9th Annual

Provost's Honors Symposium

for Research, Scholarship, & Creative Activity

May 3rd, 2019

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WELCOME

WELCOME TO THE NINTH ANNUAL PROVOST'S HONORS SYMPOSIUM FOR RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITY.

Thanks to the generous support of **Provost Patricia Kleine** and the **Office of Research and Sponsored Programs**, we can offer this wonderful annual event for selected students to present their top-notch work in a professional conference format.

This year the Provost's Honors Symposium will showcase 91 students presenting 46 research, scholarly, and creative projects in more than 24 disciplines.

Participants in the Provost's Honors Symposium are nominated each year by their UW-Eau Claire faculty mentors or major departments. Finalists are selected by the University Honors Council, a committee that includes three University Honors students, faculty representatives from each of the UW–Eau Claire colleges, and University Honors staff:

- Emily Elsner Twesme, College of Business
- Erik Hendrickson, College of Arts and Sciences
- David Jones, Interim Director, University Honors Program
- Hans Kishel, McIntyre Library
- Kris Knutson, Communication & Journalism + Honors Faculty Fellow
- Der-Fa Lu, College of Nursing and Health Sciences
- Morgan Mack, Honors Student Steering Committee
- Vicki Samelson, College of Education and Human Sciences
- Brittany Zine, Co-President, Honors Student Steering Committee

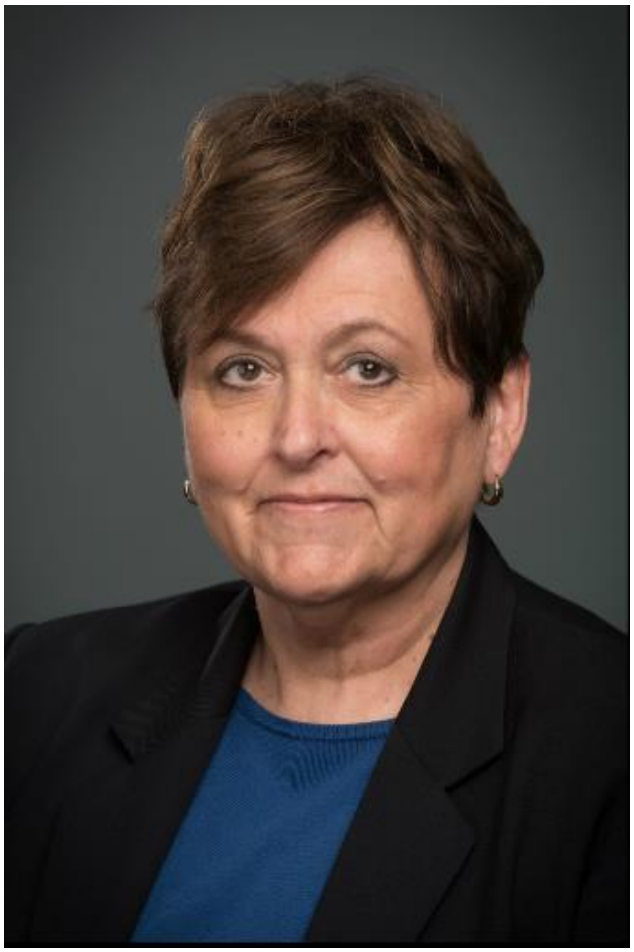
In founding and organizing this annual symposium, the University Honors Program seeks to attain its goal of engaging students fully in activities that lead to research, discovery, high-value projects, and innovation. We thank you for supporting the highly accomplished students and faculty whose collaborative work is featured at this event!

Dr. David Jones, Interim Director, University Honors Program

PROVOST'S RECEPTION

All Presenters, Attendees, Faculty, Staff, Students, and Community Members are Invited!

Join Provost Patricia Kleine



for her reception following the presentations at 5:30 p.m.

Dakota Ballroom

Hors d'oeuvres and refreshments will be served.

A SHORT PROGRAM WILL START AT 5:45 P.M.

TABLE OF CONTENTS

SCHEDULE AT A GLANCE

SESSION I: 1:00 - 2:00 P.M.

CENTENNIAL

1. The Environmental and Cultural Effects of the 1868 Fort Laramie Treaty
2. The Keystone XL Pipeline: Controversy and Consequences
3. Charles Darwin Research Station Seamounts Communication Campaign

MENOMINEE

4. 'Definitely NOT Fair': Resistance Towards Elite Transgender Athletes
5. Real Queer Eau-topias
6. Empowerment Protects Against Suicide Ideation in LGBTQ Young Adults

HO-CHUNK

7. Comparison of Isomeric Aryldibenzopyrylium Salts as Highly Conjugated Planar Dyes
8. Structural and Energetic Properties of Nitrogen Donor Complexes of Group IV Acceptors

CHANCELLORS

9. University Students and Balance: Investigating Social Support, Self-Efficacy, and Family Communication Patterns
10. Gender and Communication: Perceptions of Diffuse Status Characteristics in Workplace Email
11. Female College Students' Aspirations Regarding Childbearing, Family, and Parenting Practices

SESSION II: 2:10 - 3:10 P.M.

CENTENNIAL

12. Searching for the Lithuanian Anne Frank: A GPR Investigation
13. Examining Ancient Coastlines and Archeological Features at Tel Akko, Israel: Using 3D Ground Penetrating Radar Imaging
14. Modeling the Influence of Land Use/Land Cover Change on Surface Water Quality in the Lower Mekong River Watershed, Cambodia

MENOMINEE

15. The Impact of Low to Moderate Chronic Intermittent Ethanol Exposure on Behavioral Endpoints in Aged, Adult, and Adolescent Rats
16. Primed for Offense? An Experimental Investigation of Priming Perceptions of Harm
17. The Interaction of Distress Tolerance and Pain on the Frequency of Non-Suicidal Self-Injury

HO-CHUNK

18. Stimuli-Responsive Colloidal Systems
19. Interfacial Activity of PEG-PDMAEMA Copolymers
20. Rheological Properties of PDMAEAMA Copolymers

CHANCELLORS

21. The Sources of Happiness: A Comparative Study Between China and the U.S.
22. Economic Indicators and Business Forecasting

SESSION III: 3:20 – 4:20 P.M.

CENTENNIAL

23. A Metalinguistic Approach for School-Based Speech and Language Interventions
24. An Examination of Participant Perceptions on Experiences at Aphasia Camp: Incorporating Forced Choice to Avoid a Ceiling Effect
25. Research into Evidence-Based Practice among Practicing Speech-Language Pathologists

MENOMINEE

26. Women and Microloans in Nicaragua: Changes in Standard of Living?
27. Developing Global Competencies and Global Capacities in Two Teacher Education Programs Through International Collaboration
28. Impact of Foreign Language and Cultural Skills on Undergraduate Marketability

HO-CHUNK

29. Mechanical Testing of Bi-2212 Superconducting Wires to Replicate Stress States in Manufactured Rutherford and Cable-In-Conduit Conductor Cables
30. Investigation of REBCO Superconducting Wire Internal Structure and Composition
31. Exploring the Surface Effects of $LiCoO_2$ for Applications in Supercapacitors

CHANCELLORS

32. Personal Diction & Character Development: Lord of the Rings
33. Chaos Demon: A Comparative Study on the Origins of Characteristics Concerning Monsters and Cosmic Battles
34. Plum Season

SESSION IV: 4:30 – 5:30 P.M.

CENTENNIAL

35. Evolutionary Differences in Structural Dynamics Among Prolyl-tRNA Synthetases from Different Species
36. Progress Toward Identifying Biomarkers of Polycystic Kidney Disease
37. Effects of Macromolecular Crowding on Escherichia coli Prolyl-tRNA Synthetase Conformational Changes

MENOMINEE

38. Chinese and American Support for an International Climate Treaty Across Countries and Years: Analysis by Calculated Knowledge/Acceptance/Concern Scores
39. Insights into Public Views on Climate Change in China and the United States: Content Analysis of Open-Ended Survey Question Responses
40. Investigating the Willingness-to-Pay for Climate Change Policy Action to Reduce Greenhouse Gases Among Chinese and American Citizens: Comparing Results from Surveys Conducted in 2015 and 2017

HO-CHUNK

41. An Examination of Pre-service Teachers' Use of Code-switching in a Summer Immersion Camp
42. Effective Critique Methods across a Scaffolding Curriculum
43. The Perspectives of Graduate Students on the Implementation of Twitter as an Education Tool in Higher Level Education Courses

CHANCELLORS

44. Deformations of Algebras
45. Creating an Affordable Solar Water Heater
46. Particulate Air Quality around Wisconsin Silica Sand Mines

PRESENTATIONS

SESSION I: 1:00 - 2:00 P.M.

CENTENNIAL ROOM

1. THE ENVIRONMENTAL AND CULTURAL EFFECTS OF THE 1868 FORT LARAMIE TREATY

Presenter: Alyssa Huelsbeck

Faculty nominator: Robert Bell, American Indian Studies

During the 19th century, the Lakota people lost significant portions of their land under the Fort Laramie treaties, ultimately splitting the Great Sioux Reservation into the smaller reservations that exist today. Although the breakup of the reservation occurred more than 100 years ago, the treaties and legislation which were used to do this have created enduring problems that can still be seen today in a variety of areas. This project examines the environmental and cultural effects that have been experienced due to the breakup of the Great Sioux Reservation. By analyzing relevant treaties and legislation, as well as academic literature from other disciplines, the goal is to establish a connection between the loss of the original reservation and the range of negative consequences that have occurred since 1868. These include significant alterations to the ecology of the Great Plains, changes to Lakota traditions and culture, diet-related health problems among the Lakota people, and, recently, threats to the water supply, land, and cultural sites on the remaining reservations. The results from this project demonstrate that the breakup of the Great Sioux Reservation has created far-reaching and lasting consequences both environmentally and culturally.

2. THE KEYSTONE XL PIPELINE: CONTROVERSY AND CONSEQUENCES

Presenter: Lindsey Boehm

Faculty nominator: Robert Bell, American Indian Studies

This project aims to outline the major potential environmental and cultural consequences of the Keystone XL Pipeline for American Indians and explore how legislation from the late 1800's and forward can be used to fight the project in the courts. The National Environmental Policy Act of 1969 (NEPA) has already been used successfully in the courts to temporarily block the Keystone XL Pipeline and this project identifies other pieces of legislation from the 19th and 20th century that may bolster the already strong case NEPA makes against the pipeline. The approach to the project includes extensive review of treaties, acts of congress, laws, and presidential memorandums from the late 1800's forward with specific attention to those that address American Indian water rights. The project highlights 5 key pieces of legislation that could combine in the courts to block or reverse work on the Keystone XL Pipeline. I will recommend that American Indians and environmental groups combine legislation from the late 1800's with more recent U.S. policies and memorandums to create a cohesive, strong case against the Keystone XL pipeline that can be presented in the court system.

3. CHARLES DARWIN RESEARCH STATION SEAMOUNTS COMMUNICATION CAMPAIGN

Presenter: Sara Lavalley

Faculty nominator: Paula Kleintjes Neff, Biology

Seamounts are underwater mountains that extend up from the sea floor but do not reach the surface. They are often viewed as underwater islands that attract many forms of life of ecological and economic importance. This presentation explains the formation of seamounts arising near the Galapagos Islands, Ecuador and the underwater factors, such as depth and light availability, that affect the diversity of species that inhabit them as well as the morphological adaptations observed in fish at variable depths. Data for this project were collected and adapted into a visual art presentation while I served as an intern at the Charles Darwin Research Station in the summer of 2018. The final project will be used by the Charles Darwin Foundation for community outreach and educational events.

MENOMINEE

4. 'DEFINITELY NOT FAIR': RESISTANCE TOWARDS ELITE TRANSGENDER ATHLETES

Presenter: Amelia Montie

Faculty nominator: Pam Forman, Sociology

In October 2018 Rachel McKinnon won the sprint competition at the UCI Masters World Cycling Championships. Immediately, she faced a social media backlash for her identity as a transwoman. Third-place finisher Jennifer Wagner argued the race was "definitely NOT fair". McKinnon retorted: "If I win, they attribute it to me being trans and having an unfair advantage. If I lose, the same people think I must not be good anyway." The entrance of transgender individuals into public life has been met with resistance in all institutions, but particularly those imbued with extreme masculinity. Since sport ordinarily is contested in sex-segregated competitions, intersex and transgender athletes face intense scrutiny. Our research uses a watershed moment in sport to critically analyze (trans)gender relations within the United States (McDonald and Birrell 1999). We argue that detractors confuse sex and gender, and misconstrue the policies governing transgender athletes' participation in elite sport. Our conclusion situates the current administration's attempts to redefine sex and gender in ways that erode human rights.

5. REAL QUEER EAU-TOPIAS

Presenter: Clara Neupert

Faculty nominator: Ellen Mahaffy, Communication & Journalism

Real Queer Eau-topias contextualizes students' experiences at UW-Eau Claire and what the values of equity, diversity, and inclusivity (EDI) mean to them. The research is important in that it can help us understand how the university can more fully live up to its values. Each student in the research group undertook a different facet of EDI. This facet of the project contextualizes queer experiences at UW-Eau Claire. The 2015 UW-Eau Claire Climate Survey found 71.4 percent of trans and nonbinary students considered leaving campus. We sought to find what the ideal campus looks like for these students. Qualitative research involved conducting three to four focus groups of two to five people. Participants completed two questionnaires, one measuring their demographics and the other a post-discussion evaluation. For EDI goals to be met, the campus must continue to work to improve the

experiences of minority populations by actively combating white supremacy, providing resources, and ensuring safe, inclusive learning environments. This project is a continuous work, as researchers hope to hold more focus groups in the coming semesters.

6. EMPOWERMENT PROTECTS AGAINST SUICIDE IDEATION IN LGBTQ YOUNG ADULTS

Presenters: Sierra Dortch & Kristina Olson

Faculty nominator: Jennifer Muehlenkamp, Psychology

The current project uses data collected from over 340 university students identifying as LGBTQ to evaluate whether a sense of empowerment and having gay-straight-alliance participation reduces the presence of known risk factors for suicide; thus, reducing risk for suicide in this population. Moderated-mediation linear regression analyses were conducted to test the study's hypotheses. Results indicated that empowerment was a significant moderator of the relationship between experiences of sexual-minority stress and experiences of perceived burdensomeness, which were related to suicidal ideation. GSA involvement was not significant. These findings indicate that empowerment helps to reduce feelings of burdensomeness and thereby indirectly decrease risk for suicidal thinking among LGBTQ persons. Early prevention efforts should focus on building a sense of empowerment among sexual minority youth to reduce risk for suicide.

HO-CHUNK

7. COMPARISON OF ISOMERIC ARYLDIBENZOPYRYLIUM SALTS AS HIGHLY CONJUGATED PLANAR DYES

Presenter: Samantha Meyer

Faculty nominator: Bart Dahl, Chemistry

Many planar conjugated organic compounds can be incorporated into a variety of useful applications, such as sensors and dyes, due to their unique optical properties. One such class of these compounds contains the pyrylium unit, which is capable of reversible pH-driven conformational changes. This project focuses on the synthesis of novel aryldibenzopyrylium dye compounds with optimized pH sensitivity, fluorescent capabilities, and the ability to reversibly alter their conformation and thus produce variable optical properties. We set out to synthesize a new class of isomeric compounds, which incorporate a doubly benzannulated pyrylium unit in each structure, to determine how the molecular shape impacted the optical properties. These properties can be studied using UV-vis and fluorescence emission detection techniques. These analyses will allow for a deeper understanding of the electronic properties of these molecules and how both the conjugation path length and structural motifs alter these properties. This work has not only yielded an entirely new class of pH-sensitive fluorescent molecules but has contributed to the constantly evolving understanding of electronic activity in conjugated pathways.

8. STRUCTURAL AND ENERGETIC PROPERTIES OF NITROGEN DONOR COMPLEXES OF GROUP IV ACCEPTORS

Presenters: Anna Ley, Rachel Mooney & Brittany Zehner

Faculty nominator: James Phillips, Chemistry

The overall research goal is to identify and characterize donor-acceptor complexes that undergo major structural changes when their chemical environment is varied (i.e., gas, solid, solution, etc.). In this phase of this on-going project, we extend these investigations to complexes involving MX_4 and MX_3R Lewis acids (M=Si, Ge; X=F, Cl; R=CH_3, C_6H_5). The premise is that the geometries of these acceptors, especially MX_3R acids due to the lone organic substituent, may offer a means to embed a medium-sensitive structural motif into larger assembly, which would facilitate the exploitation of this "tunable" structural chemistry for various materials applications (e.g., molecular machines, piezoelectrics). The first step, however, is assessing the overall acceptor strength of the MX_4 and MX_3R acids towards various donors, as well as the preferred coordination arrangements. Our methods for this involve a combination of theoretical modeling and specialized experiments (low-temperature infrared spectroscopy), and we will present results from four distinct student project under this broad heading, which enabled us to draw key generalizations from this collection of data.

CHANCELLORS

9. UNIVERSITY STUDENTS AND BALANCE: INVESTIGATING SOCIAL SUPPORT, SELF-EFFICACY, AND FAMILY COMMUNICATION PATTERNS

Presenters: Kelly Anthony, Shelby Trusty & Ashley Wiswell

Faculty nominators: Martha Fay & Kristine Knutson, Communication and Journalism

Current studies indicate that university students in the United States are experiencing mental health concerns, including stress, at rising rates (James, 2017). Students are expected to succeed in every area of their lives, whether it be attending class 12-18 hours a week, completing homework 24-36 hours per week, working a job, worrying about finances, enjoying college life by attending all social events, making time to eat healthy and exercise, or getting the recommended 7-9 hours of sleep per night (Cederwall, 2017). The multiple demands placed on students are experienced as stress and can lead to feelings of imbalance (Smeltzer, Cantrell, Sharts-Hopko, Heverly, Jenkinson, Nthenge, 2016). While the associations between stress and social support (Cohen, Hoberman, 1983), self-efficacy (Wilcox, Felsten, 1992), and family communication (Schrodt, Ohrt, 2007) have been researched in the workplace, college-level student stress, and the factors that may mitigate it, have largely been ignored. This study surveys university students to look for possible relationships between these variables. Results can be used to help future university students alleviate stress and achieve balance.

10. GENDER AND COMMUNICATION: PERCEPTIONS OF DIFFUSE STATUS CHARACTERISTICS IN WORKPLACE EMAIL

Presenters: Lucy Grogan-Ripp, Leslie Peterson, Gwendolyn Smith, Caroline Walz, & Cole White

Faculty nominator: Martha Fay, Communication & Journalism

Previous research has shown that perceptions of gender act as a diffuse status characteristic which impacts how interlocutors perceive the competence, ability, and value of others (Carli, 1990). However, this research was conducted prior to the proliferation of electronic communication and focused primarily on verbal communication; this is important because visual cues contribute to perceptions of communication as gendered, and stereotypically feminine traits are evaluated less favorably than masculine traits (Carli, 1990). One communication style typically associated with femininity is tentative language; conversely, dominant language is usually associated with

masculinity (Carli, 1990). These communication styles manifest not only in face-to-face interaction, but also in electronic and written interaction. Although Ma and Atwell Seate (2017) found that both men and women use tentative language via workplace email when the topic is perceived to be gender salient, little research has been done to show how tentative and dominant communication are associated with perceptions of diffuse status characteristics. Using social identity theory (Tajfel, 1979), this study evaluates use of language strategies in workplace emails for their possible association with interlocutor perceptions of diffuse status characteristics. Results may be used to help employees understand how their use of language impacts others' perceptions of them.

11. FEMALE COLLEGE STUDENTS' ASPIRATIONS REGARDING CHILDBEARING, FAMILY, AND PARENTING PRACTICES

Presenter: Madigan Knuth

Faculty nominator: Mary Leibham, Psychology

Given the influx of information via technology (e.g., internet, social media) over the last 25 years, it is likely that current millennial college students are aware of various childbirth options (e.g., hospital birth, home birth), and more knowledgeable about the benefits of breastfeeding and vaccinations than students were 25 years ago. Further, exposure to information via technology has also likely increased college students' awareness of the variability in family planning (e.g., timing of children), family structure (e.g., cohabitation, marriage), and family practices (working vs stay-at-home parents). In this study, female college students' aspirations and knowledge surrounding childbearing, family structure, and parenting practices were examined. More specifically, participants were asked to report their anticipated decisions regarding timing of children, home vs. hospital delivery, breastfeeding, vaccinating children, cohabitation, and working vs. stay-at-home parenting. The main goal of this study was to examine the variability in current UWEC female students' reported aspirations and knowledge surrounding childbearing, family structure, and parenting practices, particularly those practices that may have been less common 25 years ago (e.g., cohabitation, water births).

SESSION II: 2:10 – 3:10 P.M.

CENTENNIAL

12. SEARCHING FOR THE LITHUANIAN ANNE FRANK: A GPR INVESTIGATION

Presenter: Joseph Beck

Faculty nominator: Harry Jol, Geography & Anthropology

Matilda Olkin was a Jewish girl who lived in the city of Rokiškis in northwestern Lithuania. She was a writer who was locally recognized for her poetry. Shortly after the Nazi invasion of Lithuania in the summer of 1941, the Nazis and their local collaborators had begun to arrest and execute the Jewish populations across the country. Matilda Olkin and her family were arrested and later murdered beside a farmer's field south of the city of Rokiškis. Her journals and poem books were hidden by the local priest, preserving her thoughts and poems as she experienced the Holocaust. In the summer of 2018, a ground penetrating radar survey was conducted in areas identified by eyewitnesses. The survey used 500 MHz antenna to collect a 10x10 meter grid in the identified location. The results

from the survey showed an area of low reflectance potentially revealing the burial location of Matilda Olkin and her family.

13. EXAMINING ANCIENT COASTLINES AND ARCHEOLOGICAL FEATURES AT TEL AKKO, ISREAL: USING 3D GROUND PENETRATING RADAR IMAGING

Presenters: Logan Bergevin & Joseph Beck

Faculty nominator: Harry Jol, Geography & Anthropology

From the Late Bronze Age to the Hellenistic period, Tel Akko, Israel was a significant ancient port city located on the northern portion of the Haifa Bay. This study presents ground penetrating radar (GPR) surveys collected at the south and southwest base of Tel Akko, where the coast is theorized to have been located. Three GPR grids were collected using a Sensors and Software pulseEKKO 1000 GPR system and analyzed using EKKO_Project, and Voxler. GPR survey results indicate that within grid A there is a drop-off associated with the end of the Kurkar Sandstone. Locations beyond the "drop-off" would be viable locations for a coastal harbor. Grid B contained areas interpreted as sedimentary downlap in an east to west direction, and a 1-3m area of reflections found at a depth of 0.4-0.5m. Both features provide evidence of progradation and a buried coastline. Grid C contains multiple areas of chaotic reflections indicating disturbances. While on the eastern side of Grid C, the subsurface stratigraphy revealed regions of right-angled patterns and are interpreted as human-made features.

14. MODELING THE INFLUENCE OF LAND USE/LAND COVER CHANGE ON SURFACE WATER QUALITY IN THE LOWER MEKONG RIVER WATERSHED, CAMBODIA

Presenter: Pa Zong Vang

Faculty nominator: Kelly Wonder, McNair Program

The main goal of this research is to investigate the relationship between land use/land cover (LULC) change and surface water quality in the Lower Mekong River Watershed, Cambodia. Landsat satellite data provided LULC information for the following years– 1988, 2004, and 2018. LULC information was generated by implementing object-based image analysis followed by random forest classifier and expert systems. Classified LULC images were then assessed for accuracy. The Soil and Water Assessment Tool (SWAT) was used to model the concentration of total suspended sediments and nitrogen load at the sub-basin level. Prior to the modeling of water pollutants mentioned above, SWAT was calibrated for flow and water quality respectively, using river discharge data collected by the Mekong River Commission. Results of this study demonstrates significant spatiotemporal relationships between LULC and surface water quality throughout the Lower Mekong River Watershed. The results have great potential to provide information that can be invaluable to sustainable watershed planning for present and future generations.

MENOMINEE

15. THE IMPACT OF LOW TO MODERATE CHRONIC INTERMITTENT ETHANOL EXPOSURE ON BEHAVIORAL ENDPOINTS IN AGED, ADULT, AND ADOLESCENT RATS

Presenters: Abigail Kastner & Amelia Schneider

Faculty nominator: Douglas Matthews, Psychology

The average age of the population in the United States and other countries is increasing. Understanding the health consequences in the aged population is critical. Elderly individuals consume ethanol, often at elevated rates, and in some cases in a binge episode. The present study sought to investigate if binge like ethanol exposure in aged male rats produced differential health and behavioral effects compared to adult male and adolescent male rats. Subjects were exposed to either 1.0 g/kg or 2.0 g/kg ethanol every other day via intraperitoneal injection for 20 days and tested on a variety of behavioral measures and body weight. Binge like ethanol exposure produced differential effects on body weight between aged and adolescent and adult rats. In addition, aged rats had significantly longer loss of righting reflex and demonstrated a trend toward tolerance following the 2.0 g/kg exposure. No significant effects on anxiety-like behavior as measured by open arm entries, depressive-like symptoms as measured by immobility in the forced swim test or cognitive performance as measured by latency and pathlength in the Morris water maze were found. These results demonstrate that aged animals are differentially sensitive to the impact of chronic intermittent ethanol exposure in some, but not all behaviors. Future research is needed to understand the mechanisms of these differential effects.

16. PRIMED FOR OFFENCE? AN EXPERIMENTAL INVESTIGATION OF PRIMING PERCEPTIONS OF HARM

Presenters: Stephanus Badenhorst, Keith Jorgensen, Katie Paulich, & Eleni Seyoum

Faculty nominators: Michael Axelrod, Human Development Center + Psychology & April Bleske-Rechek, Psychology

Microaggressions were introduced in the context of race relations and defined as "brief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial slights and insults toward people of color" (Sue et al., 2007, p. 271). Since then, awareness of microaggressions has increased and use of the term "microaggression" has spread to the domains of gender and sexuality (Lilienfeld, 2017). However, the research program on microaggressions has not provided clear operational definitions of the construct or evidence that individuals agree about what types of statements are – and are not - harmful. In this talk, we will describe the results of an experiment we are conducting to test hypothesis that priming individuals to perceive others' words as harmful leads individuals to perceive others' words as harmful as well as to report a lower likelihood of using those words themselves.

17. THE INTERACTION OF DISTRESS TOLERANCE AND PAIN ON THE FREQUENCY OF NON-SUICIDAL SELF-INJURY

Presenter: Sierra Dortch

Faculty nominators: Christopher Hagan, Psychology & Jennifer Muehlenkamp, Psychology

A combination of low distress tolerance (DT) and elevated pain endurance demonstrated by those who engage in non-suicidal self-injury (NSSI) may pose a particular risk for repeated engagement in NSSI. These individuals may experience more distress and have a reduced barrier to NSSI through an elevated ability to endure pain. We hypothesized a negative correlation between DT and NSSI frequency, a positive correlation between pain endurance and NSSI frequency, and a significant interaction wherein low DT and high pain endurance would be connected to high NSSI frequency. Participants were 193 undergraduates who completed self-report measures and a pressure pain tolerance assessment in a lab. Our first hypothesis was partially supported; there was a significant negative relationship between DT and NSSI frequency (ρ = -.16, p = .03) and a non-significant positive correlation between pain endurance and NSSI (ρ = .08, p = .25). Our zero-inflated Poisson analysis revealed that there were no significant main or interaction effects. Our results suggest that assessing and improving distress tolerance in a clinical setting may not decrease NSSI frequency.

HO-CHUNK

18. STIMULI-RESPONSIVE COLLOIDAL SYSTEMS

Presenter: Nathan Pinter

Faculty nominator: Elizabeth Glogowski, Materials Science & Engineering

PEG-PDMAEMA or polyethylene glycol-block-poly (2-dimethylaminoethyl methacrylate) copolymers exhibit stimuli-responsive or “smart” properties in solution. Smart polymers dramatically switch properties, such as solubility and interfacial activity, in response to a small change in an external stimulus such as temperature or pH. Surfactants, or surface-active agents, assemble at the interface of two immiscible fluids, such as oil and water. PEG-PDMAEMA acts as a smart polymer surfactant. PEG-PDMAEMA copolymers were synthesized using atom transfer radical polymerization with controlled PEG and PDMAEMA molecular weight and ratio of PEG to PDMAEMA. The copolymers were characterized by Nuclear Magnetic Resonance Spectroscopy and Gel Permeation Chromatography. Solubility was tested using UV-Visible Spectroscopy and Dynamic Light Scattering. Interfacial activity was determined used a pendant drop tensiometer to measure the drop in interfacial tension as a function of polymer composition, concentration, pH, and temperature. Understanding the smart surfactant properties of these copolymers enables their optimization for applications ranging from enhanced oil recovery to their use as dispersants for improving architectural coatings such as paints and primers.

19. INTERFACIAL ACTIVITY OF PEG-PDMAEMA COPOLYMERS

Presenters: Kendra Berry & Megan Hottmann

Faculty nominator: Elizabeth Glogowski, Materials Science & Engineering

PEG-PDMAEMA or polyethylene glycol-block-poly (2-dimethylaminoethyl methacrylate) copolymers exhibit stimuli-responsive or “smart” properties in solution. Smart polymers dramatically switch

properties, such as solubility and interfacial activity, in response to a small change in an external stimulus such as temperature or pH. Surfactants, or surface-active agents, assemble at the interface of two immiscible fluids, such as oil and water. PEG-PDMAEMA acts as a smart polymer surfactant. PEG-PDMAEMA copolymers were synthesized using atom transfer radical polymerization with controlled PEG and PDMAEMA molecular weight and ratio of PEG to PDMAEMA. The copolymers were characterized by Nuclear Magnetic Resonance Spectroscopy and Gel Permeation Chromatography. Solubility was tested using UV-Visible Spectroscopy and Dynamic Light Scattering. Interfacial activity was determined used a pendant drop tensiometer to measure the drop in interfacial tension as a function of polymer composition, concentration, pH, and temperature. Understanding the smart surfactant properties of these copolymers enables their optimization for applications ranging from enhanced oil recovery to their use as dispersants for improving architectural coatings such as paints and primers.

20. THEOLOGICAL PROPERTIES OF PDMAEAMA COPOLYMERS

Presenter: Tessa Plautz

Faculty nominator: Elizabeth Glogowski, Materials Science & Engineering

PDMAEMA or poly (2-dimethylaminoethyl methacrylate) is a "smart" polymer. Smart polymers change properties, including solubility and viscosity, in response to an external trigger such as temperature or pH. Copolymers of PDMAEMA exhibit unique smart properties based on polymer structure, including block length and ratio. Copolymers have been synthesized using atom transfer radical polymerization (ATRP) and activators regenerated by electron transfer ATRP (ARGET ATRP). Their smart properties have been tested using UV-Visible Spectroscopy and Dynamic Light Scattering. Rheological properties, including viscosity and shear moduli, have been tested as a function of polymer composition, concentration, pH, and temperature. These copolymers have potential applications from drug delivery to water purification and enhanced oil recovery.

CHANCELLORS

21. THE SOURCES OF HAPPINESS: A COMPARATIVE STUDY BETWEEN CHINA AND THE U.S.

Presenter: Madeleine Mayer

Faculty nominator: Yan Li, Economics

In this project, we investigated the issue of happiness in China and the United States. By using data from the World Value Survey (WVS), we empirically tested how various factors related to the overall happiness in China and the United States, respectively. The lack of such a comparative study has indicated the importance and relevance of our research. Our results will add new knowledge to the happiness research in the context of developing and developed countries and contribute to the understanding of economic well-being.

22. ECONOMIC INDICATORS AND BUSINESS FORECASTING

Presenters: Andrew Fink, Wyatt Pajtash

Faculty nominator: Yan Li, Economics

Forecasting is vital and has far-reaching impact on business performance and economic development. Housing price is a crucial indicator because it reflects the health of an economy. By using a linear regression model with autoregressive-moving-average components along with quarterly census data dating back to 1975, we carry out forecasting on median housing prices in various regions across the United States. Our model generates a quality forecast and allows us to predict how U.S. housing prices may vary over the next few years.

SESSION III: 3:20 – 4:20 P.M.

CENTENNIAL

23. A METALINGUISTIC APPROACH FOR SCHOOL-BASED SPEECH AND LANGUAGE INTERVENTIONS

Presenters: Maris Krekelberg, Megan Larson, & Vanessa Ziehme

Faculty nominator: Vicki Samelson, Communication Sciences & Disorders

A challenge for many students receiving speech-language pathology services is the development of metalinguistic awareness to support generalization of newly learned speech-language skills to classroom and home environments. This study aimed to 1) explore the degree to which elementary-age students could integrate a metalinguistic mindset into their speech-language sessions, and 2) describe the process of an SLP-Researcher collaborative project. We hypothesized that increasing a student's meta-awareness of their goals and strategies would positively alter the student's mindset and help them internalize what they learned. In recognition of the value of practice-based research, we recruited three school-based SLPs who then selected five third and fourth grade students from their caseloads. The SLPs incorporated a metalinguistic approach into therapy sessions and recorded a series of interviews and Think Alouds where the students were prompted to reflect on goals and strategies that would support generalization. Data was analyzed using a mixed methods approach to determine the depth and frequency of metalinguistic thinking. Variability across the participants' results and SLPs' reflections on incorporating the metalinguistic approach will be discussed.

24. AN EXAMINATION OF PARTICIPANT PERCEPTIONS ON EXPERIENCES AT APHASIA CAMP: INCORPORATING FORCED CHOICE TO AVOID A CEILING EFFECT

Presenter: Megan Schulze

Faculty nominators: Jerry Hoepner & Thomas Sather, Communication Sciences and Disorders

The Chippewa Valley Aphasia Camp is a joint venture between Mayo Clinic Health System – Eau Claire and the University of Wisconsin – Eau Claire Communication Sciences and Disorders Department. Now entering its 16th year, the camp strives to continuously improve and innovate based on participant perceptions and preferences. Program development and continuous improvement is guided by yearly participant surveys, however; camper feedback is historically, overwhelmingly positive. Camp

leaders value that feedback but also wish to elicit constructive feedback, avoiding the ceiling effect garnered by assessments that suggest everything is great. This past fall, we initiated a new type of survey structured to avoid the ceiling effect by asking participants to rate their top five, most valued and bottom five, least valued camp elements. The uniquely designed survey was constructed to be aphasia-friendly, providing an equal voice to all attendees, regardless of aphasia severity. Both the survey content and the survey design reflect the value of campers' specific priorities and offers a voice to persons with severe communication impairments who are often overlooked in traditional data-gathering procedures.

25. RESEARCH INTO EVIDENCE-BASED PRACTICE AMONG PRACTICING SPEECH-LANGUAGE PATHOLOGISTS

Presenters: Kaitlyn Bruggenthies, Josie Zimmel, & Dana Walstead

Faculty nominators: Jerry Hoepner & Rebecca Jarzynski, Communication Sciences and Disorders

The goal of this study was to investigate the gap between evidence-based practice (EBP) and the clinical methods used by practicing speech-language pathologists (SLPs). Previous studies into the use of EBP among health professionals indicate that professionals rely heavily on clinical expertise of colleagues to guide their clinical services and report a variety of barriers in accessing research evidence. However, limited previous research has explored specific barriers and facilitators of EBP within the field of speech-language pathology. In order to identify SLP perceptions of factors that improve and hinder information access and implementation of EBP, a survey was developed and distributed to practicing SLPs, 206 of whom completed the survey. Survey data was analyzed both quantitatively and qualitatively to gain an understanding of practicing SLPs' current use of EBP, their methods for accessing research evidence, the factors that inhibit and facilitate implementation of EBP within clinical settings, and the disorder types with which EBP is most and least frequently utilized.

MENOMINEE

26. WOMEN AND MICROLOANS IN NICARAGUA: CHANGES IN STANDARD OF LIVING?

Presenter: Hannah Bryson

Faculty nominators: Analisa DeGrave, Languages; José Alvergue, English; & Jeff DeGrave, Intercultural Immersion

This project entitled: Women and Microloans in Nicaragua: Changes in Standard of Living?, aims to provide a deep analysis of economic and social effects of microloans within the microfinance communities unique to Matagalpa, Nicaragua—particularly examining their impact on women. This project analyzes how microloans connect to female empowerment and what role microloans play in the change of the socio-economic status of women. Using the personal interviews of women in Matagalpa, this research project examines how they have been affected by microloans. Looking at how these women see the connection between microloans and empowerment is crucial to understanding how microloans and microloan cooperatives can further the feminist agenda in Matagalpa, Nicaragua. One of the goals for this project is to see if the women of Matagalpa, Nicaragua feel that access to microloans has improved their standard of living, socially and economically. The other is to effectively—and ethically—apply the narratives of these women to gain

greater understanding on how microloans impact women's lives in Matagalpa, Nicaragua. The overall value of this research is that it analyzes a factor of what is currently shaping the social empowerment movement for women in Nicaragua and how transnational or local microlending can cause cultural and economic changes.

27. DEVELOPING GLOBAL COMPETENCIES AND GLOBAL CAPACITIES IN TWO TEACHER EDUCATION PROGRAMS THROUGH INTERNATIONAL COLLABORATION

Presenters: Theresa Laporte, Jack Marchiafava, Kevin Ruhl, Elizabeth Scott, & Amy Verdegan

Faculty nominators: Carmen Manning, Education and Human Sciences & Eric Torres, Education Studies

This action-research collaborative project is a qualitative and quantitative comparative study of two successful multicultural and intercultural experiences in Peru. Through service learning as a teacher aide, ethnographic observation, surveys, interviews, critical reflection, and narrative inquiry student researchers made an abstraction of both their Peruvian students' and their own global learning experiences. Our challenge is to translate increased awareness about race, culture, intercultural relations, language difference, power and identity in the global commons into effective teaching practices conducive to the development of individual global competencies and institutional global capacities. Additionally, student researchers identified key curricular elements to be considered in a Diploma of Specialization in Global Learning to be designed and implemented as a joint effort and under a strategic alliance between UWEC's and Pontificia Universidad Catolica del Peru's teacher education programs.

28. IMPACT OF FOREIGN LANGUAGE AND CULTURAL SKILLS ON UNDERGRADUATE MARKETABILITY

Presenters: Caitlin Hedberg & Alexander Richert

Faculty nominator: Kaishan Kong, Languages

The world is becoming increasingly globalized, making it more and more important for businesses to operate internationally. It then follows that demand for individuals with foreign language and communication skills as well as knowledge of international culture would rise in the new business world. This assumption then prompts the overarching question on which this research is founded: In what way do foreign language and cultural skills impact an individual's marketability? This research utilizes both qualitative interview data and survey from American businesses and Chinese students, to explore the importance of foreign language proficiency in American businesses, as well as to assess a baseline of useful qualities in potential hires. This study is significant because it provides valuable information to help university students better tailor their studies to present a more marketable front for job applications in an increasingly competitive job market.

HO-CHUNK

29. MECHANICAL TESTING OF BI-2212 SUPERCONDUCTING WIRES TO REPLICATE STRESS STATES IN MANUFACTURED RUTHERFORD AND CABLE-IN-CONDUIT CONDUCTOR CABLES

Presenter: Jordan Egner-Schnitzler

Faculty nominator: Matthew Jewell, Materials Science & Engineering

Recent increases in the critical current density of Bi2Sr2CaCu2O8-x (Bi-2212) composite wires have driven interest in superconducting magnet applications for this material. However, the round-wire composite material is comprised of brittle filaments in a soft silver matrix, leaving the wire susceptible to filament damage during magnet operation. In this study, Bi-2212 wires were compression tested to simulate manufacturing stress states. Confocal microscopy was used to analyze wire indentations produced from testing as a function of load and angle between compressed wires. An external chemical etch process was applied to reveal filament damage. Then, scanning electron microscopy (SEM) was utilized to analyze the filament damage in each sample. Damage was specified as a function of load applied by the Instron and angle between the compressed wires. In general, as the amount of applied load on the wires increased, the observed filament damage increased. This new understanding of Bi-2212 filament damage produced in simulated manufacturing stress states establishes an understanding of how manufacturing environment can impact mechanical performance.

30. INVESTIGATION OF REBCO SUPERCONDUCTING WIRE INTERNAL STRUCTURE AND COMPOSITION

Presenter: Tanner Olson

Faculty nominator: Matthew Jewell, Materials Science & Engineering

Rare-earth cuprate-based (REBCO) superconductors are a family of high-field, high-temperature superconductors that are fabricated in a tape geometry. This structure is composed of a nickel-based Hastelloy substrate base, with oxide buffer layers and a superconducting film. The composite is finished with a silver cap layer and a copper stabilizing layer. The largest limitation of REBCO tapes in electromagnets is the possibility of internal, transverse delaminations; however, the microstructural features that cause this behavior are not fully understood. During this study, we have utilized several forms of high detail microscopy and different chemical identification methods to give insight into the mechanism causing these internal damages. Our end goal of the study is to provide feedback to the product manufacturer regarding this weak-link mechanism to improve future mechanical performance of the composite material.

31. EXPLORING THE SURFACE EFFECTS OF $LICOO_2$ FOR APPLICATIONS IN SUPERCAPACITORS

Presenter: Grant Keane

Faculty nominator: Ying Ma, Materials Science

As demand for renewable energy increases, the need for reliable energy storage technology becomes increasingly important. Supercapacitor is an energy storage device with ultra-fast charge and discharge rates, which is important for applications requiring high power output. Recent

experimental data suggested that lithium cobalt oxide ($LiCoO_2$), although primarily used as a battery material, has the potential to be used as the electrode material for supercapacitors if the size of the particle is reduced. In this work, surface properties of $LiCoO_2$ were studied using first principles calculation since surface effects tend to dominate when the size of the particle decreases. Surface energies, site energies and lithium diffusion barriers were calculated. We found that on a surface level, the site energy is drastically reduced when compared to that of a bulk structure, which corresponds to faster ionic transport. These results not only confirm previous experimental observations, but also suggest the importance of $LiCoO_2$ as a new material for supercapacitors.

CHANCELLORS

32. PERSONAL DICTION & CHARACTER DEVELOPMENT: LORD OF THE RINGS

Presenter: Maria Tomashek

Faculty nominator: Janice Bogstad, McIntyre Library

This study of Tolkien's Lord of the Rings: Fellowship of the Rings concerns his use of lexical choices for the diction of the secondary characters in contrast with Frodo Baggins, the viewpoint character. Tolkien's lexical choices establish the speech patterns of Frodo Baggins in contrast with three other major characters, Merry, Pippin and Sam, who, in the beginning of a trilogy of novels, are younger and of different social classes. This paper focuses on the use of electronic texts and search functions to establish and analyze the function of words and phrases in developing characterization. The results of research and analysis of its interpretive significance as a literary tool are presented.

33. CHAOS DEMON: A COMPARATIVE STUDY ON THE ORIGINS OF CHARACTERISTICS CONCERNING MONSTERS AND COSMIC BATTLES

Presenter: Julian Emole

Faculty nominator: Matthew Waters, Languages

This project stems from a 2018 SREU project (one we hope to continue and expand) tracing the chaos-order motif from Classical to Norse mythologies, which includes the examination of their cosmologies and specific deities, with focus on to what extent this motif is shared between these mythologies—in what ways they are similar and why. As one example, the serpent (-demon) as an agent of chaos, manifest in both Greek and Norse (inter alia) traditions, is an ideal reference point to compare the motif within both systems, its evolution, and its ultimate origins.

34. PLUM SEASON

Presenter: Mary Shaw

Faculty nominator: Theresa Kemp, English

Plum Season delves into the personal history of women in the USSR, mainly in Ukraine, through photography, conversations, and poetry. The work vividly illustrates the connection between soul and home, space and memory. Through interviewing women who lived through the social upheavals of the time, and visiting the country itself, the author's project contrasts memory of 'then' and the reality of 'now'. Plum Season offers a small window into the everyday life from the past and delves into issues of death and space relevant to all cultures. The volume gathers together stories collected through interviews, and poetry written during the summer while visiting Ukraine, offering a present-

day point of view as the daughter of an immigrant being in the space her family came from. The collection of stories and images in this project vividly describe the spaces between culture, memory, time, and family.

SESSION IV: 4:30 - 5:30 P.M.

CENTENNIAL

35. EVOLUTIONARY DIFFERENCES IN STRUCTURAL DYNAMICS AMONG PROLYL-TRNA SYNTHETASES FROM DIFFERENT SPECIES

Presenter: Murphi Weinzetl,

Faculty nominators: Sudeep Bhattacharyay & Sanchita Hati, Chemistry

Amino-acyl tRNA synthetases (AARSs) belong to a class of an important family of enzymes that are critical for proteins biosynthesis in all living organisms. They catalyze aminoacylation of tRNAs, a key step in protein synthesis. An important member of AARSs is prolyl-tRNA synthetase (ProRS), a multidomain enzyme in which domain-domain communications are essential for catalytic function. The ProRS family displays a significant variation in domain architecture. The "prokaryotic-like" ProRSs contain an insertion (INS) domain between motifs 2 and 3 of the catalytic domain, whereas "eukaryotic-like" ProRSs lack the INS domain. Recent computational and experimental studies revealed that the INS domain of the "prokaryotic-like" ProRSs is critical for catalysis. However, "eukaryote-like" ProRSs contain a small zinc-binding domain instead of an INS domain. To gain in-depth understanding of the structure-dynamic-function relationship in ProRSs, a comparative study is being conducted using a hybrid Quantum Mechanical/Molecular Mechanical technique. The two bacterial ProRSs and two "eukaryote-like" ProRSs are being chosen for this study. The preliminary results of our comparative study will be presented.

36. PROGRESS TOWARD IDENTIFYING BIOMARKERS OF POLYCYSTIC KIDNEY DISEASE

Presenter: Anneka Johnson

Faculty nominator: Jamie Lyman Gingerich, Biology

Patients with autosomal dominant polycystic kidney disease (ADPKD) suffer from disrupted kidney function due to large, fluid-filled cysts that form in the collecting ducts and kidney tubules. This results in a range of symptoms, including back pain, high blood pressure, and kidney failure, affecting multiple body systems. Age of symptom onset varies with this disease. Our goal is to identify biomarkers that could predict symptom onset and progression. Screening for these biomarkers might enable personalized treatment plans to mitigate symptoms and improve care. In order to identify these biomarkers, we work with zebrafish that are homozygous for a mutation in the gene, spinner. The developing zebrafish kidney has many similarities to the mammalian kidney, and spinner mutants develop kidney cysts as well as a number of other symptoms. Gene expression analysis has revealed a number of genes with differential gene expression in the spinner mutants compared to wild-type siblings. To assess each gene's role in cystic kidney disease, we begin by looking at the relationship between gene function and primary cilia. The polycystin-2 (PC-2) protein localizes to primary cilia, and changes in PC-2 are linked to ADPKD. Thus, by disrupting gene expression individually and examining the localization of PKD-2, the C. elegans ortholog of PC-2, we

can begin to understand how changes in gene expression might be related to the disease. We will also report our efforts to identify the spinner gene, itself.

37. EFFECTS OF MACROMOLECULAR CROWDING ON ESCHERICHIA COLI PROLYL-TRNA SYNTHETASE CONFORMATIONAL CHANGES

Presenter: Katelyn Weeks

Faculty nominators: Sudeep Bhattacharyay & Sanchita Hati, Chemistry

Most computational and experimental studies to understand the molecular mechanism of an enzyme-catalyzed reaction are performed in dilute solutions. However, enzymatic activities in vivo (inside living cell) occur in a crowded environment composed of many macromolecules. To explore the impact of molecular crowding on the conformation and function of Escherichia coli prolyl-tRNA synthetase, we are using synthetic crowding agents to mimic the highly crowded intracellular environment. This enzyme is a member of an important family of enzymes, which are essential for the biosynthesis of proteins in all living organisms. Our initial kinetics and molecular dynamic simulation studies have revealed alterations in catalytic function and protein conformations in the presence of molecular crowders. To determine the site of conformational changes, site-directed mutagenesis and intrinsic tryptophan fluorescent studies have been performed. Changes in fluorescence emission intensity and wavelength, which indicate conformational change in the presence of various crowding agents, are being monitored for wild-type and mutant variants of Ec ProRS. The preliminary results of our work will be presented by Katelyn Weeks.

MENOMINEE

38. CHINESE AND AMERICAN SUPPORT FOR AN INTERNATIONAL CLIMATE TREATY ACROSS COUNTRIES AND YEARS: ANALYSIS BY CALCULATED KNOWLEDGE/ACCEPTANCE/CONCERN SCORES

Presenters: Connor Adams, Clayton Cavanaugh, Elise Chapin, & Trung Nguyen

Faculty nominators: James Boulter, Watershed Institute & Eric Jamelske, Economics

Surveys were conducted in China and the U.S. in 2015 (N=7,556) and 2017 (N=7,415) to investigate people's support for an international climate treaty. A climate change acceptance/knowledge/concern score (from -10 to 10) was calculated for respondents in both years using a set of eight questions from the survey. In both 2015 and 2017, scores for Chinese were on average higher than Americans, while the American scores were more variable. Largely due to an increase in concern among U.S. respondents in 2017, the difference in American and Chinese mean scores decreased compared to 2015.Two additional questions were used to explore support for an international climate treaty. One question was unconditional, while the other was conditional on non-participation of the other country. Responses from both nations indicate a significant withdraw of support for the conditional question. However, Chinese respondents showed significantly greater support in both years compared to Americans. Like the climate change score, US unconditional and conditional treaty support increased in 2017 with little change in China, decreasing the gap between American and Chinese respondents.

39. INSIGHTS INTO PUBLIC VIEWS ON CLIMATE CHANGE IN CHINA AND THE UNITED STATES: CONTENT ANALYSIS OF OPEN-ENDED QUESTION RESPONSES

Presenters: Michelle Beh, Carly Morris, Adara Coker & Andrew Moran

Faculty nominators: James Boulter, Watershed Institute & Eric Jamelske, Economics

Public views of climate change in China and the United States are diverse and complex and may often be uninformed/misinformed. To better understand climate change views in the US and China, we use survey data collected in 2015 (N=7,556) and 2017 (N=7,415) to analyze responses to the question "what comes to mind when you hear the words 'climate change'?" We manually coded open-ended responses to examine respondents' perceptions related to the consequences of climate change, and actions or solutions to address it. We also probed who they assigned responsibility for climate change to, and what groups they projected negativity toward. Quantitative correlations will be drawn between coded open-ended responses and other variables from our survey including calculated climate change acceptance/knowledge/concern scores and support for international climate treaties. Preliminary results indicate that Chinese respondents very rarely mentioned actions, solutions or assignment of responsibility, focusing mostly on consequences of climate change. Americans mentioned politics much more frequently than Chinese and projected negativity toward opposing groups. But they also mentioned actions or solutions to mitigate climate change.

40. INVESTIGATING THE WILLINGNESS-TO-PAY FOR CLIMATE CHANGE POLICY ACTION TO REDUCE GREENHOUSE GASES AMONG CHINESE AND AMERICAN CITIZENS: COMPARING RESULTS FROM SURVEYS CONDUCTED IN 2015 AND 2017

Presenters: August Guenthner, Eric Mallmann, & Lillian Strehlow

Faculty nominators: James Boulter, Watershed Institute & Eric Jamelske, Economics

Reducing greenhouse gases to mitigate climate change impacts will undoubtedly have significant costs. The willingness of citizens across nations to incur these costs is an important component of achieving meaningful policy success. Surveys were conducted in China and the United States in 2015 (N=7,556) and 2017 (N=7,415) to investigate the willingness-to-pay (WTP) for climate change policy action among citizens in these two important countries. We employ contingent valuation analysis to estimate WTP. Our results show significantly higher mean WTP among Chinese respondents compared to Americans in purchasing power parity terms in both 2015 and 2017. We also find higher mean WTP in 2017 compared to 2015 in both countries. Regression analysis reveals similar results for 2015 and 2017; variables describing climate change acceptance, knowledge, and concern correlate with WTP for climate action in both countries. Political affiliation also influences WTP among Americans in both years. Advancing upon last year's presentation on this topic, we are undertaking a more detailed examination into the determining factors of increased WTP from 2015 to 2017, in both countries.

HO-CHUNK

41. AN EXAMINATION OF PRE-SERVICE TEACHERS' USE OF CODE-SWITCHING IN A SUMMER IMMERSION CAMP

Presenter: Cheyenne Bonincontri,

Faculty nominator: Anne Hlas, Languages

This study investigates teachers' decision-making process when switching between English and the language of instruction (e.g. Spanish) in the classroom. In recent years, much research has shown that the first language is being used in the majority of world language classroom. However, these findings have often failed to include pre-service world language teachers and their teaching context. The research questions include: What do pre-service language teachers report to believe about using the target language (e.g. Spanish) and the first language (e.g English) during an early language summer camp? Which instructional factors influence a pre-service teacher's decision to switch between English and Spanish?

42. EFFECTIVE CRITIQUE METHODS ACROSS A SCAFFOLDING CURRICULUM

Presenter: Adria Renee Peters

Faculty nominators: Marie Cedar, Art and Design & Angie Stombaugh, Center for Excellence in Teaching and Learning

How can we use the art critique as a model of assessment to construct balanced course content where students differ in knowledge and skill level? What teaching strategies can be applied that will effectively guide both beginning and advanced students in learning specific skills while also giving them the freedom to transfer newly acquired knowledge to increasingly self-directed creative experiences? The objective of this project is to develop a critique model/process in collaboration with an undergraduate art education student that could be effectively applied to Art 264 (Beginning Sculpture) and Art 364 (Intermediate Sculpture) courses which will share a combined (scaffolding) curriculum beginning fall semester 2018.

43. THE PERSPECTIVES OF GRADUATE STUDENTS ON THE IMPLEMENTATION OF TWITTER AS AN EDUCATIONAL TOOL IN HIGHER LEVEL EDUCATION COURSES

Presenters: Kayla Black, Emily Jaeger & Callie Larson

Faculty nominator: Thomas Sather, Communication Sciences & Disorders

The primary goal of this research is to investigate the use and effectiveness of Twitter in graduate level courses from the perspective of online and residential Communication Sciences and Disorders graduate students. A survey was developed to gain insight on the perspective of Twitter use in the classroom and the lasting effects in residential and online graduate students. Both residential and online cohorts were surveyed anonymously to determine perspectives of varying degrees of course-based Twitter requirements. Survey data will be reported related to student perceptions regarding required versus optional course-based Twitter requirements as well as optimal implementation of Twitter into course development. Implications will be discussed relating to barriers and facilitators to Twitter usage within a graduate course, and pedagogical strategies to reduce barriers and

enhance facilitators in graduate-level coursework. We anticipate our research will guide future Twitter practices in higher education and expand this body of research.

CHANCELLORS

44. DEFORMATIONS OF ALGEBRAS

Presenter: Tyler Gonzales

Faculty nominator: Michael Penkava, Mathematics

Tyler has been working with several other research students to determine a classification of complex associative algebras of dimension 3|2 which is consistent with deformations. Students worked with the professor to determine an initial classification, which has been refined as a result of the computation of deformations. The space satisfies a conjecture of Fialowski/Penkava about the structure of the moduli space.

45. CREATING AN AFFORDABLE SOLAR WATER HEATER

Presenter: Rebecca Tollakson

Faculty nominator: Kim Pierson, Physics & Astronomy

The goal of this project is to develop an inexpensive flat-plate solar water heater panel that would be used in conjunction with a ground source heat pump to increase efficiency of heating buildings or to create hot water for residential or industrial processes. Our solar water panels would be used to pre-heat the water going into a heat pump. This unique coupling of technologies will create a heating system that is more than twice as efficient as a natural gas water heater. Thus, our system will reduce operating costs and promote sustainability. In order to commercialize this panel, we have investigated the design parameters to maximize efficiency and minimize production cost. Our panel is theoretically three times more efficient than current flat-plate designs at transferring incident solar energy into heated water. It also weighs 1/3 as much and costs approximately 1/3 to 1/2 as much as commercial panels. These characteristics suggest that our panel will produce environmentally sustainable results and can potentially be commercially competitive.

46. PARTICULATE AIR QUALITY AROUND WISCONSIN SILICA SAND MINES

Presenters: Orion Allgaier, Connor Barnes, Aleah Gmeiner-Anderson, Josephine Killoren & Alexandra Larson

Faculty nominators: James Boulter & Crispin Pierce, Watershed Institute

The purpose of our research is to quantify the risk of ambient exposure to airborne particulates around industrial silica sand operations. EPA-certified dichotomous samplers were calibrated before and after sampling, and pre and post filter weights recorded. Over a two-year period, we observed increases in average PM2.5 concentrations of 2.6 and 16.1 ug/m3 over concurrent DNR background levels near industrial sites in Bloomer and New Auburn, WI, respectively. Using published studies, we estimate this increase in PM2.5 exposure to cause a loss of life expectancy of one day per year of exposure in Bloomer and three days in New Auburn. In Albertville, WI we conducted yearlong background air quality monitoring where mining operations are planned to begin. Here we found an average PM2.5 concentrations of 11.8 ug/m3 using our EPA-certified dichotomous sampler and 15.0

ug/m3 using a spectroscopy-based DustTrak II monitor. Collaborating with the DNR, academic colleagues, and community organizations, future research will employ affordable PurpleAir monitors to quantify particulate exposure, using corrected formulas derived from the California South Coast Air Quality Monitoring District.

INDEX OF PRESENTERS & FACULTY NOMINATORS/ADVISORS

Name	Department/Major	Presentation #
Grogan-Ripp, Lucy Natia	Communication, Communication Studies	10
Guenthner, August William	Geography	40
Hagan, Christopher R	Psychology	17
Hati, Sanchita	Chemistry	35, 37
Hedberg, Caitlin Elisabeth	Physics	28
Hlas, Anne Cummings	Languages	41
Hoepner, Jerry K.	Communication Sciences & Disorders	24,25
Hottmann, Megan Margaret	Biochemistry/Molecular Biology	19
Huelsbeck, Alyssa Catherine	Biochemistry/Molecular Biology	1
Jaeger, Emily Marie	Communication Sciences & Disorders	43
Jamelske, Eric M.	Economics	38, 39, 40
Jarzynski, Rebecca L.	Communication Sciences & Disorders	25
Jewell, Matthew C.	Materials Science & Engineering	29, 30
Johnson, Anneka Lila	Biochemistry/Molecular Biology	36
Jol, Harry M.	Geography & Anthropology	12, 13
Jorgensen, Keith John	Biology	16
Kastner, Abigail Riley	Neuroscience	15
Keane, Grant James	Physics	31
Kemp, Theresa D.	English	34
Killoren, Josephine Kelly	Environment Public Health	46
Kleintjes Neff, Paula K.	Biology	3
Knuth, Madigan Mae	French	11
Knutson, Kristine M.	Communication & Journalism	9
Kong, Kaishan	Languages	28
Krekelberg, Maris O'Neill	Communication Sciences & Disorders	23
Laporte, Theresa Rose	Spanish, Teaching	27
Larson, Alexandra Kristine	Environment Public Health	46
Larson, Callie	Communication Sciences & Disorders	43
Larson, Megan Lee	Communication Sciences & Disorders	23
Lavalley, Sara Josephine	Biology, Ecology & Environmental Biology	3
Leibham, Mary Beth	Psychology	11
Ley, Anna Rose	Chemistry, A.C.S.	8
Li, Yan	Economics	21, 22
Libera, Rachel Simone	Political Science	5
Lyman Gingerich, Jamie S.	Biology	36
Ma, Ying	Materials Science	31
Mahaffy, Ellen D.	Communication & Journalism	5
Mallmann, Eric Andrew	Mathematics, Applied/Stat	40
Manning, Carmen K.	Education & Human Science	27
Marchiafava, Jack Anthony	Mathematics, Teaching	27
Marie, Cedar	Art & Design	42
Matthews, Douglas B	Psychology	15
Mayer, Madeleine Irene	Accounting	21
Meyer, Samantha Marie	Biochemistry/Molecular Biology	7

Name	Department/Major	Presentation #
hMontie, Amelia Dora	Information Systems	4
Mooney, Rachel Loraine	Chemistry, A.C.S.	8
Moran, Andrew Timothy	Economics, Business	39
Morris, Carly Ann	Liberal Studies	39
Morris, Caroline Mary	Spanish	5
Muehlenkamp, Jennifer J.	Psychology	6, 17
Neupert, Clara Millicent	Journalism	5
Nguyen, Trung Anh Huynh	Accounting	38
Olson, Kristina Kay	Psychology	6
Olson, Tanner Erik Robert	Material Sciences, Applied	30
Pajtash, Wyatt Emrick	Geography	22
Paulich, Katie Nicole	Biology	16
Penkava, Michael R.	Mathematics	44
Peters, Adria Renee	Art, Art and Design Education	42
Peterson, Leslie Rose	Communication, Communication Studies	10
Phillips, James A.	Chemistry	8
Pierce, Crispin H.	Watershed Institute	46
Pierson, Kim W.	Physics & Astronomy	45
Pinter, Nathan Joseph	Material Sciences, Math of Material	18
Plautz, Tessa Padma	Biology	20
Richert, Alexander Paul	Chemistry, Business Emphasis	28
Ruhl, Kevin Paul	Music, Choral Teaching	27
Samelson, Vicki M.	Communication Sciences & Disorders	23
Sather, Thomas W.	Communication Sciences & Disorders	24, 43
Schneider, Amelia Marie	Neuroscience	15
Schulze, Megan Lynn	Communication Sciences & Disorders	24
Scott, Elizabeth Mary	Eled, Mid/Early Adolescent	27
Seyoum, Eleni	Biology	16
Shaw, Mary Margaret	English, Critical St	34
Sims, Darius Stephon	Sociology	5
Smith, Gwendolyn Rose	Communications, Organizational	10
Stombaugh, Angie	Center for Excellence in Teaching & Learning	42
Strehlow, Lillian Jean	Liberal Studies	40
Tollakson, Rebecca Rae	Physics, Applied Emphasis	45
Tomashek, Maria Deanna	Undeclared Undergrad	32
Torres, Eric D.	Education Studies	27
Trusty, Shelby Ruth	Communication, Communication Studies	9
Vang, Pa Zong	Geospatial Analysis & Tec	14
Verdegan, Amy Lynn	Spanish, Teaching	27
Walstead, Dana Rae	Communication Sciences & Disorders	25
Walz, Caroline Anne	Communication, Organizational	10
Waters, Matthew W.	Languages	33
Weeks, Katelyn Marie	Biochemistry/Molecular Biology	37
Weinzetl, Murphi Theresa	Biochemistry/Molecular Biology	35

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