork and photographs, the analysis protocol includes a final step creating a digital record of all burial information and completed analysis forms as part of the project data management plan. Two burials were chosen for this research because they included more than one individual in a coffin, which highlights the importance of burial paperwork and photographs in informing initial expectations for the analysis process. In the first case, there was no note of more than one individual in the coffin. In the second case, two distinct individuals were identified in the field. Inclusion of osteological analysis, burial paperwork and burial photographs help us share stories, explain aspects of life and death, and demonstrates the collectively powerful postmortem "lives" of those buried in the MCPFC.

**Jonathan Zagrodnik**

Grand Avenue and the Encyclopedia of Milwaukee  
Mentor: Amanda Seligman, History  
Oral Presentation, 1:20pm, Union 280

The Encyclopedia of Milwaukee is a specific type of urban history. The Encyclopedia does not present history in one continuous narrative. Rather, it divides the history of the city into the most crucial, definitive parts. These parts, estimated to total 740, demonstrate how specific elements contributed to the development of Milwaukee as an urban space. The import of this project is it provides the public and emerging scholars a scholarly guide to Milwaukee history. A curious citizen, a high school student, or a college undergraduate can access the Encyclopedia online to learn about the city. The information found on the website is scholarly, with the sources cited so people may expand research on their own. SURF grant recipients assist in two roles in creating entries for this project. First, recipients work as Fact-checkers. The job of the fact-checker is to ensure all the information is scholarly and correct. Once an entry is edited, the fact-checker must confirm individual pieces of information as correct. The verification can involve finding both primary secondary sources, depending on what the author cited. Frequently, fact-checkers must go to the archives to physically access a primary source. Beyond fact-checking, SURF recipients also write an entry for the Encyclopedia of Milwaukee. In this role, recipients must complete as extensive of research as possible and write a 500 word entry on the history of the subject at hand. The entries then go through the normal editing and fact-checking process, in the end to be published in the Encyclopedia. Entries can include “understories,” or small entries illuminating the process of scholarly, historical research.

**Denise Zahran**

The Transmittance of Milwaukee's Hmong Cultures and Traditions  
Mentor: Arijit Sen, Architecture  
Poster Presentation, Easel 15

Milwaukee is one of many cities in America where the population is very diverse but it is one of the most segregated cities in this country. The built environment creates barriers that cause the separation of different cultures and ethnicities. One of the ethnicities in the city of Milwaukee is the Hmong culture and the magnificent traditions that go along with it. A majority of the older Hmong population are refugees and have resettled in the Washington Park neighborhood to no call it their home. In my research I have observed, interviewed, and documented what I have noticed in the Hmong culture located in the Washington Park neighborhood. The spaces that the Hmong people inhabit are changed with the traditions, heritage, and history that each person holds and has carried over from Laos or Thailand. Each aspect of their traditions is held dear to their hearts. One of the main places of my research in the Washington Park Neighborhood was the Hmong American Friendship

Association (HAFA) which was founded in Milwaukee in 1983. HAFA was created by Hmong refugees and is used to better the lives of Hmong people in the greater Milwaukee area. There was also the opportunity for me to spend time with a Hmong family in the Washington Park. The space that this family provided for me was their whole home. I had the opportunity to ask questions and learn the different religious rituals and ceremonies that were done. I also observed the household layout and how the Hmong culture changed the functions of different spaces in this home and in HAFA as well. The overall cultural observations that carry the traditions and heritage down through the generations that inhabit these spaces is the spoken language but it is also smells, sounds, and sights that may awaken memories and induce a behavioral or habitual response. My research will take a person through the history and sentimental values these spaces hold as well as the overall feeling of safety that the presence of the Hmong culture provides for the Hmong refugees.

**Rebecca Zdrojewski**

Misconception About Autism Spectrum Disorder  
Mentor: Celeste Campos-Castillo, Sociology  
Poster Presentation, Easel 77

Misconceptions about Autism occur regularly and are part of the reality individuals with Autism live daily. Some of these misconceptions have presented themselves through forums and websites on the internet such as social media sites and YouTube. This content analysis assesses the social support that is created through comments on YouTube videos posted by individuals with Autism. Comments are coded into categories such as questioning a diagnosis, seeking information or advice, and checking in based on the nature of the comment. While categorizing the comments on each video a trend of the general population having misconceptions about how Autism presents itself and how it can manifest in each individual with a diagnosis has been highlighted. It is important to examine such comments to evaluate a need for a program to educate the general population on the basics of Autism to change the misconceptions about individuals with a diagnosis. Aside from comments relating to a lack of understanding there has been an overwhelmingly positive display of support for individuals posting videos as well as a critical commentary on the educational system and its deficits relating the individuals with Autism.