Research, scholarship, & creative work from the WSU community

ACADEMIC SHOWCASE & GPSA RESEARCH EXPO

SHOWCASE|WSU

Table of Contents

Abstract Summaries are grouped by Primary College/Unit

Following Abstract Summaries:

Academic Showcase Participant
Board Placement: 5

Effects of color brightness on consumers' food evaluations and purchase intention

Primary Author: Ruiying Cai
Faculty Advisor: Dogan Gursoy

Primary College/Unit: Carson College of Business
Associated College(s)/Unit(s): Carson College of Business
Campus: Pullman

Abstract

The objectives of the research are to explore and investigate the effects of red and green brightness on consumers' affective and cognitive food evaluations; to examine the effects of affective and cognitive food evaluations on consumers' purchase intention, and to test the effects color brightness on consumers' food evaluations with the presence of nutrition information. With the advancement of technology in the digital menu and picture display, food pictures play an important role in consumers' food-related decisions. However, current literature pays less attention to the effects of food pictures and color brightness of food pictures. To fill the void in the current literature, the present study conducted two picture-based experimental studies with a total of 399 U.S. restaurant consumers. Multilevel modeling analysis and ANOVA were applied to analyze the data. The results revealed that red and green brightness of a food picture influences consumers' affective and cognitive evaluation of the food regardless of the presence of nutrition label. Consumers' affective and cognitive evaluations influence consumers' purchase intention. Findings have theoretical implications by contributing to an understanding of the effects of red and green brightness of food picture on consumers' evaluations and purchase intention. This study is one of the first attempts to provide empirical evidence of the color brightness of food pictures in the context of restaurants. Practical implications can be provided for food providers in menu engineering, profit management, and inventory management. The findings help in promoting healthy options and encouraging responsible food consumption.

GPSA Research Exposition Participant
Board Placement: 119

Tipping Required: Understanding Customer Reactions to Non-voluntary Tipping Systems

Primary Author: Ismail Karabas
Co-Author(s): Jeff Joireman

Primary College/Unit: Carson College of Business
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

Principal Topic

Customers in North America spend $42 billion a year on tips. Customers generally enjoy the voluntary nature of tipping since it gives them the ability to reward/punish service employees for the quality of service they provided. However, recently, 18% of restaurants in the U.S. have already adopted a non-voluntary tipping model (e.g., adding tips to the bill regardless of table size) while an additional 29% are expected to follow.

Method

The current work investigates this new trend with critical implications for retailers. Next, we present our findings across three experiments of which two are in a restaurant setting and one in a hair salon setting for generalizability of our findings.

Results/Implications

We find that customers are less likely to patronize a business with non-voluntary tipping compared to voluntary tipping, because non-voluntary tipping leads to a lack of perceived customer autonomy and higher customer anger. We also find that the negative effects of non-voluntary tipping becomes worse if the service quality is high. Counter intuitively, customers perceive higher lack of autonomy, become angrier at the non-voluntary tipping system (vs. voluntary), and report lower repurchase intentions if the service quality is higher (vs. lower). The main implication of this research that a change in servicescape that denies customers the ability to voice their opinion will lead to negative outcomes, especially when service quality is high. To account for such a change, retailers should adopt methods to rebuild customer autonomy that has been threatened by the new non-voluntary tipping policy.

Academic Showcase Participant
Board Placement: 90

Residents' support toward tourism development: a meta-analysis of 2000-2016 research

Primary Author: Zhe Ouyang
Co-Author(s): Dogan Gursoy
Robin Nunkoo
Faculty Advisor: Dogan Gursoy

Primary College/Unit: Carson College of Business
Associated College(s)/Unit(s): Carson College of Business
Campus: Pullman

Abstract

Research on residents' attitudes of tourism development has been one of the most systematic and well-studied areas within tourism domain (McGehee & Andereck, 2004). Social exchange theory (SET) is considered as a theory that has made the most important theoretical contribution to tourism impact studies (Nunkoo & Ramkissoon, 2012). It proposes that the structure of benefits and costs in an exchange process affect patterns of ongoing interactions. However, the operationalization of residents' perceptions of tourism impacts differs in previous studies, including two-dimensional approach (i.e. benefits and costs), triple-bottom-line approach (i.e. economic, socio-cultural and environmental impacts), and a more parsimonious approach (i.e. overall perception of tourism impacts). Various factors that have an indirect impact on residents' attitudes to tourism development make it more difficult for researchers to draw general conclusions. Thus, applying a meta-analysis, present study assesses the general credibility of SET and the prediction power of specific models to explain residents' attitude toward tourism development in a quantitative fashion. The mean effects of selected factors to explain the variances of perceived tourism impacts (i.e. personal benefits from tourism, community attachment, power, economic dependence on tourism, ecocentric attitude) were examined. This study further identifies that the studied regions will cause variations in the effect sizes among individual studies.

GPSA Research Exposition Participant
Board Placement: 157

NADPH-cytochrome P450 reductase (CPR) is involved in multiple acaricide resistance in the generalist herbivore; Tetranychus urticae Koch

Primary Author: Adekunle Adesanya
Co-Author(s): Antonio Cardenas
Doug Walsh
Laura Lavine
Fang Zhu

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

The two spotted spider mite, Tetranychus urticae is a polyphagous pest feeding on over 1100 plant species, covering highly valued economic crops. The control of T. urticae largely depends on the use of multiple chemistries of acaricides, despite its ability to rapidly develop resistance to acaricides. Metabolic detoxification mediated by cytochrome P450s is a major mechanism of acaricide resistance in T. urticae. NADPH-cytochrome P450 reductase (CPR) is a crucial co-factor protein that donates electron to all cytochrome P450s during their catalytic activity. Therefore, this study seeks to understand the involvement of CPR in acaricide resistance in T. urticae. The full length cDNA sequence of T. urticae's CPR (TuCPR) was determined using PCR and PGEM cloning. Bioinformatics analysis and in silico modelling were performed on the deduced amino acid sequence of TuCPR to identify the catalytic domain. A reverse genetics approach i.e. RNAi was used to test the hypothesis that the knockdown of CPR expression in T. urticae will lead to a significant loss of acaricide resistance. TuCPR was more expressed in the matured life stages of T. urticae (nymphs and adults) relative to the egg and larval stages. Ingestion of dsCPR through feeding significantly reduced the transcription of TuCPR in acaricide resistant strains of T. urticae and also increased their susceptibility to 3 widely used acaricides; abamectin, bifenthrin and fenpyroximate. The outcome of this study highlights CPR as a potential novel target for eco-friendly control of the ubiquitous T. urticae and other related plant feeding pests.

GPSA Research Exposition Participant
Board Placement: 104

Evaluation of resistance in chickpeas to seed rot caused by metalaxyl resistant Pythium ultimum.

Primary Author: Chiti Agarwal

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Seed and seedling diseases of chickpeas (Cicer arietinum) caused by Oomycete pathogens, including Phytopthora sp. and Pythium sp., have been effectively controlled for several decades through the use of inexpensive seed treatments that contain the fungicide metalaxyl. However, since its first discovery in 2014, seed rot and pre-emergence damping-off of chickpea caused by metalaxyl-resistant Pythium ultimum has become a disease of increasing importance to chickpea production in the U.S. Pacific Northwest. Although the disease can be managed using seed treatments that contain ethoboxam, this incurs additional costs to growers and genetic resistance would be a preferable means of disease control.

METHOD

The objective of this study was to develop an efficient screening method and to identify sources of resistance in chickpea to metalaxyl resistant P. ultimum. Chickpea recombinant inbred lines (CRIL) derived from the cross FLIP 84-92C /PI599072 and other chickpea cultivars were screened in growth chamber assays using soil infested with oospores of a metalaxyl resistant pythium isolate collected from Patterson, WA.

RESULTS/IMPLICATIONS

Resistance was identified in small dark seeded inbred lines and in the desi-type cultivar Myles, while large seeded café kabuli-type inbred lines and the popular kabuli cultivar Sierra were highly susceptible. Current studies include detecting quantitative trait loci associated with disease resistance and screening additional plant materials to identify sources of resistance in kabuli chickpeas.

GPSA Research Exposition Participant
Board Placement: 9

Development and Characterization of Adsorbents for New Anaerobic Digestion Bio-refinery Concepts

Primary Author: Michael Atogiba Ayiania Apasiku
Co-Author(s): Felix Martin Carbajal-Gamarra
Tsai Garcia-Perez
Graig Frear
Waled Suliman
Manuel Garcia-Perez
Faculty Advisor: Manuel Garcia-Perez

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Principal Topic

Development and Characterization of Adsorbents for New Anaerobic Digestion Bio-refinery Concepts. Although, anaerobic Digestion (AD) is an efficient technology to convert the carbon contained in farm animal manure into methane, it does not have the capacity to separate or transform the nitrogen and the phosphorous. Thus, high contents of these nutrients remain in the AD liquid effluents. The presence of H2S in the biogas is another hurdle for the wide adoption of this technology. In this work we developed and tested a biochar from anaerobically digested fiber for nutrients (N and P) removal from liquid efluents and H2S from bio-gas.

Methods

The biochar was prepared and activated under CO2 utilizing slow pyrolysis conditions, and the adsorption capacity of the biochar toward hydrogen sulfide (H2S) and phosphate (PO43-) was tested. Some of the analytical techniques used were: Elemental analysis, proximate analysis, gas physisorption analysis for biochar surface area and porosity and microstructural analysis and ICP MS analysis. Batch equilibrium studies of phosphate and breakthrough curves of H2S.

Results/Implications

Biochars produced at high temperatures (above 500°C) from anaerobic digestion fiber adsorbed hydrogen sulfide from biogas at levels that were comparable to those of commercial activated carbon. Phosphate recovery of 97.62% was also observed. This work discusses the advances in the design and use of biochar to adsorb and retain nutrients and H2S. We developed an engineered biochar adsorbent made from anaerobic digestion fiber that fulfills two important roles: adsorbing hydrogen sulfide from bio-gas, and removing phosphorus from the liquid effluent.

GPSA Research Exposition Participant
Board Placement: 6

Developing Sustainable Supply Chain: A Study of CSR Practices in the Indian Textile Industry

Primary Author: Jyoti Chawla
Co-Author(s): Ting Chi
Faculty Advisor: Ting Chi

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

PRINCIPAL TOPIC

In recent years, the concepts of sustainable supply chain and corporate social responsibility (CSR) have been gaining tremendous momentum in the global textile and apparel industry. CSR encompasses the economic, legal, ethical, and philanthropic expectations that society has for business entities at a given time (Carroll, 1991). Many researchers have suggested that incorporation of CSR practices throughout the supply chain could positively contribute to firm competitiveness and ultimately result in better financial performance. CSR practices in textile and apparel supply chain has been more studied from a buying country perspective (e.g., U.S.) but less investigated from a manufacturer/supplier perspective (e.g., India). This study aimed to gain a better understanding on the drivers and inhibitors for CSR practices among Indian textile manufacturers. Both external factors (e.g., customer pressure) and internal factors (e.g., resources) were explored.

METHOD

10 semi-structured interviews with senior managers in Indian textile companies were conducted for collecting primary data. Qualitative method was applied to identifying the themes. Stakeholder theory and triple bottom line theory provided the theoretical foundation for this study.

RESULTS/IMPLICATIONS

The findings show CSR practices haven't been popular among the investigated companies. Those that have made certain efforts commonly viewed CSR as a potential source for business success and had supplied goods to buyers from developed countries. In general, we found there are more inhibitors than drivers facing Indian textile manufacturers. The prominent inhibitors include lack of customer interest, political instability and corruption, lack of government support, and missing CSR education infrastructure.

GPSA Research Exposition Participant
Board Placement: 132

Willingness To Pay for Strawberries Grown on Biodegradable Plastic Mulches

Primary Author: Kuan-Ju Chen

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Consumer awareness about environmentally friendly products as they have realized that they could have a direct impact on ecological issues from their purchasing behavior. To evaluate consumers' willingness to pay (WTP) for strawberries grown on biodegradable plastic mulches (hereinafter defined as "BDMs"), we conduct a survey with 1,510 consumers to gauge their shopping habits, environmental friendliness and perception on different types of strawberries. Using Contingent Valuation (CV) method, we estimate consumers' premium on strawberries grown on BDMs versus the more conventional form of strawberries grown on non-biodegradable mulches. Our results show that survey respondents with higher income, more favorable attitude towards environmental friendliness, and lower shopping frequency are more likely to purchase strawberries grown on BDMs, and the effects are revealed to be significantly positive. From a research standpoint, it is interesting to understand how food products grown in a more environmental sustainable manner affect consumers' willingness to pay. It is also interesting to understand how green technologies affect strawberries prices when they introduce their products to the market. This is true for both policymakers and industry participants as well. Finally, we discuss the effect on consumer willingness to pay from information regarding the biodegradable plastic mulches and environmentally-friendly disposal processes. By providing empirical evidence on the potential adoption of biotechnology in the food production system, our research enables agricultural crop producers to make more informed decisions on growing and pricing strategies, and also for agricultural scientists and policymakers to articulate industry-supporting policies for sustainable development.

GPSA Research Exposition Participant
Board Placement: 151

Diversity of Plastids and Evolution of Plastid Transit Peptides in Higher Plants

Primary Author: Ryan Christian

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Principal Topic

Plastids take on a multitude of forms and functions in different plant organs, but temporal and interspecific variation in plastid proteomes is underexplored. Fortunately, the expanding availability of sequenced plant genomes has made it possible to do large-scale genetic comparisons between species.

Method

As a proof of concept, we examined plastid ultrastructure for three apple varieties to demonstrate the scope of plastid variation within a single species. This experiment warranted additional investigation into evolutionary change in plastid proteomes which we approached through use of subcellular localization programs and bioinformatic clustering techniques to identify predicted shared and unique plastid-targeted peptides in 15 sequenced plant genomes.

Results/Implications

Our microscopy work in apple found major differences between varieties, timepoints, and cell layers. Across evolutionary space, we found 650 proteins shared among the plastids of all species, while individual species have between 115-1,632 unique plastid-targeted proteins. Species-unique plastid-targeted proteins may exhibit novel traits even if non-plastid targeted functions are known. For high-value crops such as apple, or emerging bioenergy crops such as switchgrass, understanding how these crops differ genetically from other species presents opportunities to improve crop management for maximum yield and minimal postharvest loss. Conversely, model plants including Arabidopsis, Brachypodium, and Rice have many species-unique plastid targeted proteins each, with the ramification that experiments for these proteins will not directly translate to other plants. Further work will shed light on the evolution of plastid-nuclear trafficking to uncover how new proteins become plastid-targeted.

GPSA Research Exposition Participant
Board Placement: 154

Studying the Effects of Ripening Compound on 1-MCP Treated 'D' Anjou' Pear Fruit (Pyrus communis)

Primary Author: Seanna Hewitt

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC:

Pears are an economically and nutritionally valuable fruit throughout the world. As with other climacteric fruits, like apple, banana, and mango, ripening in pear is characterized by a peak in ethylene and carbon dioxide production (respiration). However, there are three main characteristics that make pears unique from other climacteric fruit: 1.) They are harvested in a biologically mature, but unripe, state, 2.) They require a genetically pre-determined amount of cold to ripen, and 3.) ripening in pear is inhibited indefinitely following treatment with 1-methylcyclopropene (1-MCP), a compound that is used to block production of the primary ripening hormone ethylene, and therefore delay ripening. A set of ripening compounds (RCs) have been identified in the lab that allow pears to ripen consistently and at the desired time following 1-MCP treatment.

METHODS:

We used ultrasonic humidification to treat 1-MCP-treated Anjou pear fruit with 1%, 2% and 3% RC solutions. Over the course of two weeks, we observed the effects of RC concentration and pH on the functionality of the compound. Firmness was measured using a fruit texture analyzer and soluble solids were measured using a handheld refractometer. Gas chromatography was used to measure internal ethylene and carbon dioxide. In addition to physiological measurements, tissue samples were taken for RNA extraction and sequencing.

RESULTS/IMPLICATIONS:

Determination of optimal RC concentration for reactivation of ripening inhibited pear fruit will provide the tree fruit industry with a novel toolset for ripening regulation. This translates to reduced waste associated with unpredictable ripening.

GPSA Research Exposition Participant
Board Placement: 135

Influences of Fuel Reduction Logging on the Nutritional Ecology of Deer in Northeastern Washington

Primary Author: Iver Hull

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Historically, inland northwest forests were structured to support light fuel loads and frequent low-severity fires. More recently, fire suppression shifted these forests to have thick, continuous overstories with densely stocked trees, and heavy fuel loads that can lead to catastrophic wildfires that threaten human safety and further alter natural forest communities. In addition, closed canopy, densely-stocked forests allow limited light penetration to the forest floor, which limits production of understory vegetation that is available as forage for native herbivores. To restore historic conditions, promote healthy forests and wildlife, and reduce wildfire risk, managers have implemented fuels reduction thinning projects. To determine whether these treatments improve the quality and quantity of forage resources for deer, we measured plant species composition, biomass, and nutritional quality of understory vegetation in the Colville National Forest of northeastern Washington. We also measured diet quality and composition, nutrient intake, and nutritional carrying capacity of Mule Deer (Odocoileus hemionus) and White-tailed Deer (Odocoileus virginianus) using bite-count methods with tractable, hand-raised deer. Our results show forage biomass increasing with canopy cover reduction and years since treatment. Digestible energy and protein contents of deer diets decreased with high canopy cover, and deer spent more time active and traveled further distances as canopy cover increased. Deer harvest rates increased with years post thinning and greater available biomass, they traveled less, and had higher dry matter intakes. These results can help identify how deer use and adapt to changing habitats, aid in management decisions, and promote interdisciplinary natural resource practices.

GPSA Research Exposition Participant
Board Placement: 107

Characterizing the Impact of Biochar on Plant Growth and Development

Primary Author: Daylen Isaac
Co-Author(s): Ryan Christian
Nathan Tarlyn
Amit Dhingra

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Principal Topic

Biochar has been shown to positively impact plant growth and development in some studies however the published results have remained inconsistent. There are several feedstocks of biochar used for its production. Not all biochars are created equal and a standardized formulation of biochar consistently beneficial to plant growth and development remains to be developed. Previously published studies have reported the evaluation of a single biochar on a single genotype. Further, it has also been observed that any enhancement of growth and development does not directly translate to improved yields, with some reports indicating that enhanced growth and development compromises the plant defense systems.

Method

Based on these observations, we hypothesized that 1) different biochar sources will produce unique phenotypes in a single cultivar of tomato, and 2) different biochar sources will produce different phenotypes across multiple tomato cultivars. Tomato was used as study system both due to its value as a model system and its global economic importance. In this study, six biochars, at two concentrations, fertilized with organic fertilizer, were assessed across three cultivars of tomato grown in greenhouse conditions. Plant performance was evaluated by phenotyping total fruit mass, average fruit mass, fruits per plant, soluble solids (%brix), aboveground biomass, and root biomass.

Results/Implications

Results obtained so far indicate that both hypotheses tested true, and an increase in root biomass by 63%-264%, plant biomass by 25%-31%, and most importantly yield by 28-32% was observed. These results are interesting, given that organic fertilizer can reduce yields by 5-34%.

GPSA Research Exposition Participant
Board Placement: 66

Assessing the Effectiveness of Systems Thinking Instruction and the Individual Learner: Improve Understanding of Socio-Ecological System Complexity

Primary Author: Jennifer Johnson

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Social Sciences
Campus: Pullman

Abstract

Even with the increased level of science-to-public communication regarding socio-ecological issues, there remains a significant disconnect within this exchange of information which has led to a lack of sustainable habits and practices. These issues are exacerbated by the relationships and feedbacks inherent in socio-ecological systems (SES) between social and economic actors, political institutions and related ecosystem variables. These variables are complex and often "invisible" in the real sense (e.g. groundwater depletion, CO2 accumulation), and over space and time. This research, as part of the WSU Student Success Initiative, argues that an incomplete mental model can result when information is not presented in a manner compatible to how an individual learns and approaches complex problems. This work revised the Environmental 101 course materials and activities to incorporate systems thinking as a means for students to explore "invisible" aspects of socio-ecological systems. This research used systems thinking methodologies and analyzed which processes were most effective for different individual learning approaches with the goal of improving understanding of complex relationships and feedbacks within a system. This led to improved student identification of variables and relationships within an SES that were most likely to lead to sustainability or collapse. This research was performed across WSU student cohorts in the School of the Environment. Surveys, an adapted Bloom's Taxonomy protocol assessment, and the participant's ability to successfully complete systems thinking exercises were used to evaluate and assess the relationship between individual learning and systems thinking skills.

GPSA Research Exposition Participant
Board Placement: 21

Bionic. Neuromuscular feedback football girdle pilot design

Primary Author: Nigel Joseph

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Principal Topic:

Core dysfunction (CD) is known to decrease athletic performance and increase injuries (Brodt et al., 2008; Nesser et al., 2008). For example, football athletes are five-times more likely to sustain an injury related to their core than their head/neck (NCAA.org, n.d). A conventional method to self-correct CD is neuromuscular feedback (NMF), with a passive external stimulus. Currently, no known football products address CD.

Method:

The purpose of this research is to apply Labat and Sokolowski's (1999) systematic design problem solving to address CD in football athletes through the lens of kinesiology. The research developed the following questions to create a prototype investigating over 80 references: What are the strengths and limitations of commonly used NMF methods? What is an effective NMF application for a prototype?

Results/Implications:

The research found that NMF is commonly accomplished with compression fabric (CF), kinesiology tape (KT) and elastic bands (EB). Each solution has its own strengths and drawbacks, for instance, although KT and CF can increase CD, KT may cause skin irritations and the window for CF tightness conducive for NMF is narrow. After several ideations, the research developed girdle prototype with CF and EB, this mimics a lower back KT method to maximize benefits while mitigating limitations of KT and CF. Next steps include subject testing and evaluation of the prototype's functional and aesthetic properties. This research is pertinent because it blends design and kinesiology in the hope to improve CD, thus, aiding athletes in achieving remarkable feats while lowering injuries.

GPSA Research Exposition Participant
Board Placement: 75

Understanding ice recrystallization during freeze–thaw cycles and its influence on mechanical properties of potato (Solanum tuberosum l.) var. Russet Brown

Primary Author: Pavitra Krishna Kumar

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Principal topic:

Ice recrystallization- any change in shape, size or location of existing ice crystals during frozen food storage and distribution, is attributed to freeze–thaw cycles due to temperature fluctuation. The study determines the impact of temperature fluctuations on frozen foods and helps optimize storage and transport conditions.

Method:

Ice recrystallization induced by temperature fluctuations has an influence on the mechanical properties of frozen food. Food samples were fluctuated between thermal transitions states: glassy/frozen, rubbery and unfrozen. Transition temperatures were determined using Differential Scanning Calorimeter. Pore size of potatoes was analyzed using Scanning Electron Microscopy, and mechanical properties related to food texture were studied using Texture Analyzer.

Results:

Values for unblanched potatoes were 56.3+15.9 µm for the glassy state without temperature fluctuation, 74.3+12.6µm, glassy state with temperature fluctuation, 106.9+27.8 µm for the rubbery state, and 96.3+22.3 µm for the unfrozen state, while it was 45+10.2 µm, 70.4+8.61 µm, 73.2+14.0 µm and 80.6+18.9 µm, for the respective states for the blanched potato. Overall, there was a significant difference ($p<0.05$) in equivalent pore diameters of potatoes, due to temperature fluctuation. Hardness was influenced significantly in both potatoes. There was a significant difference in shear force in blanched potatoes alone. Therefore, temperature fluctuations did influence the ice crystal sizes and mechanical properties of frozen potatoes. Ice recrystallization study can thus greatly assist in product packaging, storage, and transport strategies of potatoes and other frozen foods, such as location of the food in the storage system, based on their susceptibility to freeze-thaw cycles

GPSA Research Exposition Participant
Board Placement: 178

Influences of direct root-zone deficit irrigation on wine grape production, grapevine growth, and root distribution in Pacific Northwest

Primary Author: Xiaochi Ma
Co-Author(s): Pete Jacoby
Karen Sanguinet

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Principal Topic:

Washington State is the second largest premium wine producer in the United States with around $2 billion of total economic impact in 2016. The rain shadow of the Cascade Range leaves the Columbia River Basin with around 8 inches (200 mm) of annual rain fall, making irrigation and water rights of paramount interest to the Washington wine industry. Conventional surface irrigation causes moisture loss through water evaporation and encourages weed growth. Direct root-zone (DRZ) deficit irrigation, by delivering water to the lower soil profile through vertical tubes, is an emerging strategy to enhance water conservation and fruit quality in Pacific Northwest vineyards.

Method:

We hypothesize that limited water delivered directly into the middle and lower root-zone will help sustain grapevine growth and grape production, improve water use efficiency, and enhance grape quality. By using the grapevine Cabernet Sauvignon as a model variety, we conducted both greenhouse and field experiments to investigate the effects of root-zone deficit irrigation with different irrigation rates and depths on grape production and grapevine growth.

Results/Implications:

Total irrigation amount significantly influenced fruit yield and root distribution; however, quality of grapes was enhanced under concomitant reduction in seasonal water delivery amounts. No significant differences in grape yield were attributed to any particular depth of DRZ delivery. In conclusion, DRZ deficit irrigation shows promise for water conservation and enhancement of wine grape quality, which would help improve water use efficiency and accelerate the development of wine industry in Washington State.

GPSA Research Exposition Participant
Board Placement: 160

Identification of quantitative trait loci associated with cold tolerance in an interspecific chickpea recombinant inbred line population

Primary Author: Deus Mugabe

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Fall planted chickpea (*Cicer arientinum* L.) yields are often nearly double that of spring sown chickpea in regions with Mediterranean climates that have mild winters, however, winter kill can limit the productivity of winter planted chickpea. Creating cold tolerant chickpea would allow expansion of the current geographic range where chickpea is grown, and also improve productivity for land that chickpea is currently grown on. The objective of this study was to map the quantitative trait loci (QTLs) and genomic regions associate
d with cold tolerance in chickpea. An interspecific recombinant inbred line (RIL) population of 129 lines derived from a cross between ICC 4958, a cold sensitive desi type (*C. arietinum*) and PI 489777, a cold tolerant wild relative (*C. reticulatum*) was used for this study. The RILs were evaluated for cold tolerance in the field for four years and two experiments in controlled conditions and were genotyped using genotyping-by-sequencing (GBS). Assessment of cold tolerance was based on stand counts and leaf damage, both assessed in late fall and again in early-spring. Mean stand counts was correlated to cold damage in the 2016 field environments. For QTLs, three QTLs were found on linkage group (LG) 1B, 3 and 8. QTLs on LG 3 and 8 were consistent in six environments and accounted for a maximum of 34.6%, and 48.4% phenotypic variation respectively.

GPSA Research Exposition Participant
Board Placement: 181

Apple Peel Morphology and Attachment of Listeria innocua through Aqueous Environment as shown by using Scanning Electron Microscopy

Primary Author: Ewa Pietrysiak
Co-Author(s): Girish M. Ganjyal

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Industrial apple packing process begins with submerging the harvested or stored apples into the water dump tank and carrying them by water flumes through various washing steps before drying and packing. Constant introduction of organic matter and water recirculation introduce the risk of apple being cross-contaminated with the pathogenic bacteria such as *Listeria monocytogenes*. This study investigated the relationship between apple peel microstructure and attachment of bacteria in aqueous environment. Whole fresh unwaxed apples of three varieties (viz., Gala, Golden Delicious, and Granny Smith) were inoculated with *L. innocua*, a surrogate strain of *L. monocytogenes*, by submerging the apples into the inoculum solution at ~10^6 CFU/mL level. Apples were carefully turned around in the inoculum for 10 min simulating industrial dump tank and flumes conditions. Attachment of *L. innocua*, to different apple peel sections, was demonstrated by using scanning electron microscopy (SEM). Textural characteristics varied considerably among apple varieties. Generally, apple peel was covered with amorphous layer of wax, disrupted by microcracks, lenticels, and occasionally overlaid with various types of epicuticular wax platelets. *L. innocua* attached primarily to apple peel in stem bowl and calyx sections, embedding in the microcracks, lenticels and on the surface of the trichomes. Bacteria was difficult to be located on the smooth peel surfaces in the equatorial section of the apples. Results provide valuable information on *Listeria* attachment on apples which can be used in developing new intervention methods of microbial decontamination.

GPSA Research Exposition Participant
Board Placement: 187

Understanding the molecular basis of Fusarium solani mediated root rot in Pisum sativum

Primary Author: Bruce Williamson Benavides

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Pisum sativum (pea) yields have declined significantly over the last decades. Root rot caused by the fungus, *Fusarium solani* f. sp. *pisi (Fsp)* is one of the predominant cause of decline in yields. Yield losses caused by *Fsp* range from 15 to 60%. To gain a comprehensive and comparative insight into the molecular changes that accompany *Fsp* infection we performed a time-course gene expression analysis in a set of tolerant and susceptible *P. sativum* genotypes challenged with the pathogen. It is hypothesized that genes exhibiting differential expression in the gene expression analysis in response to *Fsp* challenge, and associated polymorphisms, will confer tolerance or susceptibility to *Fsp*. Gene expression analysis has predicted a list of 769 differentially expressed genes with embedded polymorphisms. Sequence alignment analysis shows that the 769 genes represent mostly disease response genes. This subset of predicted polymorphisms has been evaluated for being polymorphic across four tolerant and four susceptible pea genotypes. In conclusion, the identified subset of 769 polymorphisms are most likely involved in tolerance or susceptibility to *Fsp*. The 769 SNPs will be used to screen two segregating populations generated from sets of tolerant and susceptible parental genotypes. Genotype and phenotype association methods will be used for molecular marker identification. Identification of molecular markers will help obviate the incalculable losses caused by *Fsp*. Farmers will also be able to reduce reliance on chemical seed treatment. Overall the results will provide a cost effective and sustainable technique to control root rot disease caused by *Fsp*.

GPSA Research Exposition Participant
Board Placement: 116

Product Differentiation in a Two-Characteristic Space, With Discrete and Continuous Characteristics

Primary Author: Kiana Yektansani

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

In this paper, we investigate the profit-maximizing choices of attributes and price of an entrant's new product when one attribute of the product follows continuous uniform distribution and the other one is discrete with arbitrary distribution of consumers. A discrete distribution allows to consider the case where one value of the attribute is more popular among consumers than the other. Both attributes of the new product are horizontally differentiated from the existing product.

Our results show that overall, the entrant has the tendency to perform maximum product differentiation to avoid a potential price war. In the equilibrium, the entrant always performs maximum differentiation in at least one of the attributes. However, the entrant does not want to prevent a price war at any cost. Specifically, the choice of location for both attributes depends on the portion of consumers who ideally prefer the incumbent's location for the discrete attribute.

If most of consumers have this preference, entry is feasible only if the entrant has enough room for differentiation in the continuous attribute and the weight that individuals assign to the continuous attribute is high enough. If, however, the majority of consumers pay a transportation cost for the discrete attribute to buy from the incumbent, the entrant performs maximum differentiation in the discrete attribute. In this case, partial differentiation in the continuous attribute can occur when the incumbent's location assures some room for differentiation in this attribute. Otherwise, we observe maximum product differentiation in both continuous and discrete attributes.

GPSA Research Exposition Participant
Board Placement: 128

A Precision Pruning Strategy For Improving Efficiency Of Vibratory Apple Harvesting

Primary Author: Xin Zhang
Co-Author(s): Long He
Yaqoob Majeed
Manoj Karkee
Matthew D. Whiting
Qin Zhang

Primary College/Unit: College of Agricultural, Human and Natural Resource Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

Due to the extensive human labor requirements for apple harvest, there is increasing demand for mechanical harvest systems. Fruit removal efficiency (FRE) is a key factor determining the performance of any mechanical harvest system. Our recent observations have revealed an important role of canopy management and pruning in apple FRE under vibratory excitation. In this study, 'JazzTM' apple trees trained to a vertical, trellised fruiting wall architecture were subjected to pruning treatments to analyze effect of fruiting branch characteristics to FRE. On randomly-selected horizontal branches, all lateral fruiting shoots were dormant pruned to leave no shoot longer than 15 cm (Treatment 1) or 23 cm (2). Harvest tests were conducted using a prototype shake-and-catch mechanical harvest system with fixed vibrating frequency of 20 Hz and shaking duration of 5 s. Both FRE and harvested fruit quality were analyzed. The basal diameter and length of each fruiting shoot was recorded just before harvesting. We recorded significantly greater FRE from Treatment 1 compared to Treatment 2: 90.8 ± 8.6% and 81.1 ± 6.9% (mean ± SD) for Treatment 1 and 2, respectively. Analyses of the relation between shoot length and FRE revealed that FRE was up to 98% when shoots were shorter than 5 cm. In contrast, FRE was 56% when fruiting shoots were longer than 25 cm. Combined, these results suggest that pruning lateral fruiting shoots to less than 15 cm (6 in.) can maintain a minimum 85% of 'JazzTM' FRE improving the overall performance of a mechanical shake-and-catch harvest system.

Academic Showcase Participant
Board Placement: 25

City of Yakima Equity Study Analysis

Primary Author: Martha Aitken
Co-Author(s): Branden Born
Philip M. Hurvitz
Brad Gaolach

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Everett

Abstract

In 2015, the City of Yakima replaced their previously at-large electoral system with district-based representation, resulting in increased Latino representation on the City Council. The following year, the Yakima City Council initiated an 'Equity Study' to assess the distribution of city resources across all council districts with respect to social, racial, and economic equity. The city began by compiling existing data and making it available via a web-based, interactive platform. The City of Yakima contracted WSU's Metropolitan Center for Applied Research and Extension (Metro Center) to a conduct an evaluation and statistical analysis of specific data in the equity study across demographics and a geographical dividing line in the city. Of the data sets assessed, we concluded they were developed using best practices to support the operations of their respective city departments; however, the majority of the data did not include date attributes. This limited our ability to assess the city's decisions of resource allocation over time, but did provide the city with a valuable baseline. The Metro Center's analysis, helped the city understand their data and its utility in decision making. Our report included specific recommendations for improving data collection to better assess equity, and suggested implementing decision making criteria for future resource allocation, such as an equity toolkit. This project illustrates the value of university expertise in helping cities deal with challenging issues and can be used as a model for other cities seeking to improve data-driven decision making.

Academic Showcase Participant
Board Placement: 40

A mixed method cross-cultural study to compare the college students' drinking cultures in Italy and the U.S.A

Primary Author: Giovanni Aresi
Co-Author(s): Michael Cleveland
Brianna Hernandez
Ashley Boysen
Anna Guilas

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

This study used a sequential explanatory mixed method design to compare the drinking cultures (i.e., schema of beliefs, practices, and values maintained by a society regarding alcohol use) of youth in Italy and the U.S.A. Phase 1 used Multigroup Latent Class Analysis to examine differences in drinking patterns (i.e., subgroups of drinkers) across samples of Italian (N = 476) and American (N = 375) college students (age range = 18-22). Four subgroups of drinkers were found in both countries, though relevant differences in the features of these groups exist. In both countries, most participants concentrated drinking during weekends, with a notable subgroup of weekend risky drinkers. However, daily drinking was differently associated with probabilities of incurring in risky drinking patterns (e.g., episodes of drunkenness) among American (high probabilities) and Italian youth (moderate probabilities). Phase 2 used focus group interviews with 37 Italian and 47 American youth to collect narratives on features of the two drinking cultures, and elaborate on the quantitative results obtained in the first phase. Preliminary results indicate there are differences in the meaning of alcohol consumption itself (e.g., whether alcohol is predominantly used to reach intoxication or has other purposes), which are influenced by underlying cultural assumptions and the policy context (i.e., drinking age). This study represents a significant theoretical and methodological advancement in the field of cross-cultural psychology applied to health promotion, and will inform policy developments and design of services and intervention to promote less risky drinking patterns for young people in both countries.

Academic Showcase Participant
Board Placement: 35

Healthy Food Pantry Assessment Tool

Primary Author: Karen Barale
Co-Author(s): Alexandra Bush-Kaufman

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Location: Pierce County Extension

Abstract

Introduction: Food environments can shape the dietary patterns of individuals and communities. Food pantries are a key food source for food insecure Americans. Efforts have been made to improve offerings and promote healthfulness in the pantry. However, no validated, reliable tool exists to evaluate the healthfulness of food assistance settings. The purpose of this study was to develop and test an observational survey that quantifies food pantry environments. Methods: Formative research included a literature review and qualitative interviews with key informants. Themes and best-practices in food pantry environments were identified and guided survey development. The tool was pilot tested for face and content validity and revised. Then it was tested to assess inter-rater and test-retest reliability and revised again. The modified questions were cognitively tested for face validity. Results: The final tool contains 69 items representing observable characteristics and best-practices of food pantry environments. Pilot test feedback and field test data indicated appropriate face and content validity, and moderate to high inter-rater and test-retest reliability. An instruction guide, resource guide, and training webinar were created to accompany the tool. Conclusions: The Healthy Food Pantry Assessment Tool is a reliable observational survey with content and face validity. It is available and can be used to evaluate and quantify the healthfulness of food pantry environments. This project was supported by Regional Nutrition Education and Obesity Prevention Center of Excellence Initiative of the USDA National Institute of Food and Agriculture, grant number 2014-48757-22607.

Academic Showcase Participant
Board Placement: 184

Engagement with a Handbook Program for Parents of Students Transitioning to WSU

Primary Author: Brittany Cooper
Co-Author(s): Laura Hill
Matt Bumpus
Michael Cleveland

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

First-year college students are at increased risk of harm due to substance use. Parents continue to have an impact on students' behavior; however, few studies have tested parent-college student interventions or their implementation. Here we use data from an efficacy trial of a self-directed handbook for parents of first-year college students at WSU, part of the WSU Transformational Change Initiative. In the summer before college, parent-student dyads were randomly assigned to one of three conditions: control (N=110), parent handbook (N=100), or parent handbook+ (N=103). Intervention parents received phone calls from specialists who encouraged parents to read and complete activities before school started. Parents in the handbook+ condition received periodic booster text/email messages to remind them of handbook content that may be useful throughout the student's first semester. Preliminary results indicate positive results. 85% of parents reported they read the handbook and/or completed at least some of the activities. 62% competed at least three quarters; 47% completed all 22 activities. 88% of parents reported that the handbook was at least somewhat useful for their student; 43% reported that it was very or extremely helpful. About half reported that their students were very or extremely engaged. Self-directed family interventions increase participation rates, but we know little about their implementation. Most parents found the intervention useful and engaging, but full dosage was low. Future analyses will illuminate how family characteristics (e.g., ethnicity, SES, first generation college student status) are associated with levels of engagement in order to inform future adaptation of handbook content.

Academic Showcase Participant
Board Placement: 31

Extension Fund Development Education System

Primary Author: Melissa Cummins
Co-Author(s): Jana Ferris

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Location: Clark County Extension

Abstract

Fund development is crucial to WSU Extension programming, especially the 4-H youth development club delivery model. Lack of an effective and efficient approach to educating members on proper methods of accruing, spending, and recording funds, could result in noncompliance with IRS and state requirements, inappropriate spending of public funds, and ultimately, legal implications. The 4-H Youth Development Fund Education system was developed and implemented spring 2017. This system includes education materials informing WSU Extension faculty, staff, and volunteers of policies and guidelines for managing funds associated with the management of 4-H clubs. Educational pieces include the 4-H Treasurer's Handbooks for youth treasurer and Club Leader, a power point presentation, and a Guide for Staff. Seventy one attended training statewide. Evaluation results indicated the following (N=51): Before training, 29% (n=14) felt they 'always' understand how to develop a system for handling club funds. After training, 86% (n=43) felt they 'always' understand how to develop a system for handling club funds. Before training, 42% (n=21) felt they 'always' understand what is necessary for keeping accurate club financial records. After training, 92% (n=46) felt they 'always' understand what is necessary for keeping accurate club financial records. Before training, 18% (n=9) felt they 'always' understand end of the year reporting of club finances. After training, 78% (n=38) felt they 'always' understand end of the year reporting of club finances. This system has prepared faculty, staff, and volunteers to keep in compliance with requirements for managing funds developed to strengthen the mission of WSU Extension.

Academic Showcase Participant
Board Placement: 91

Perceptions of Biodegradable Mulch Films: A Case Study of Cloudview Farm

Primary Author: Katherine Dentzman
Co-Author(s): Jessica Goldberger
Faculty Advisor: Jessica Goldberger

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

As part of a USDA-SCRI funded project, we conducted a case study of biodegradable plastic mulch films at Cloudview Farms in Ephrata, Washington. These films are envisioned as an alternative to polyethylene plastic films for sustainable agricultural systems. In particular, they can significantly reduce the labor cost of pulling up polyethylene mulches at the end of the season as well as reducing the amount of non-degradable plastic going to landfills. We propose presenting a poster detailing the case study at Cloudview Farms - including details of the mulches on trial, the farmers' perceptions and reactions to the mulches, field day participants' questions and perceptions of the mulches, and an overview of the mulches' performance. We have discovered that biodegradable plastic mulch films are of particular interest to sustainable and organic farmers - however knowledge of these mulches and their regulation in organics is low. This poster presentation aims to address this and facilitate learning about biodegradable plastic mulch films.

Academic Showcase Participant
Board Placement: 14

Rapid, accurate, and on-site molecular detection of soilborne potato pathogens

Primary Author: Joseph DeShields
Co-Author(s): Rachel Bomberger
Natalia Moroz
Kiwamu Tanaka
Faculty Advisor: Dr. Kiwamu Tanaka

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

"On-site diagnosis for plant disease is pivotal for growers as timely decisions regarding early-stage treatment are often crucial and can thereby reduce secondary spread of disease in the field. Polymerase chain reaction (PCR) is currently the most sensitive and accurate method for plant pathogen detection. However, standard PCR requires expensive laboratory equipment and skilled personnel. Here, we propose a rapid and simple method for on-site detection of soilborne potato pathogens comprised of magnetic bead-based nucleic acid extraction, portable real-time PCR equipment and data analysis that can be done remotely on a laptop computer. The capabilities of a portable real-time PCR thermocycler were compared with a standard real-time PCR thermocycler for the detection of the soilborne potato pathogens. Our conclusion is that the method we developed enables highly sensitive and rapid, on-site detection of important soilborne pathogens in the field, which can serve as an alternative to conventional diagnostic methods."

Academic Showcase Participant
Board Placement: 4

Addressing data gaps in freight and commodity supply chains

Primary Author: Suzette Galinato
Co-Author(s): Eric Jessup
Sal Hernandez

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

State transportation agencies face a significant challenge in addressing current and future transportation needs based on existing and evolving transportation activity on the multi-modal network, which supports many different types of users and businesses. Data gaps in freight movements and commodities being transported limit the ability to understand how current businesses and industries throughout a state depend and rely upon specific aspects of the transportation system. Consequently, this limited understanding creates challenges in the allocation and prioritization of limited state funds for investments and improvement of specific parts of the transportation network. This research project will identify a strategy of utilizing existing data from public sources, and complementing these data by performing one or a combination of alternative data collection approaches: GPS vehicle routes from private data sources; establishment, roadside, or shipper/trucker surveys; and vehicle video/image capture. Primary data collection can complement the publicly available secondary data. Each data source, while possessing limitations to some degree individually (detailed origin-destination, route, commodity or other data details), can be very informative when taken and evaluated collectively.

Academic Showcase Participant
Board Placement: 67

King County Age-Friendly Housing Assessment

Primary Author: Anthony Gromko
Co-Author(s): Cory Bolkan
Alan DeLaTorre
Brad Gaolach
Season Hoard
Christina Sanders
Jon Morrison-Winters
Brian Anderson

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource SciencesExtension/CED unit
Campus: Everett

Abstract

King County has changed significantly in the past decade. The gap between the need for age-friendly housing choices and the existing stock of affordable housing in King County has grown. The City of Seattle Human Services Development, Aging and Disability Services Division (ADS) contracted with the WSU Metropolitan Center for Applied Research and Extension to perform an age-friendly housing assessment of King County that will be used to inform policies and an Age-Friendly Implementation Plan. This also helps to provide a consistent narrative of needs, gaps, and the most appropriate solutions to support older adults in aging-in-place. As the aging population increases, researchers, policymakers, and service providers must closely analyze how best to respond to the changing needs of older adults; specifically, it is important to determine current and future needs for housing and home-based services that are equitable and accessible to a wide range of older adults in King County. We analyzed secondary data from multiple sources (e.g., ACS, ADS) and conducted an extensive literature review, informed by case studies. We reported on three overarching aims: 1) We determined current and future projections of housing and in-home service needs among the older adult population of King County. 2) We described policy impact on housing and service needs among older adults, with a particular emphasis on affordability, housing stability, and aging-in-place. 3) We included a focus on vulnerable populations (e.g. low income, LGBTQ, homeless, immigrant, and veteran) to inform social justice policies and equitable access to housing.

Academic Showcase Participant
Board Placement: 121

Habitat Selection of Columbian White-tailed Deer

Primary Author: Jonathon Heale
Faculty Advisor: Lisa Shipley

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Columbian white-tailed deer (Odocoileus virginianus leucurus) are a federally threatened species inhabiting historic floodplains along the Columbia River in Washington and Oregon. From 2013 to 2015, 88 deer were translocated from the Julia Butler Hansen Refuge (JBH) and surrounding areas to Ridgefield National Wildlife Refuge (RNWR). A major component of habitat management at each refuge involves using cattle grazing to manage grasslands. Grazing from April to October potentially creates habitat that is irregularly available, both spatially and temporally. We hypothesized that cattle presence and grazing would alter the space use and movement of deer. Specifically, we predicted that a) cattle presence would increase seasonal home range size, b) deer would avoid cattle pastures year-round, and c) avoidance of cattle pastures would be most pronounced when cattle were present on the landscape. To test this, we examined GPS location data from resident (JBH) and translocated (RNWR) deer. Average home range size during cattle-on and cattle-off periods was not significantly different ($p=0.47$). For deer with ≥500 relocations, the mean percent of locations in cattle pastures was 8% at JBH ($n=6$) and 2% at RNWR ($n=12$), whereas pastures comprised 20% and 13% of the habitat at JBH and RNWR, respectively. Locations occurring in cattle pastures when cattle were present accounted for 3.8% ($n=2501$) of total in-pasture locations. Our next steps involve building models of habitat selection within each refuge. Results from our work may help to guide management decisions that will assist in the recovery of this threatened species.

Academic Showcase Participant
Board Placement: 186

The Transformational Change Initiative

Primary Author: Laura Hill
Co-Author(s): Katie Forsythe
Samantha Swindell
Denise Yost

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
College of Arts and Sciences
Campus: Pullman

Abstract

Washington State University's Transformational Change Initiative (TCI) is a multiple-component plan to improve resiliency and empowerment using interventions known to support students' emotional, social, and academic development. Its major components include: 1) a parent handbook, 2) a faculty and curriculum development program (LIFT), and 3) a peer mentoring program (LAUNCH). The parent handbook provides parents and their WSU-bound children with interactive exercises for identifying core values, developing a sense of purpose, and engaging in values-based decision making. LIFT (Learn. Inspire. Foster. Transform.) trains faculty on the development and implementation of course-embedded active learning strategies and brief behavioral interventions known to support student engagement and connection. Finally, LAUNCH utilizes a peer-mentoring model to facilitate students' early awareness of, and participation in, experiential learning opportunities. These components are arranged in a scaffold framework that targets critical time points within the undergraduate experience (i.e., matriculation through graduation), thus reinforcing one another at multiple touchpoints. This poster will present an overview of the TCI's first year (AY 2016-2017) activities and accomplishments. It will likewise provide an assessment of each components' impact, both individually and holistically, as viewed through the RE-AIM measurement framework, a well-established approach for evaluating complex interventions in terms of their "reach", "efficacy", "adoption", "implementation", and "maintenance and dissemination". As viewed through this lens, TCI has made significant progress on its goals to produce transformational change both institutionally (by establishing WSU as a university that supports students emotionally, socially, and academically) and individually (by producing graduates prepared for life-long success).

Academic Showcase Participant
Board Placement: 58

Trust in Campus Policing in the United States: A Multi-Campus Assessment

Primary Author: Season Hoard
Co-Author(s): Christina Sanders

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Recent events across the U.S. have spurred conversations regarding the role of police and levels of citizen trust in law enforcement. Several of these incidents have occurred on college campuses nationwide since the presidential election, suggesting the need to better understand trust in law enforcement on college campuses and the surrounding communities and to better prepare for the consequences and outcomes of these events. Washington State University worked with Chico State University, Clayton State University and the University of Illinois Urbana-Champaign to develop and implement a web-based survey to analyze trust in both campus police and municipal police on the four college campuses in the United States. The survey includes campuses in four major U.S. regions (South, Pacific Northwest, Midwest, and West) to not only understand differences in trust within a single campus, but differences in trust and legitimacy across college campuses in the United States. Faculty, staff and students at each university were surveyed regarding their opinions of law enforcement, personal experiences with law enforcement, and perceptions of the proper role of law enforcement. Multinomial regression was used to examine and compare overall opinions of law enforcement in each community, and their potential impacts on policing. Because trust is imperative for effective law enforcement, our study provides valuable information to campus police, local law enforcement, and universities on current perceptions of these important institutions, and provides recommendations for improving perceptions through community engagement, particularly for groups who have been found to have less trust in law enforcement.

Academic Showcase Participant
Board Placement: 44

The role of coalition functioning, community involvement, and technical assistance in promoting effective coalition implementation across developmental stages: A mixed method study

Primary Author: Garrett Jenkins
Co-Author(s): Brittany Cooper
Angie Funaiole
Faculty Advisor: Brittany Cooper

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Coalitions mobilize stakeholders to improve community health and have recently gained prominence among community change efforts. Theory suggests coalitions progress through developmental stages, and that activities which support coalitions vary between stages. This study explored factors associated with coalition implementation and functioning across development. Data was collected from coalitions participating in Washington State's Community Prevention and Wellness Initiative (CPWI). Outcome analyses support CPWI's effectiveness, but mechanisms underlying this remain unexplored. This mixed methods study addresses that gap. A total of 59 (51%) respondents across four cohorts completed a web-based survey assessing coalition development, functioning, and implementation. Twenty (34%) of the respondents also participated in interviews to further illuminate these processes. Thematic analysis was used to identify patterns in responses across interviews. Convergent survey and interview data suggested that coalition leadership and functioning, community involvement, and technical assistance enhance CPWI implementation. More developed coalitions reported higher levels of functioning, implementation progress, satisfaction with CPWI work, and perceived community change, as well as greater community involvement and effective community champions. For less developed coalitions, school involvement was a more significant challenge. These coalitions reported greater needs in: leadership development, coalition building, program implementation, risk factor analysis, and leveraging local data. Successful implementation practices support positive community health outcomes. Few studies have examined the interplay of coalition developmental stage with functioning and implementation barriers. The current study captures this information, enabling community coalitions and supporting agencies to provide developmentally-targeted technical assistance at critical junctures.

Academic Showcase Participant
Board Placement: 80

Who Talks Who Questions? Exploring Parent-Teen Communication about Romantic Relationships

Primary Author: Cristina McAllister
Faculty Advisor: Dr. Kathleen Rodgers

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Communication within families is complex, yet research focused on parent-teen communication about sex and romantic relationships often relies on one sided self-report methods, usually from the teen, rather than using an observational dyadic approach (Lefkowitz, 2002). These studies also provide a limited understanding of the dynamic process that occurs between parents and children, particularly around the topic of romantic relationships and sex (Mauras, Grolnick & Friendly, 2013). Using observational methods and music media as communication prompts, we explore how mothers and fathers communicate with their sons or daughters about portrayals of romance, sexual objectification, and intimate partner violence. Across all video discussions, we calculated the percent of time each parent-teen dyad talked about or asked questions about the videos. Mothers spent, on average, less total time talking about the videos with their daughters (27.5%) than did fathers (35.8%). However, Mothers spent more time talking with their sons (32.5%) than fathers did (30.7%). Mothers spent more time asking questions with their daughters (5.2%) than did fathers (3.1%). However, Fathers spent more time asking questions of their sons (8.6%) than mothers did with their sons (4.6%). The results provide a glimpse into parent-teen patterns of communication about these sensitive topics. The proposed presentation will provide further differentiation of parent-teen discussions by each music-video conversation, using both quantitative and qualitative analyses. We anticipate that the level and type of questioning and disclosure will differ by the music-video content used to prompt parent and teen discussion, and by the gender of the participants.

Academic Showcase Participant
Board Placement: 112

Agricultural Export Gateways: Transportation Infrastructure Investment Modeling

Primary Author: Austin Miller
Co-Author(s): Eric Jessup
Faculty Advisor: Eric Jessup

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

There has been increased attention and focus on the importance of freight transportation at the local, regional and national level, especially with respect to efficient multimodal transportation that supports U.S. agriculture. As individual states and different federal agencies begin developing candidate projects that are eligible for infrastructure investment dollars, there exists a need for a mechanism of evaluating how specific investments improve export competitiveness. This research effort addresses that need by engaging with key stakeholders throughout the agricultural export supply chain and developing a model of major agricultural export corridors that allows estimation of candidate improvements. Projects are evaluated based on CGE and benefit-cost analysis and the analysis incorporates both the construction of the project and resulting usage of the infrastructure. The output by which potential projects can be ranked is in terms of both the efficiency gains of the agricultural industry as well as net social welfare in the region.

Academic Showcase Participant
Board Placement: 137

The Birds and Bees (and Fish) of Paleolimnology: Did Sockeye Salmon Historically Spawn in Lake Roberta, WA?

Primary Author: Barry Moore
Co-Author(s):

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
College of Arts and Sciences
Campus: Pullman

Abstract

Many parts of the upper Columbia River watershed are often ignored in regards to historic salmon runs because migration barriers such as the Grand Coulee and other dams currently limit restoration practices. However, there has been recent interest in making migratory fish passage to the upper Columbia a reality. Understanding the native ranges of historic salmonid migrations can help us properly manage aquatic ecosytems tht have lost the integral influence of salmon migrations, and provide insight into the extent of habitat restoration required if migration barriers to the upper Columbia are removed. Historically, the Sanpoil River tributary had produce spawning Chinook salmon (Oncorrhynchus tshawystscha) and Steelhead trout (O. myskiss) runs. Since the Sanpoil is connected to Lake Roberta, the river may also have sustained a productive Sockeye salmon (O. nerka) population. In our study we are employing stable isotope analysis (SIA) to analyze Roberta Lake sediments for unique marine isotope signatures and nutrient ratios to determine if sockeye were indeed historically present. The practical aspects of this research will guide restoration efforts in the upper Columbia.

Academic Showcase Participant
Board Placement: 62

From Field to Flight: Using Community Capitals to Predict Sustainable Aviation Biofuel Scale-Up

Primary Author: Daniel Mueller
Co-Author(s): Season Hoard
Christina Sanders
Michael Gaffney
Faculty Advisor: Season Hoard

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Aviation is one of the world's largest emitters of greenhouse gases and commercial aviation is growing rapidly around the world. These factors mean aviation will account for a larger and larger proportion of the global carbon budget in the next few decades. In order to curb aviation emissions, second generation aviation biofuels are an ideal path forward, but a rapid scale up of a sustainable aviation biofuel industry is necessary to accomplish this. Part of this scale up includes siting biorefineries and their feedstocks in communities where successful and sustainable production chains can take hold. Using the Community Capitals Framework (CCF), which details seven community capitals as necessary for successful project implementation, we argue that communities with high levels of social, human, cultural, and political capital are best suited for the location of a sustainable aviation biofuel production chain. We have developed the Community Assets and Attributes Model (CAAM), a quantitative model that measures these four capitals. We show how the CAAM can be used as a predictive tool for decision makers to determine which communities have high levels of these capitals and are subsequently suited to the siting of a biorefinery and sustainable biofuel production chain. In combination with information on built, financial, and natural capitals and factors like public support for biofuel, decision makers and community stakeholders can use this tool to rapidly scale up aviation biofuel production and also identify community strengths and weaknesses to build up community capitals for future projects.

Academic Showcase Participant
Board Placement: 16

Evidence of B-starch granule presence or absence in soft wheat associated with kernel texture (hardness) variation

Primary Author: Jose Orenday-Ortiz
Co-Author(s): Craig Morris
Faculty Advisor: Craig Morris

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Bread wheat is one of the most widely cultivated and consumed crops in the world, and a major source of caloric intake in the human diet. Its textural (hardness) properties are an important factor that affect milling, flour functionality, and end-use quality. Traditionally, wheat has been characterized as either hard or soft, the two major classes of texture. However, further variation is typically encountered in each class. Soft wheat varieties are utilized to make a diversity of baked products and Asian-style noodles. Therefore, variation in grain texture is an important quality parameter that can be exploited with novel kernel textures to provide new opportunities for food processing, and to modify the end-use quality of wheat. While much is known about the structural, morphological, and textural differences amongst hard and soft wheat kernels, little is known about the physical architecture that constitutes wide variations in the quantitative levels of kernel hardness among the soft wheat class. Samples of unique 'super soft' wheat kernels and normal soft kernels were sectioned, prepped, and visualized using scanning electron microcopy. Micrographs of the two soft wheat types reveal that normal soft kernels are most notably comprised of lenticular A-starch granules, spherical B-starch granules, and protein matrix. However, in super soft kernels there is a striking lack of B-starch granules and lower levels of gluten network formation. It is proposed that the presence, or lack thereof, of B-starch granules may play a role in undermining the variations in kernel hardness observed within the soft wheat class.

Academic Showcase Participant
Board Placement: 96

Extending an Evidence-Based Retention-Enhancing Human Development Course across WSU Campuses

Primary Author: Mary Kay Patton
Co-Author(s): Elizabeth Soliday
Anna Whitehall
Denise Yost
Kate McAteer

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

A cross-campus collaboration to increase retention and degree attainment at WSU Vancouver and Tri-Cities is showing signs of success after its first year of implementation, with improvements in semester-to-semester persistence rates of 5-20%. HD205 is a high-enrollment general education course focused on social-emotional health and interpersonal communication. The class includes evidence-based active learning techniques associated with improved academic performance, persistence, and communication skills. In summer 2016, seven Vancouver and Tri-Cities faculty from diverse disciplines completed an instructional development workshop led by Pullman HD205 faculty. In the 2016-17 academic year, Vancouver and Tri-Cities offered a combined ten sections of HD205. In Vancouver, Spring 2017 HD205 students had higher spring-to-fall persistence compared to the campus wide rate (74% vs. 65%). In addition, the percentage of Vancouver freshmen HD205 enrollees, whose persistence rates are the lowest, jumped 20% from 2014. In Tri-Cities, the Fall 2016 cohort, consisting of five sections of freshmen, had a fall-to-spring persistence rate of 87% but a first year retention rate of 71%. However, the Fall 2017 cohort has a higher persistence than the Fall 2016 HD205 cohort (92% vs. 87%). This study also included measures of socially responsible leadership and mental health, with promising trends noted. Fall 2017 Tri-Cities students showed significant increase in overall well-being, social well-being, and socially responsible leadership overall and subscale scores (civility, consciousness and change). Emotional and psychological well-being scales showed no significant improvement, which we will continue to examine as additional data become available.

Academic Showcase Participant
Board Placement: 70

High Tech and High Touch - Using Webinar Technology to Grow Agricultural Opportunities for Women

Primary Author: Janet Schmidt

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Location: WSU Whitman County Extension

Abstract

To be successful as female farm farmer, women need educational resources to help them improve their skills and make informed management decisions that will increase their farm profitability and quality of life. Through utilization of webinar technology and facilitated on-site discussion, women have the opportunity to participate in skill building presentations with experienced women farmers across the United States. Originally, the Women In Agriculture Conference was a traditional, multiple day conference. When women participants were asked what they preferred, they wanted a one-day conference that was a two hour drive from home to accommodate family and work responsibilities. Thus the evolution to the one day Women, Farm and Food Conference; offered in 31 locations, 5 states and 3 time zones in the Western Region reaching hundreds of women. Each site has a host contact that facilitates the program. A new theme and keynote presenter is selected each year using an interview process. In 2016, the theme was "Power Up Your Farm - Power Up Your Communication". Participants discovered their unique communication style and how to use it to build their business and personal relationships. Other useful technologies employed for the conference are Constant Contact, Brown Paper Tickets, website and facebook. In a follow up survey, 53% indicated they market to their farms strengths and 86% analyze their business for profitability. The Women, Farm and Foods Program is a unique and effective program in reaching women farmers and providing them with the skills to be successful in their farming operation.

Academic Showcase Participant
Board Placement: 100

A novel techniques for estimating response to drought in spring wheat.

Primary Author: Andrei Smertenko
Co-Author(s): Kathleen Hickey

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Plant peroxisomes maintain a plethora of key life processes including fatty acid β-oxidation, photorespiration, synthesis of hormones, and reactive oxygen species (ROS) homeostasis. The abundance of peroxisomes in cells can change in response to environmental cue, however the significance of this phenomenon remains unknown. The progress in this direction is hindered by the lack of an efficient method for measuring peroxisome abundance in plant tissues. Counting peroxisomes using fluorescence or electron microscopy is expensive and time-consuming. Here we report development of a high-throughput technique for measuring peroxisome abundance using the small fluorescent probe Nitro-BODIPY. We then applied this technique to analyze peroxisome abundance during plant development, salt, and drought stress in Arabidopsis thaliana and Triticum aestivum. We found that salt stress promotes peroxisome proliferation in tolerant genotypes and inhibits peroxisome proliferation in the susceptible genotypes. Peroxisome abundance was also higher in drought-stress plants. Principal component analysis shows negative correlation between yield parameters and peroxisome abundance under drought. In conclusion, peroxisome abundance can be used as a proxy for stress-tolerance.

Academic Showcase Participant
Board Placement: 74

The Structure of Ideology in Public Policy Making

Primary Author: Justin Smith

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Location: Mason County

Abstract

The study of ideology has a long history in the social sciences, yet the concept remains one of the most ambiguous and contested. The purpose of this research is not to debate definitions of ideology, but to provide a working framework answering questions about the role of ideology in group decision-making processes, and in particular, to better understand why some groups act to address existential threats such as climate change, while other groups do not. Ideology is considered here, as a system of beliefs that serve as a model by which people construct shared identities, make sense of information, communicate meaning and ultimately inform collective action. Communication is one of the primary mechanisms through which groups construct and maintain ideology, and often attempt to influence larger social decision processes. Because communication is central to the formation of ideology, the study of discourse in public policy making can lead to important insights into public policy decision-making and its outcomes. This research presents an approach to the study of ideology and conflict in the social construction of risk, and risk mitigation policy. In particular, this work presents an integrative approach that combines natural language processing (NLP) and algebraic topology to derive multi-level representations of ideological structures using news, social media, and public meeting minutes. The approach links speakers and their discourse to uncover conceptual connectives across networks of people, and thus provides a method for classifying ideologies and groups given a unique use of language reflecting both explicit and latent beliefs.

Academic Showcase Participant
Board Placement: 142

Farm Fresh Food Boxes: Increasing Food Access in Rural Communities through New Markets for Farmers and Retailers

Primary Author: Diane Smith

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Location: Skagit County

Abstract

The Farm Fresh food Box (FFFB) provides a low-risk strategy to address the complex supply, demand, and distribution challenges faced by producers and retailers of fresh local foods, while overcoming barriers that consumers face in accessing affordable, healthy food. The project design builds on a partnership between Extension faculty and University-based researchers in a multi-state research collaboration. The extension team is responsible for engaging farms and associated retail sites in three participating states: Vermont, Washington, and California, and promoting this innovative program to consumers in communities with limited access to fresh, local produce. The research team conducts mixed-methods research on the economic impacts of FFFB on farmers, retailers, and consumers. Participants include farmers, rural community members, and small food retailers. The intervention supports farms that offer weekly boxes of fresh produce at retail sites that provide convenient access to consumers. Retail sites post flyers detailing the content and cost of FFFB from participating area farms. Customers' pre-order advertised boxes at the retail site or online on a week-to-week basis for later pick-up. Box contents and flyers change throughout the season to move produce that is most abundant. A mixed-methods research protocol was followed to assess the economic impacts on farmers, retailers, and consumers using surveys and interviews. Preliminary data reflects project outcomes which include: market potential, measure of economic impact, measure of acceptability, comparative use of FFFB among consumer at Farmers Market and CSA shares, and benefits and barriers to farmers, retailers, and consumers.

Academic Showcase Participant
Board Placement: 50

Evaluation of Bio-refinery Concepts for the Production of Alternative Jet Fuels in a Dry Grind Corn Ethanol Plant

Primary Author: Abid Tanzil
Faculty Advisor: Dr. Manuel Garcia-Perez

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Principal topic With the rapid growth of US aviation industry, there has been growing concern about increasing greenhouse gas (GHG) emission. Through a network of governmental and private organizations, the US aviation industry is studying the production of alternative aviation jet fuels (AJF) from biomass as a tool to reduce its greenhouse footprint. But the high price of alt. fuels comparing to conventional jet fuel is a major challenge. Integration with existing industrial infrastructures may provide cost reduction opportunities. Method In this work, an existing dry grind corn ethanol mill (DGCEM) is used as base case scenario for the evaluation of biorefinery concepts for the production of 20 million gallons of AJF per year. Five AJF technologies were studied: alcohol to jet (ATJ), direct sugar hydrocarbon (DSHC), fast pyrolysis (FP), Virent's BioForming, and Gasification & Fischer-Tropsch (GFT). A standardized methodology was adopted to evaluate twelve integration scenarios between DGCEM and AJF technologies. For each of the concepts the minimum fuel selling price (MFSP) and GHG emission was estimated. Results Eight scenarios resulted in cost reduction opportunities in capital expenditure (CAPEX) and operational expenditure (OPEX) leading to reduced MFSPs in the range between 3% to 48%. Production capacity and finance method have higher impact on the fuel price among other factors. Of the twelve scenarios, one integrated strategy yielded negative carbon emission profile. Three strategies had higher emission profile than their respective base cases. The rest eight scenarios had no deviation in emission profile from their base case scenarios.

Academic Showcase Participant
Board Placement: 127

An Investigation in Age Precision: Determining if Non-lethal Sampling Yields Precise Age Estimates in a Lentic Brook Trout Population

Primary Author: Timothy Taylor
Co-Author(s): Barry Moore
Benjamin Cross
Faculty Advisor: Dr. Barry C. Moore

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

Ageing fish has always been important to fisheries managers because fish age can be used to understand how populations change (population dynamics), including growth, mortality, predation, and harvest rates. In order to age fish, calcified structures like scales, fin rays, or otoliths are removed from fish, processed, and viewed under a microscope where their growth rings can be counted. However, some structures require the fish to be sacrificed in order to obtain accurate ages. In systems with small fish populations, especially those that are an important form of sustenance, routinely sampling fish using lethal means may not be sustainable. Previous methods suggest using otoliths to age Brook Trout, but we are interested in determining if we can precisely age these fish using non-lethal means (e.g. scales, fin-rays). We collected scales, pectoral fin rays, and saggital otoliths in the fall when annulus formation had already occurred. Age from each structure was determined by three readers. We utilized common age precision statistical tests to compare each age structure, including age bias plots, percent agreement, and coefficients of variation. Age bias plots identify biases associated with reader and structure. Percent agreement determines how often reader's age assessments were similar, and coefficients of variation are used to create unbiased estimates of precision. These results will allow us to determine if scales or fin-rays are viable structures to precisely age Brook Trout non-lethally.

Academic Showcase Participant
Board Placement: 22

4-H Club Kits - an educational tool to support volunteer leaders

Primary Author: Dan Teuteberg

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Location: Extension

Abstract

The 4-H Youth Development community club model is the backbone for positive youth development delivery. Research shows 4-H clubs are effective in helping youth develop critical life skills such as decision-making, responsibility, interpersonal skills, and social skills. Families and communities are adjusting to meet the current demands of society, leading to a steady 4-H community club decline in two western Washington counties. Fewer 4-H community clubs means local youth have less opportunity to develop these critical life skills. Starting a 4-H club can be an over-whelming experience. The role of a club leader is often met with uncertainty and hesitation. Planning and organizing skills are needed for success. To assist in developing these volunteer skills "4-H Club Kits" were created. Education on how to use this kit to new 4-H club leaders was provided. Items in this educational tool include sample meeting agendas, activity lesson plans, promotional material, project curriculum, policy and guidance documents, as well instructions on how to run an effective meeting. From March 2017 to January 2018, five "4-H Club Kits" have been used by trained volunteers to start five new 4-H clubs. Preliminary evaluation data suggests that the "4-H Club Kits" are a successful addition to the volunteer education process. One volunteer notes, "Having the kit allows me to spend my time getting to know the youth and families. I feel so much more supported with this tool." Additional follow-up evaluations are scheduled for the coming months.

Academic Showcase Participant
Board Placement: 106

The association of masculinity beliefs and risk taking behaviors: a normative approach

Primary Author: Jason Wheeler
Co-Author(s): Jiayu Li
Nicole O'Donnell
Stacey Hust
Faculty Advisor: Stacey Hust

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Social cognitive theory and the social norms approach suggest that individuals' behaviors choices are informed by their perceptions of their peers' behavior. Studies have found this normative effect to be especially salient regarding alcohol-related behaviors. Individuals' behaviors are also informed by other norms, such as gender norms. Traditional masculinity gender ideology has consistently been associated with risk-taking behaviors. Participants in this study were surveyed on their personal alcohol-related risk behaviors, their perceptions of their peers' alcohol behaviors, and their adherence to specific domains of traditional masculinity. Traditional masculinity domains included seeking multiple sex partners (i.e. being a "playboy") and feelings of having power over women. A hierarchical regression analysis found these normative beliefs to be associated with alcohol-related consequence behaviors such as getting into a verbal argument or a fight, experiencing personal injury, and damaging community property. 290 college men participated in the survey. These results suggest that social norms approach interventions should consider the influence of gender norms as well as perceived norms of peers when seeking to inform individuals' behavior choices.

Academic Showcase Participant
Board Placement: 205

Connecting Policy to Purpose: A Qualitative Coding Approach

Primary Author: Alison White

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Kittitas/Yakima

Abstract

Looking to adapt a lengthy policy document into practical and impactful educational resources a team of WSU 4-H Youth Development faculty used an innovative evaluation approach to attached relevance to the rules. 4-H is a primarily volunteer-run organization, with limited staff tasked with educating thousands of volunteers on program rules and guidelines. Without a proper lens and tools to aid clear communication, policies may seem arbitrary or disconnected from the program's mission, resulting in misunderstanding, indifference, or noncompliance. The team used qualitative coding as a creative tool to connect policy to research-based indicators for positive youth development. Using the Essential Elements framework (i.e., the mission of 4-H) the team designed a deductive codebook and utilized a priori coding process to analyze policy. The analysis led to policies restructured under the four positive youth development domains of the Essential Elements (i.e., Belonging, Mastery, Independence, Generosity) within a coded policy hand-out, part of a curriculum which also included hands-on activities. The curriculum has reached over 400 volunteers statewide. Retrospective pre-post evaluations revealed that 95% of participants 'agreed' or 'strongly agreed' that the coded policy is a useful tool for understanding the Essential Elements connections; 91% 'agreed' or 'strongly agreed' that they will share the Essential Elements connections with the youth and families they serve; and 93% 'agreed' or 'strongly agreed' that the training was useful for understanding how the 4-H program operates. The researchers recommend this strategy to others interested in research-based approaches to attached unique relevance to their rules.

Academic Showcase Participant
Board Placement: 147

Dry matter and yield of barley and triticale grown for forage under irrigation in the Pacific Northwest

Primary Author: James Wolf
Co-Author(s): Don Llewellyn
Steve Fransen
Faculty Advisor: Dr. Don Llewellyn

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

An experiment was conducted near Moses Lake, Washington to evaluate the utility of growing forage barley and triticale in monocultures and blends to maximize yield and forage quality. Spring barley (447e) and spring triticale (Merlin) were planted in plots on April 10, 2017 in graded amounts of normal monoculture planting rate of 100 lbs./acre. The relative seeding proportion treatments were: 100% 447e; 447e 90%/Merlin 10%; 447e 70%/Merlin 30%; 447e 50%/Merlin 50%; 447e 30%/Merlin 70%; 447e 10%/Merlin 90%; 447e 20/Merlin 100; and 100% Merlin. Each of the eight treatment combinations were randomly assigned to plots and replicated four times. On July 6, 2017, forage plots were collected by forage harvester (harvested plots size = 3 feet x 14 feet). Forage was collected, weighed and dried for dry matter (DM) determination. From the dry weights and plots size, DM yield was determined (tons/acre). The 100% barley treatment (447e) had the highest DM concentration (P

Academic Showcase Participant
Board Placement: 53

Improved Methodology for Benefit Estimation of Preservation Projects: Phase 2

Primary Author: You Zhou
Co-Author(s): Eric Jessup
Faculty Advisor: Eric Jessup

Primary College/Unit: College of Agricultural, Human, and Natural Resource Sciences
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Campus: Pullman

Abstract

There is a gap between the highway pavement management and economic analysis in the process of evaluating existing road preservation and maintenance projects. This research develops a consistent and systematic method for economic benefit estimation of those projects. The phase 1 stage conducts a comprehensive phone survey with U.S. state transportation agencies. The results indicate a lack of consistent method to conduct the evaluation across states. Moreover, it identifies that the Highway Economic Requirements System - State Version (HERS-ST) has the potential to mitigate the issues. This phase 2 stage develops an Excel module, the HERS-ST Benefit Application Tool (HERS-ST-BAT), to complement to HERS-ST and facilitate the evaluation process. By combining HERS-ST-BAT and HERS-ST, the improved method is able to provide estimates for a variety of regional-level agency and user costs associated with highway preservation programs. It also provides the function to compare the timings of project implementation. Three case studies are conducted. It shows that the method can be applied into projects with different scenarios.

Academic Showcase Participant
Board Placement: 199

The effect of visual representation on cognitive load and student performance

Primary Author: Jessie Arneson
Faculty Advisor: Dr. Erika Offerdahl

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Visual representations like diagrams, graphs, and computer-generated models are central to science communication, allowing complex ideas to be shared between scientists and with the general public. As such, development of scientific visual literacy - the ability to use and create visual representations - has become a goal of undergraduate science instruction. Before we can effectively target visual literacy skills through instruction, however, we need to understand how scientific imagery impacts students' ability to process and act on information. Our working memory can only accommodate a few elements at once, so tasks with high cognitive demand can overwhelm a student's capacity for processing information. There are two contrasting predictions as to how adding visual representations affects working memory: adding visual elements either 1) requires additional processing, lowering task performance, or 2) allows information to be processed through two separate channels, increasing task success. To test these hypotheses, I am working with WSU Molecular Biosciences faculty to craft paired questions -- one form includes a visual representation, while the other does not - that are embedded in exams. Preliminary data indicate that visual representations may not significantly alter student performance on individual questions, but multiple visual questions may cumulatively result in decreased exam performance. Better understanding of the impact of visual representations will allow us as educators to devise strategies for training students to interpret and use scientific images. Improving student visual literacy could lead to increased understanding of the content in STEM courses and greater retention of students in STEM disciplines.

Academic Showcase Participant
Board Placement: 126

Fostering Mature Coping in Incarcerated Workers:

An Examination of Prison Work Programs

Primary Author: Courtney Bagdon
Faculty Advisor: Faith Lutze

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

This study seeks to examine the use of prison work programs as an intervention strategy for fostering mature coping and the advanced corrections model among incarcerated individuals in the work environment. Utilizing survey, record, and interview data of men currently working in either Correctional Industries or Department of Corrections jobs while incarcerated in a Washington State Correctional Facility. This study aims to further understand and explain how prison labor and work programs can serve as a rehabilitative intervention for positive change.

GPSA Research Exposition Participant
Board Placement: 98

The Structure of International Trade in Ecologically Unequal Contexts and the Disposal of Plastic Waste

Primary Author: Yikang Bai

Primary College/Unit: College of Arts and Sciences
Category: Social Sciences
Campus: Pullman

Abstract

Ecologically unequal exchange theory focuses on how the economic structure of the world system contributes to environmental inequality between world countries. It is argued that less-developed countries, which oftentimes depend on export-oriented and energy-intensive production, often face negative environmental impacts. Adopting this perspective, comparative international studies on plastic waste, a major form of solid waste nowadays, are limited. Preliminary analysis shows that the majority of the top exporting countries are developed countries, while many of the top importing countries are less-developed countries. This study focuses on the import of plastic waste. Conducting a longitudinal analysis of plastic waste import for a large sample of developed and less-developed nations for a period from the mid 1990s to the present, this study examines to which extent the structure of international trade in ecologically unequal contexts may contribute to the disposal of plastic waste to the less-developed countries.

Academic Showcase Participant
Board Placement: 141

One Day as a Thousand Years

Primary Author: Scott Blasco

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

One Day As a Thousand Years is a composition for piano and computer that draws its structure from the Catholic liturgical calendar and lectionary (the three-year cycle of scripture readings employed in the liturgy). Cast in cyclical form, the work can make use of two different possible beginning and ending points depending on the timing of a given performance in the then-current liturgical year. Each performance may thus vary according to its date and the programming needs of a particular concert, yielding a variable experience for both performers and listeners. The composition of One Day As a Thousand Years was supported by a WSU New Faculty Seed Grant. The complete work will be recorded by pianist Kari Johnson and composer Scott Blasco for release on the Irritable Hedgehog Music label in 2018.

GPSA Research Exposition Participant
Board Placement: 30

Heart of Darkness, Beating Still

Primary Author: Sarah Blum

Primary College/Unit: College of Arts and Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Principal Topic

The choices made in high school curriculum today reflect pedagogy that increasingly relies on critical theory. Literature once considered classic is now sometimes censored for its racist, sexist, and other discriminatory elements, but this ban may not be the best pedagogical tool for adolescents for whom it is much more crucial to prevent ignorance of history than their familiarity of past evil. Joseph Conrad's Heart of Darkness is the example I analyze to purview its contribution to literature and to the education American youth.

Method

Through close reading of the novel and the application of critical theories of race and pedagogy (teaching theory), I will scrutinize the problematic and contradictory morals bleeding from the Victorian era into this controversial turn-of-the-century novel. I will summarize my research of Victorian morals which on the surface seemed inscrutable, but in Heart of Darkness we see their effects revealed in a way that we should not quickly forget.

Results/Implications

The results of this analysis reveal the fatal mistake of censoring too much of our past, or in believing that we as humans have completely overcome the ills that plagued us decades or centuries ago. That hubris is little different than what is exhibited by white Europeans exploiting Africans in Heart of Darkness, a novel which still has much to teach us.

GPSA Research Exposition Participant
Board Placement: 18

Situating an Archival Marriage Document of the Second Count of Regla Utilizing Digital Forums.

Primary Author: Anne Boothman

Primary College/Unit: College of Arts and Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Principal Topic:

This research focuses on the marriage document, or carta dotal, of the Second Count of Regla, who married in 1785. The WSU library houses a unique collections of Spanish-language documents that belonged to the Regla family. During the late colonial period this intriguing family took advantage of the relative flexibility of the colonial structures to move from poverty and obscurity to extreme wealth within one generation. This document provides insight into the functional practices and power structures that governed those living in New Spain.

Method:

This research required the transcription, translation and digitization of portions of the manuscript. Additionally, historical contextualization of the document was necessary. Examining the complexities related to marriage is valuable because marriage was a public act that bisected multiple aspects of life. Marriage had social, religious, legal and financial implications, and for the Count of Regla it provided a public forum for self-situating. Contextualization reveals that this type of self-situating was essential to the maintenance of class structures among colonial subjects.

Results/Implications:

Recognizing that display is an inherent element of this manuscript, as a part of my research I utilize Scalar, an online scholarly forum, which allows for visually-rich, multimodal presentation. I argue that online forums are powerful educational tools that can be used to facilitate primary research and collaborative learning within classrooms, thereby expanding cultural knowledge, bringing historical documents into relevance and accessibility. Contextualization of the Regla papers can be used to engage minority learners with primary sources related to their own heritage.

GPSA Research Exposition Participant
Board Placement: 122

Thalidomide-induced suppression of naloxone-precipitated physical withdrawal signs in morphine-dependent mice

Primary Author: Abigail Brewer
Co-Author(s): Prianka N. Maharaj
Shea N. DeWald
Erin K. Heath
Raymond M. Quock

Primary College/Unit: College of Arts and Sciences
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Chronic morphine treatment increases release of proinflammatory cytokines in the brain and spinal cord indicating an involvement in some aspects of morphine dependence [Song and Zhao, 2001]. Tumor necrosis factor-a (TNFa) levels are increased in the periaqueductal gray (PAG) of animals undergoing opioid withdrawal; moreover, microinjection of TNFa into the PAG induces withdrawal-like symptoms [Hao et al., 2011], suggesting TNFa may underlie some aspects of opioid withdrawal. Thalidomide inhibits TNFa production [Deng et al., 2003; Bauditz et al., 2002]. To investigate the role of TNFa in opioid withdrawal, male NIH Swiss mice received s.c. injections of morphine sulfate or saline twice a day for 4 days, the daily dose increasing progressively from 50 mg/kg on day 1 to 125 mg/kg on day 4. On day 5, opioid withdrawal was precipitated by i.p. injection of 5.0 mg/kg naloxone. Sixty min prior to the naloxone injection, different groups of mice were treated with either 65 mg/kg thalidomide or 30% DMSO vehicle. Withdrawal was videorecorded and evaluated for 30 min using 5 different behavioral endpoints. Results showed that naloxone caused an increase in frequency of forepaw tremors and withdrawal jumps compared to saline-treated controls. Pretreatment with thalidomide reduced naloxone-precipitated withdrawal jumping, rearing, tremors and defecation but not wet-dog shakes. These findings support the working hypothesis that thalidomide can reduce certain signs of precipitated withdrawal in morphine-dependent animals. Further research will investigate whether thalidomide-induced inhibition of TNFa production is causally related to suppression of opioid withdrawal.

Academic Showcase Participant
Board Placement: 29

Police Use of Deadly Force: An Analysis of Incident-Level Characteristics

Primary Author: Rachael Brooks
Co-Author(s): Dale Willits
Faculty Advisor: Dale Willits

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The unjustified use of deadly force by police officers is a concern for police agencies in regards to potential legitimacy costs. However, there has been limited research on predictors of official court dispositions for deadly force incidents involving police officers. Indeed, there is limited and often misrepresented data on police officers using deadly force in the United States. This is a critical problem for the perceived legitimacy of police agencies because lacking a clear understanding of contextual factors surrounding an incident and the subsequent court disposition may lead to public misconceptions of deadly force. This study utilizes crowdsourced data and news articles identifying deadly force incidents occurring between 2010-2012 involving police officers in the United States. A multilevel logistic regression model is used to evaluate predictors of official court dispositions for incidents. Incident-level characteristics including, deceased demographic variables, whether the deceased had a weapon, whether the deceased assaulted the officer, if a violent crime was involved, and if the state the incident occurred in had a state deadly force statute will be analyzed.

Academic Showcase Participant
Board Placement: 202

All student-centered instruction is not created equal: Characterizing student-centered instruction

Primary Author: Aramati Casper
Co-Author(s): Erika Offerdahl
Faculty Advisor: Erika Offerdahl

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Recently, there have been calls to improve undergraduate biology instruction, including using student-centered activities. Research shows that student-centered activities, such as small group work, clicker questions, and whole-class dialogue, are more effective in facilitating learning than stand-and-deliver lecture. Such activities create opportunities for students to test, receive feedback on, and adjust their in-progress learning. Student-centered instruction is not simply students doing activities; instruction must be responsive to student needs and go beyond repeating facts. While there are several classroom observational protocols for undergraduate settings, most are limited to describing the frequency of student-centered activities. Few differentiate the nuances between different student-centered strategies, which likely have implications for learning. We address the research question: how do we measure variation in student-centered instruction? We used a case study approach in large-lecture introductory biology to characterize differences in student-centered instruction, as implemented by two instructors trained in the use of such instruction. We used metrics that characterize 1) types of instructor-student interactions, 2) conversations where instructors provide feedback to students, and 3) conversation turns in feedback conversations. Additionally, we collected descriptive data, such as length of student responses to questions. We found that the descriptive data allowed us to capture the nature of student-centered interactions, providing an important lens for metric interpretation. For example, call-and-response questioning is not a student-centered activity, yet the metrics classified it as such. Drawing from multiple data sources allowed us to capture classroom interactions at a more nuanced level, identifying instructional differences that may influence student learning.

Academic Showcase Participant
Board Placement: 150

Interfacial Dynamics in Radioactive Environments and Materials - a Department of Energy, Energy Frontier Research Center

Primary Author: Aurora Clark
Co-Author(s): Sue B. Clark
Carolyn Pearce
Kevin Rosso
Jaehun Chun
Gregory Kimmel
Gregory Schenter
Xiaosong Li

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The vision of the Department of Energy, Energy Frontier Research Center on Interfacial Dynamics in Radioactive Environments and Materials (DOE IDREAM) is to master molecular-to-mesoscale chemical and physical phenomena at interfaces, and in complex environments characterized by extremes in alkalinity, low water activity, and driven far from equilibrium by ionizing radiation. Mastering these phenomena will help to transform the ability to process high-level radioactive wastes safely and efficiently at the Hanford site, which stores the largest volume of such material in the United States.

GPSA Research Exposition Participant
Board Placement: 45

How do Scientists Know What They Know? Assessing Student Understanding of Disciplinary Practices in Science

Primary Author: Larry Collins
Co-Author(s): Joshua T. Premo
Jamierin C. Walters
Andy R. Cavagnetto

Primary College/Unit: College of Arts and Sciences
Category: Social Sciences
Campus: Pullman

Abstract

A major goal in undergraduate science education is to support the development of disciplinary practice in students (AAAS, 2011). While efforts have been made to assess broad views of the nature of science, less attention has been given to student understanding of science as a discipline can be assessed. Recent work in both biology education (Bissonnette et al., 2017) and chemistry education (Krieter et al., 2016) has demonstrated that sort based assessments can provide insights into students' abilities to recognize core scientific concepts, suggesting that a similar task could provide insight into students' understanding of the nature of science. The purpose of the present study was to develop a sort task that assesses student understanding of the nature of scientific knowledge. Two iterations of data collection occurred in an introductory biology course (n = 313, n =330) on unframed and framed versions of the task. Preliminary results illustrate a weak relationship between achievement on the unframed and framed sorts (ρ=0.28, n=308, $p<.05$). No significant differences were found within the multiple regression model indicating that gender, race, number of previous science courses, and interest level in science were not predictors for achievement. Our assessment tool has important implications for scientists as it can be used to support the development of knowledge of disciplinary practices in science and can be used to assess how non-scientists conceptualize the nature of science and the degree to which they accept or trust scientific ideas.

GPSA Research Exposition Participant
Board Placement: 95

FEEDBACK REGULATION OF PHOTOSYNTHESIS AFTER CHLOROPLAST TRANSPORTER LOSS-OF-FUNCTION

Primary Author: Rachael DeTar
Co-Author(s): Hans-Henning Kunz
Reimo Zoscke
Rouhollah Barahimipour

Primary College/Unit: College of Arts and Sciences
Category: Agricultural & Natural Sciences
Campus: Pullman

Abstract

The maintenance of ion gradients within the chloroplast plays a key role in photosynthesis. Ion gradients regulate osmotic balance, chloroplast shape and architecture, and regulate the proton motive force (PMF) to generate ATP. However, little is known about how the chloroplast senses and maintains ion balance in the chloroplast. To better understand how ion gradients are sensed in chloroplasts, researchers investigated signaling pathways in mutant lines for kea1 and kea2, two K+/H+ antiporters with redundant function. Loss-of-function in both kea1 and kea2 results in reduced photosynthetic capacity, and altered PMF partitioning. Not surprisingly, kea1kea2 double knock-out lines also have a significant downregulation of genes related to chlorophyll biosynthesis and light harvesting, as also known as Photosynthesis-Associated Nuclear-encoded Genes (PhANGs). However, the signaling pathway used to downregulate PhANGs in response to loss-of-function in ion transporters is unknown. RNA sequencing analysis of kea1kea2 mutants suggests that either anterograde signaling via phytochromes, or retrograde signaling in response to chloroplast damage could regulate expression of PhANGs via transcription factors such as Golden-Like 1 and 2 (GLK1/GLK2). Thus, the goal of this study was to determine whether anterograde or retrograde signaling is responsible for altered gene regulation and reduction of photosynthetic efficiency in kea1kea2. To accomplish this goal, researchers quantified the activity of key players in the both pathways. There is strong support for the hypothesis that retrograde signaling in response to chloroplast damage is essential for communicating loss of ion homeostasis in the chloroplast.

Academic Showcase Participant
Board Placement: 61

Evaluation of a Semester-based Mindset Intervention in Math-Intensive College Courses

Primary Author: Alexander Dimitrov
Co-Author(s): Kristin Lesseig
Lindsay Lavaysse
Tahira Probst
Joyce Ehrlinger

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
College of Education
Campus: Vancouver

Abstract

Many students in higher education struggle in math-intensive classes early in their careers, often switching intended concentrations or completely dropping out of college because of such classes. One important predictor of academic success in these courses is students' beliefs about the nature of intelligence: whether it is something that can improve over time (growth mindset) as opposed to being an innate, fixed quantity (fixed mindset). In an applied social psychological experiment, we tested a semester-long intervention with online and face-to-face components to enhance growth mindset among students (N = 368) in math intensive courses in 5 departments of a public university in the pacific northwest. Compared to control group participants (N = 449), longitudinal results indicate that the intervention resulted in significantly improved growth mindset perceptions and perceived control, better access of learning resources, higher self-reported quantitative literacy, and reduced math anxiety. A 3-way interaction with gender indicated that the mindset intervention was particularly helpful for female students at increasing growth mindset and perceived math control. This is a report based on results from a Student Success Seed Grant from 2016.

Academic Showcase Participant
Board Placement: 37

Effects of Fatigue and Heart Rate Variability of Officer Performance in Deadly Force Simulations

Primary Author: Elizabeth Dotson
Faculty Advisor: Stephen James

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Spokane

Abstract

Principle Topic: Police officers are expected to function under conditions of fatigue as a result of job strains and shift requirements. While fatigued, officers may be required to use deadly force. This study assessed the relationship that fatigue and heart rate variability have on performance in simulated deadly force scenarios. Methods: 80 experienced patrol officers participated in two to four separate 5-hour sessions in the laboratory. In half the sessions (randomized counterbalanced), officers came to the laboratory following five 10.7-hour shifts (fatigued condition); in the other half, they came to the laboratory after 72 hours off shift (control). Each laboratory session included six deadly force scenarios, during which performance was observed and demonstrated behavior was recorded. Each officer wore an ambulatory Holter ECG monitors which provided the pNN50 output measure of heart rate variability. Results: Results of mixed effects regression analysis found a significant interaction between pNN50 and scenario type (shoot/ don't shoot) on officer performance. Officer performance decreased in the don't shoot scenarios as pNN50 increased (parasympathetic response). We found no significant effects of fatigue on this interaction. Implications: These results may indicate an important influence of autonomic nervous system, specifically parasympathetic activity, on officer performance in simulator training. When pNN50 is high, meaning greater heart rate variability and increased parasympathetic response, we see officer performance decreasing in a null/ no shoot scenarios. This physiological data may indicate that officers are less engaged and less invested in the scenarios that do not lead to a deadly force decision point.

Academic Showcase Participant
Board Placement: 103

Working with Disaster: Weimar Mission Responses to the Boxer Catastrophe (1900-1901)

Primary Author: Lydia Gerber

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

In 1900, two young Protestant German missionaries, Richard Wilhelm (1873-1930) and Wilhelm Schüler (1869-1935), witnessed the Boxer Uprising in China in the relative safety of the German settlement of Qingdao. Here they observed German acts of continued violence and racism, in stark contrast to the near universal condemnation of Chinese brutality. Hesitant to directly confront the German authorities, Wilhelm and Schüler reported what they observed in a series of letters to the Weimar Mission home board. This project offers a qualitative analysis of these letters, and of the published texts they inspired in the Weimar Mission's signature journal Zeitschrift für Missionskunde und Religionswissenschaft (ZMR). It argues that a careful process of editing, and gradual and piecemeal inclusion of this eyewitness material in the ZMR enabled the missionary society to deflect the impact the Boxer catastrophe might otherwise have had on a missionary enterprise geared toward cross-cultural exchange. Instead of excusing the violence of the foreign response to the Boxers as a means of chastising the Chinese in preparation for the gospel, as other missionaries had done, the Weimar Mission effectively positioned itself as a source for peace and cross-cultural understanding within a context dominated by violence and racism. This project contributes to our understanding of the complex forces impacting the relationship between eyewitness testimony and published accounts of the Boxer Uprising specifically and of international conflicts in general.

GPSA Research Exposition Participant
Board Placement: 216

Paleotemperature Reconstructions of the Upland United States Southwest for the Last 2,000 years

Primary Author: Andrew Gillreath-Brown
Co-Author(s): R. Kyle Bocinsky
Simon Goring
Timothy A. Kohler

Primary College/Unit: College of Arts and Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Principal Topic

Reconstructions of past climates allows for a greater understanding of the past, particularly of the effects of climate-driven variability on past populations. The study of past climates uses environmental proxies such as pollen. Studying past climate can improve future climate projections, which are useful for predicting future human behaviors and scenarios. While past climate reconstructions have recently improved, the models are difficult to access and process. To resolve these issues, I introduce a model being implemented in the NSF-supported SKOPE project "Synthesizing Knowledge Of Past Environments."

Method

The application of the model (openSKOPE.org) allows users to select a geographical area and time interval, and subsequently obtain past climate reconstructions for a given climate parameter. I use pollen data from the Neotoma Paleoecological Database (https://www.neotomadb.org/) to produce long-term temperature reconstructions using the Modern Analog Technique (MAT). MAT builds a relationship between modern climate data and associated modern pollen spectra, and relates this pairing to fossil pollen assemblages based on the use of an appropriate multivariate distance metric.

Results/Implications

While the application is designed to cover the continental United States, my initial efforts focus on the southwestern United States for the last 2000 years. Reconstruction results show that several periods had above and below average temperatures, of which the timing and location varied across the southwest. These temperature reconstructions will be used to model the effects of temperature variability on prehistoric farming, calibrate future climate projections, and explore a variety of questions surrounding social and cultural responses to climate change.

Academic Showcase Participant
Board Placement: 118

The Growth of Outer Satellites' Icy Shells: Convection and Crystallization

Primary Author: Austin Green
Co-Author(s):
Faculty Advisor: Catherine Cooper

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC Examining the behavior of remote planetary bodies such as Jupiter's satellite Europa provides valuable insight into geological processes outside of a terrestrial context. Of especial interest is the properties and behavior of Europa's highly active surficial icy shell. Here, we investigate the controls on the thickness of Europa's ice shell. METHOD Recently the timing of ice shell growth has been modeled by analogy to a solution describing the cooling and solidification of a layer of magma. For icy satellites, the solid ice shell is analogous to solidified basalt and the underlying liquid water ocean is analogous to magma. Traditionally, in this method heat is transferred solely by conduction; however, Europa's shell likely convects heat. We modify the solution to consider the effect of a convective layer in the shell and then model the growth of an ice shell from an initial thickness until it reaches thermal equilibrium, controlled primarily by heat generated from tidal interactions with Jupiter. RESULTS/IMPLICATIONS A reference model was evaluated under Europan consensus conditions, followed by a suite of model runs over a range of heat production rates thought to be experienced by Europa's shell. The reference model reached a final thickness of 28 km in approximately 1 Myr. The model suite found a thickness variance of ~22 km over the considered range of heat production. These results, combined with the rapidity at which the shell equilibrates, imply that the Europan shell's thickness may be strongly inhomogeneous, even in the presence of non-synchronous shell rotation.

Academic Showcase Participant
Board Placement: 87

Directing Anticancer Immunomodulation To Hepatocarcinoma using Aldehyde Oxidase

Primary Author: Joseph Hantho
Co-Author(s): Erickson Paragas
Faculty Advisor: Dr. Rock J. Mancini

Primary College/Unit: College of Arts and Sciences
Campus: Pullman

Abstract

Principal Topic One method of Cancer Immunotherapy, in particular for hepatocarcinomas, uses immunostimulants to elicit anticancer immune responses. However, intravenous administration results in system toxicity. By targeting the anticancer effects of immunostimulants to the enzymatic activity of Aldehyde Oxidase (AO), we can direct immunostimulants to the liver in an effort to target hepatocarcinomas. AO in human livers metabolizes drugs and has only recently shown nitroreductase activity. We exploit this with a prodrug that is selectively converted to the immunostimulant Imiquimod by the nitroreductase activity of AO. This method uses the bystander effect, in which a cancer cell activates the prodrug before it interacts with a non-cancerous cell, to selectively activate immune cells in local proximity to cancer cells. Herein we report the synthesis and activity of AO-directed imidazoquinoline immunostimulants with in vitro activation of bystander immune cells mediated by AO in Human Liver Cytosol (HLC). We envision that this method could find use in targeting immunostimulants to hepatocarcinomas. Method and Results To target immunostimulants to the liver, we have prepared two prodrugs from the immunostimulant Imiquimod: one through direct oxidation of the critical moiety, the other through covalent attachment of a nitroreductase-cleavable cage with a self-immolative spacer. We have demonstrated that these prodrugs are converted to Imiquimod by AO in HLC, and have been monitored by LC-MS/MS and RAW-Blue immune cells. These results have shown promising conversion and activation of the parent immunostimulant, implying these prodrugs may be suitable to target liver cancer.

Academic Showcase Participant
Board Placement: 206

Population genomics of the glacier ice worm

Primary Author: Scott Hotaling
Co-Author(s): Joanna Kelley
Faculty Advisor: Joanna Kelley

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

If you spend enough time on glaciers in the Pacific Northwest (PNW), you'll eventually encounter an enigmatic, extremophile: the glacier ice worm (Mesenchytraeus solifugus). Ice worms are the largest glacier-obligate residents known, and M. solifugus is only present in coastal mountains from Oregon to southern Alaska. Though globally rare, individual populations can number in the tens of million, suggesting the potential for an important functional role of ice worms in glacier ecosystems. To feed, ice worms come to the glacier surface during summer nights and overwinter at this summer ice-snow interface, letting deep, seasonal snow act as a barrier against plunging winter temperatures. Their unique, ice-obligate biology make ice worms an interesting model for evolutionary research but little is known about their population genetic differentiation, evolutionary history, and biogeography. Using double-digest restriction-site associated DNA sequencing (ddRAD) we are addressing two basic questions: (1) What is the population genomic structure of ice worms across their range? (2) Is there evidence for elevated levels of inbreeding (perhaps correlating to glacier size)? Our results shed light on the evolutionary history of ice worms and set the stage for more fine-scale studies of their genome biology going forward.

Academic Showcase Participant
Board Placement: 211

"Accidental Environmentalists": Examining the Effect of Income on Positive Social Evaluations of Environmentally-Friendly Lifestyles

Primary Author: Emily Huddart Kennedy

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Addressing environmental issues requires significant decreases in household consumption of natural resources. Scholars have suggested that a possible driver of these important reductions is the perception that those who lead "environmentally-friendly" lifestyles will receive more social approval than those who do not. However, empirical tests of this theory have been inconclusive. Using qualitative pilot data collected from 64 socioeconomically and politically diverse Washington State residents, I found that income might be an important mediating factor in the extent to which green lifestyles earn social approval. Subsequently, I administered a survey experiment (manipulating income (high /low) and environmental impact (low / same)) to test the empirical prediction that a household that reduces its environmental impact will only be evaluated positively if that household has a high income. Social evaluations are measured with a single-item approval measure and a 2-item measure of social closeness. I use scales measuring perceived competence, morality, and environmental commitment to explain people's judgments of the households. The findings indicate strong support for the hypothesis that the social rewards earned by reducing consumption are accessible only to high-income households. This research advances literature by identifying the bases for social approval of green lifestyles and examining how that approval is affected by income.

GPSA Research Exposition Participant
Board Placement: 69

The Effect of Marijuana Legalization on Jail Populations in Washington State

Primary Author: Sohee Kim
Co-Author(s): Duane Stanton
Xiaohan Mei
Dale Willits
Mary K. Stohr

Primary College/Unit: College of Arts and Sciences
Category: Social Sciences
Campus: Pullman

Abstract

Initiative 502 was passed in 2012 by the citizens of Washington State, which legalized the growth, production, sale, and possession of marijuana. Advocates of the legalization of marijuana expected that it would have an impact on the many criminal justice institutions and their practices. In particular, it was hypothesized that the legalization of marijuana would decrease the jail population and disproportionate incarceration of minorities as a result of the deprioritization of marijuana-related criminality in policing.

To assess the effects of cannabis decriminalization on county jail populations, an evaluation involving statewide Washington jail booking data was conducted. Specifically, this study determined whether cannabis decriminalization has reduced the number of people incarcerated in jails and decreased disproportionate minority group jailing between 2009 and 2016, or has resulted instead in the same or increased jail use as other criminally defined activity receives more enforcement. For the analysis, we estimated a set of interrupted time-series regression models. The results suggest that jail trends vary from county to county and that if legalization affected jail bookings, it was not a consistent effect. One important note, though, is that when trends did change, they seemed much more likely to decline after legalization and to increase after sales. There are very few significant increases in jail population rates after legalization and very few significant decreases in jail population rates after the start of retail sales.

Academic Showcase Participant
Board Placement: 115

Detecting hybridization in Hawaiian Cyrtandra using genome-wide data

Primary Author: Joseph Kleinkopf
Faculty Advisor: Eric Roalson

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Principle Topic: Island systems are isolated and often young in age, making them ideal locations to study how species evolve over time. Hawaii, in particular, is an excellent setting for studying evolutionary processes due to its unique history and extremely isolated location. Cyrtandra (Gesneriaceae, the African violet family) is a genus of flowering plants found throughout Southeast Asia and the Pacific. There are currently 60 species and over 62 putative hybrids in Hawaii, most of which are identified based on morphology. Despite many previous studies on this lineage, questions regarding the reconciliation of genetics and morphology remain, many of which can be attributed to the relatively young age and evidence of hybridization between species of Hawaiian Cyrtandra. Method: Based on prior studies, we hypothesized that species relationships would group by island and morphology, and putative hybrids would be intermediate to their parents. We utilized high-throughput DNA sequencing (569 nuclear genes) to test how hybridization and other evolutionary processes have shaped a subsample of the Hawaiian Cyrtandra. We utilized traditional and modern analyses, including maximum-likelihood and species-tree methods, to test for species relationships and hybridization in Hawaiian Cyrtandra. Results: Despite utilizing significantly more data than previous studies, Cyrtandra and the underlying evolutionary processes that shaped it remain largely unresolved. Different methods showed different relationships, though there are similarities between trees where some species are grouped similarly by either morphology or island. Future studies will require wider sampling to fully understand the history of Hawaiian Cyrtandra

Academic Showcase Participant
Board Placement: 168

The Gendering of Engineering as Masculine across Contexts: A Case Study of Female Malaysian Undergraduates

Primary Author: Julie Kmec
Co-Author(s): Sarah Morton
Ashley Ater Kranov
Nehal Abu-Lail
Zahra Atiq
Jennifer DeBoer

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

The under-representation of women is a well-known and persistent feature of the field of engineering in the U.S. The masculine gender-typing of engineering is partly accountable for women's under-representation. In Malaysia, a country in which engineering is also masculine-typed, women's participation rate in engineering is nearly triple that in the U.S. The obvious question is: Despite a masculine gender-typing of engineering in both countries, why do so many more Malaysian women enter engineering than in the U.S.? We conducted a case study using focus group interviews with roughly twenty female undergraduate engineering students in Malaysia's top engineering school. Our interviews captured students' descriptions of their decision to study engineering. Analyses confirm that while engineering is masculine-typed in Malaysia, it is gendered in different ways compared to the U.S. This masculine labelling also has different implications for Malaysian women studying engineering. Even though women recognize the challenge of engineering work and the possibility of differential treatment in the field because they are women, they talk of support in their pursuit of engineering and expect success in the field. By studying a context with a relatively high female engineering participation rate, our study offers new insight into how the gender-typing of a field matters for women's curricular choices. Of greatest significance, we learn that the field's masculine gender-typing does not always mean the exclusion of women. Overall, we bring new insight into the growing dialogue about ways to improve women's engineering presence and, more broadly, their STEM participation in the U.S.

Academic Showcase Participant
Board Placement: 76

Making DREAMs come true: A resilience intervention to increase academic persistence among undocumented students in higher education

Primary Author: Paul Kwon
Co-Author(s): Marcela Pattinson
Emily Faust
Steven Hobaica
Joseph Tse
Rebeca Sainz
Cesar Castañeda
Brittany Graham

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
MSS
Campus: Pullman

Abstract

Undocumented students face a number of obstacles during their educational pursuits. Currently, there are no published interventions designed to increase resilience against these obstacles among undocumented students. With support from a Student Success Seed Grant from the WSU Office of the Provost, our team developed a self-help workbook, ran an eight-week group to supplement the workbook, and tested the feasibility of implementing this intervention. Based on a theoretical model developed by Kwon (2013), our workbook was designed to help undocumented students increase three critical resilience variables: 1) social support, 2) hope regarding the future, and 3) emotional openness. An initial pilot test compared 16 undocumented students who received the intervention with 19 control group students who received a treatment-as-usual intervention consisting of empirically supported behavioral techniques of relaxation. The intervention was well-received; ratings of the workbook's helpfulness and utility ranged from 4.88 to 6.50 on a 1-7 Likert scale. Qualitative feedback about the workbook included positive feedback regarding the value of each of the resilience variables addressed by the workbook. Based on student feedback, we implemented a follow-up pilot test that added an eight-week group discussion component co-led by four members of our research team. Ten participants who completed the group lauded the experience. Ratings of various components of the workbook and group ranged from 6.10 to 7.00 on a 1-7 Likert scale. The group component led to statistically significant improvements in participants' commitment to using the workbook and their plans to continue using the workbook in the future.

GPSA Research Exposition Participant
Board Placement: 148

What's Normal? Microbiomes in human milk and infant feces vary geographically and are related to each other

Primary Author: Kimberly Lackey
Co-Author(s): Janet E. Williams
Courtney L. Meehan
William J. Price
Mark A. McGuire
Michelle K. McGuire

Primary College/Unit: College of Arts and Sciences
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Principal Topic

We characterized milk and infant fecal microbiomes from healthy maternal/infant dyads living in Ethiopia (2 cohorts), Ghana, the Gambia (2 cohorts), Kenya, Peru, Spain, Sweden, and the US (2 cohorts). We hypothesized that there would be variation in microbial diversity and composition across cohorts, and variation in milk and fecal microbiomes would be related.

Methods

Milk was collected from 396 mothers and feces from 377 infants. DNA was extracted, the V1-V3 region of the 16S rRNA gene amplified and sequenced, and microbial community compositions characterized and compared.

Results/Implications

There was substantial intra- and inter-cohort variability in both sample types, although *Streptococcus* and *Staphylococcus* were present in 90% of milk samples and *Streptococcus, Escherichia/Shigella*, and *Veillonella* present in 90% of fecal samples. Shannon diversity was highest in Kenyan and lowest in Ghanaian and Californian infant feces; microbial richness was highest in Kenyan feces. Shannon diversity and richness were highest in milk produced by rural Ethiopian women, and lowest in milk produced by Ghanaian women ($P < 0.05$). Relative abundance of *Lactobacillus* was lowest in infant feces from Spain, Sweden, and the US, while *Rhizobium* was most abundant in milk in rural Ethiopia ($P < 0.05$). Myriad associations were noted between genera in milk and feces; for example, relative abundance of *Achromobacter* in milk was positively correlated with those of *Lactococcus* and *Leuconostoc* in feces ($r_s = 0.311$, 0.392, respectively; $P < 0.0001$). Additional work is needed to understand environmental, behavioral, and genetic factors contributing to this variation and the impact on health.

GPSA Research Exposition Participant
Board Placement: 42

Inspired by Mary Jane? Mechanisms Underlying Enhanced Creativity in Cannabis Users

Primary Author: Emily LaFrance

Primary College/Unit: College of Arts and Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Previous research suggests cannabis may enhance some aspects of creativity, although the results remain somewhat equivocal. Moreover, it is unclear whether differences in cannabis users' personalities may account for any potentially beneficial effects of cannabis on creativity. This study was designed to examine whether sober cannabis users demonstrate superior self-reported and objective creativity test performance relative to non-users, and to determine whether any of the Big 5 personality domains underlie these effects. A sample of sober cannabis users (n = 412) and non-users (n = 309) completed measures of cannabis consumption, personality, self-re- ported and objective creativity. Relative to non-users, sober cannabis users self-reported higher creativity, and performed significantly better on a measure of convergent thinking. Controlling for cannabis users' higher levels of openness to experience abolished these effects. Therefore, while cannabis users appear to demonstrate enhanced creativity, these effects are an artifact of their heightened levels of openness to experience.

Academic Showcase Participant
Board Placement: 65

Labyrinth of Ice: The Triumphant and Tragic Greely Polar Expedition

Primary Author: Buddy Levy

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

In 1881, American Lt. Adolphus Washington Greely set off from St. John's, Newfoundland with 24 American men on an expedition to attain "Farthest North" (closest to the North Pole) and to set up an international polar weather station, the northernmost outpost in the world. This would be part of the first International Polar Year, a joint program designed to place 14 remote weather stations circumnavigating the north polar region. When resupply ships failed to reach Greely and his men at Fort Conger on Ellesmere Island (the ships were destroyed by ice or had to turn back), Greely had to make the difficult decision to abandon the fort they'd built and retreat to the south, where food caches had been planned. What followed was one of the most harrowing, tragic, and heroic stories of survival in the annals of polar exploration. This book chronicles the expedition's successes, failures, and highlights of this important American story: the attainment of Farthest North (which broke an English record of nearly 300 years); thousands of scientific experiments that provide information about global weather still used today; and the heroism of the leader, Adolphus Greely, who would go on to receive the Congressional Medal of Honor for his lifetime of achievement.

Academic Showcase Participant
Board Placement: 109

Evolutionary Dynamics of the Antifreeze Protein III Gene Cluster in Polar Fish

Primary Author: Luana Lins
Faculty Advisor: Joanna Kelley

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

To sustain life at subfreezing temperatures in the poles, organisms must survive in constant cold temperatures and long periods of darkness. Many species in polar regions experience temperatures below their serum freezing point and have independently evolved antifreeze proteins (AFPs). AFPs bind to forming ice crystals and inhibit ice recrystallization, conferring an adaptive advantage to the species that have AFPs. The type III AFP gene in the Antarctic fish, Lycodichthys dearborni, arose from the translocation and duplication of another gene (SAS-B). Tandem duplications of the AFP gene led to a cluster of AFP III genes. A transposable element (TE) is located upstream of the SAS-B and the AFP cluster, suggesting the putative role of this TE in the formation of the AFP gene cluster. We aim to understand how this important protein (AFP) has evolved in some polar species and the role of TEs in this evolutionary process. To answer these questions, we characterized the AFP gene cluster region and analyzed the TEs density in L. dearborni. We identified a highly abundant TE in the AFP cluster that has not been identified for this species before: the L2-1 element. These elements are located downstream of each annotated repeat unit of the AFP III gene with a conserved distance suggesting recurrent duplication events. We then further characterized the AFP III genes by examining the relationships among the gene copies and their nearby TE insertions. This study sheds light on the role of TEs in the evolution and duplication of novel proteins.

Academic Showcase Participant
Board Placement: 17

Rural Dwelings and Planetary Retreats: A Case Study

Primary Author: Xinmin Liu

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Rural Dwellings and Planetary Retreats: A Case Study Critical of "soulless high tech," the silicon-valley high-tech elites have lately joined the eco-conscious public in seeking for ideas and ways to "ensoul" high tech so that it can do more good for societal and ecological wellbeing. It is precisely this idea that drives the recent trend of reinventing many health-rehab facilities, such as the Esalum Institute (NY Times, 12/05/2017), in order not just to revitalize the design and function of health spars and resorts, but retool and reorient the essential nature of "retreats" for the sake of rehabilitating the humans and the nonhuman lifeworld amidst ecological crises. One effective way is to extend the concept of a healing retreat by impinging it on rural dwelling and eco-tourism so that it gives fresh impetus to our efforts to defuse and curtail the sprawling megacities, polluting industries and displaced rural population. My field-trip studies of healing retreats have led me to explore the "Naked Retreats" in Zhejiang, East China where rural dwelling and eco-travel have been infused rewardingly by Shanghai-based foreign expats working together with local peasants to renovate traditional farmhouses into eco-friendly dwellings and conduct a low-carbon life style and health tourism. I have discovered the original intent of building Naked Retreats has now morphed into an effective strategy for sustaining economic growth of the local villages, while its success has even considerably swayed the CCP leadership in pushing for a nation-wide ecological awareness and implementing a sustainable rural economy. (250 words)

Academic Showcase Participant
Board Placement: 164

Contextual Determinants of Observed Negative Emotional States in Police-Community Interactions

Primary Author: David Makin
Co-Author(s): Dale Willits
Rachel Bailey
Bryce Dietrich
Wendy Koslicki
Rachael Brooks

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
The Edward R. Murrow College of Communication
University of Iowa
Campus: Pullman

Abstract

Researchers universally agree that interactions between police and community members have the propensity to be emotionally charged. However, to date, there is limited research investigating situational and dynamic factors that make an interaction between a police officer and citizen more or less emotionally charged. Analyzing unedited police body-worn camera footage, associated with 287 criminal code violations, this research explores the individual, behavioral, and environmental factors that affect police officers' and citizens' emotional states during a police-citizen interaction. Results show clear variations at the situational, organizational, and environmental levels influencing the observed emotional state of the suspect and police officer.

Academic Showcase Participant
Board Placement: 11

Dysfunctional Beliefs Mediate the Relationship Between Belief Systems and OCD Symptoms

Primary Author: Dakota Mauzay
Co-Author(s): Carrie Cuttler
Faculty Advisor: Carrie Cuttler, PhD

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

There is evidence to suggest that both religious and paranormal beliefs are associated with symptoms of obsessive-compulsive disorder (OCD). However, the specific mechanisms that underlie these relationships are not as well understood. The purpose of this study was to examine the extent to which three sets of dysfunctional beliefs known to be linked to OCD (i.e., inflated sense of responsibility and over-estimation of threat [RT], intolerance of uncertainty and perfectionism [PC], and importance of and the need to control thoughts [ICT]) mediate the relationships between religious beliefs and OCD as well as between paranormal beliefs and OCD. A correlational design was used in which 775 students completed an anonymous questionnaire online. Parallel multiple mediation analyses indicated that, after controlling for the influence of both depression and anxiety, all three sets of dysfunctional beliefs (i.e., RT, PC, and ICT) were significant mediators of the relationship between religiosity and OCD as well as of the relationship between paranormal beliefs and OCD. Although causality cannot be determined due to the correlational nature of the design, the overall pattern of results suggests that both belief systems may promote dysfunctional cognitive styles which in turn contribute to the severity of OCD symptoms. Thus, it is possible that targeting these dysfunctional beliefs in a therapeutic setting may decrease the negative influence of religious and paranormal beliefs on OCD.

Academic Showcase Participant
Board Placement: 159

Differential Gene Expression in Eye Transcriptomes of Cave and Surface Populations of the Atlantic Molly, Poecilia mexicana

Primary Author: Kerry McGowan
Faculty Advisor: Joanna Kelley

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Principal Topic Understanding the functional implications of genome-wide changes in gene expression in response to extreme environments is an important challenge in evolutionary and developmental biology. The Atlantic molly, Poecilia mexicana, is able to survive in sulfidic environments as well as in caves with minimal light and scarce food. Exposure to hydrogen sulfide has been shown to inhibit cytochrome c oxidase, an important enzyme in aerobic respiration. Troglodytic P. mexicana also exhibit reduced opsin expression, indicating possible regression of eye structures in cave environments. Investigating gene expression changes in these fish across populations exposed to both hydrogen sulfide and low light may help determine how they survive in and possibly adapt to such extreme environments. Method Genes expressed in eye tissue were sequenced from four populations of P. mexicana: nonsulfidic surface and cave populations as well as sulfidic surface and cave populations. Sequenced reads were mapped to a reference genome to generate a counts matrix currently being analyzed to identify differentially expressed genes. Reads that did not map were assembled into transcripts de novo. These expressed genes will be analyzed for their putative functions. Results/Implications The identification of differentially expressed is ongoing, complicated by a low mapping rate to the reference genome. De novo assembly of the unmapped reads is also ongoing. Initial results based on differential gene expression suggest that the two cave populations are more similar to each other than to the other populations. Understanding how gene expression changes in extreme environments will shed light on evolutionary processes.

Academic Showcase Participant
Board Placement: 221

The Limits of Erasure: Recognising Reuse

Primary Author: Hallie Meredith

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Over the course of approximately 350 years, erasure transformed likenesses into effigies, remnants of one figure in another's guise, and emendations to history. The focus of this research is the intersection of preservation and change in Roman imperial imagery, and implications for erasure today, such as the 2001 destruction of the fourth and fifth-century CE monumental Buddhas of Bamyan in the Hazarajat region of central Afghanistan or the 2003 toppling of the Saddam Hussein statue in Firdos Square in Baghdad, Iraq. The principal aim is to discern the mechanisms by which honour and dishonour were linked in a transfer of power premised on the joining of imperial likenesses. Addressing referents and the revised roles imposed on such visually transformed figures, this investigation considers well-known examples of visual alteration in tandem with a production-led typology of erasure, including palimpsests and partial to incomplete excision. The act of reusing imperial images as spolia (repurposed material) meant that the figure depicted was publicly re-presented as his power was waxing or waning. This analysis examines the delicate balance of unmaking and remaking as iterations in the relational nature of viewing and Roman imperial reuse.

Academic Showcase Participant
Board Placement: 99

The quantum-mechanical piston shock: Turbulence-induced viscous dissipation in a superfluid

Primary Author: Maren Mossman
Co-Author(s): Peter Engels
Faculty Advisor: Peter Engels

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

We present the results of a piston-shock experiment at WSU that explores the emergence of viscous dissipation in a nominally inviscid superfluid. When a cloud of atoms is actively cooled to temperatures nearing absolute zero, the atoms can condense into a state of matter known as a Bose-Einstein Condensate (BEC). As a superfluid, a BEC is nominally inviscid and is typically not expected to exhibit dissipation within the system. In this work, we consider a prototypical piston shock set-up with a BEC to test hydrodynamics in extreme quantum regimes. This investigation is performed experimentally, numerically, and theoretically. We observe rich dynamics in the extremely perturbed system, including the formation of a plateau region, a sharp shock front, and rarefaction waves. It is shown that many aspects of the observed dynamics follow predictions of classical viscous, rather than superfluid dispersive, shock theory. We attribute the emergence of this viscous dissipation in the system to turbulent vortex dynamics. This work provides a new avenue for the investigation of quantum shock waves and quantum turbulence in cold atom systems, both of which are currently the focus of significant research efforts. In conclusion, our work establishes the quantum mechanical piston shock as a paradigm setting for the study of turbulence-induced viscous dissipation in a superfluid.

Academic Showcase Participant
Board Placement: 173

Differences between Rural and Urban Families: Mother-infant Interactions, Child Temperament, and Parenting Stress

Primary Author: Alyssa Neumann
Co-Author(s): Eric Desmarais
Sydney Iverson
Allegra Campagna
Natalia Potapova
Maria Gartstein
Faculty Advisor: Maria Gartstein, PhD

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The impact of macro socio-cultural factors on child and family functioning have been studied, including comparisons between urban and rural contexts. For example, rural families have demonstrated lower levels of parental warmth and responsiveness and utilize fewer educational materials (Sheridan, Koziol, Clarke, Rispoli, & Coutts, 2014). Lower socio-economic status (SES) has been associated with more controlling, restrictive, and disapproving parenting and more difficult infant temperament (Jansen et al., 2009), and thus represents a potentially important covariate in comparing rural and urban families. It was hypothesized that rural children would demonstrate significantly more challenging temperament profiles. Additionally, sensitivity/responsiveness and synchrony were both expected to be higher in the context of urban parent-child interactions, and analyses concerning stress in the parental role should be considered exploratory. Existing data collected for two independent projects were used in this secondary analysis: urban sample (N=68) from the San Francisco bay area a rural sample (N=120) from adjacent towns in the inland Pacific Northwest (

GPSA Research Exposition Participant
Board Placement: 3

Dopaminergic polymorphisms C957T and ANKK1 contribute to distinct aspects of delay discounting

Primary Author: Amy Nusbaum
Co-Author(s): John Hinson
Paul Whitney
Faculty Advisor: Paul Whitney

Primary College/Unit: College of Arts and Sciences
Category: Social Sciences
Campus: Pullman

Abstract

Principal topic: Impulsivity is characterized in part by the tendency to make decisions that lead to immediate reward without consideration of potential future consequences. Excessive impulsivity has been conceptualized as an imbalance between top-down processes, driven by the prefrontal cortex, and bottom-up processes, driven by regions including the striatum. Thus, neurochemical modulation of impulsivity may rely on those two regions. Further, impulsivity as measured by delay discounting tasks can be altered using constraints such as working memory loads, but the biological factors that confer resiliency or vulnerability to such constraints have not been identified. We examined the role of dopamine-related genetic polymorphisms in impulsivity under baseline conditions and while engaged in a working memory task.

Method: Participants (n=121) were genotyped for COMT (rs4680), a polymorphism that affects dopamine in the prefrontal cortex, C957T (rs6277), and ANKK1 (rs1800497), polymorphisms that affect dopamine in the striatum. Participants two conditions of a delay discounting task involving choices of hypothetical amounts of money while maintaining either a relatively small or relatively large working memory load of randomly selected digits.

Results/implications: We found that the C957T C allele increased discounting of delayed amounts of money, consistent with more impulsive decision making, while the ANKK1 A1 allele increased discounting rates only when individuals were undergoing a working memory load. These results provide further support for the role of genetics in impulsivity, while also suggesting a potential biomarker that may confer vulnerability to factors that alter impulsivity, such as working memory loads and stress.

Academic Showcase Participant
Board Placement: 23

A Survey of Protophloem Unloading Patterns in Divergent Plant Species

Primary Author: Grayson Ostermeyer
Faculty Advisor: Michael Knoblauch

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC Concealed within the root tips of all important crops resides a small vascular tissue tasked with the essential function of discharging nutrients to fuel root growth. Deemed the protophloem, this realm of the plant body has historically eluded careful scientific inquiry because its analysis requires techniques that minimize disruptions to its delicate living state. The first detailed account of protophloem structure and physiology was recently released for a single plant- Arabidopsis thaliana. This species exhibits two protophloem veins in roots where unloading of products translocated through the phloem occurs in a predictable cellular architecture. Plants may regulate the size of this unloading domain by plugging conduits connecting neighboring cells in regions of mature vasculature with an occluding substance. Investigating protophloem patterns in diverse plant varieties will provide scientists with a new platform to design higher-yield crops to meet human needs. METHOD We propose that plants express species-specific protophloem organization in the vascular bundles of roots, but that a conserved filtration mechanism is present as well as a common unloading regulation strategy of plasmodesmata occlusion. After optimizing preservation protocols, protophloem from alfalfa, populus, and coleus will be analyzed by light and transmission electron microscopy. RESULTS/IMPLICATIONS Evidence of occluding substance build-up in mature regions of the protophloem and a conserved pentagonal filtration architecture was observed in each species. Different numbers and organizations of protophloem veins characterized each species. These results suggest that protophloem development has diverged to accommodate different plant species, but some aspects of phloem unloading are universal.

Academic Showcase Participant
Board Placement: 215

Madeleine's Children: Family, Freedom, Secrets, and Lies, in France's Indian Ocean Colonies

Primary Author: Sue Peabody

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Vancouver

Abstract

This is a multigenerational saga of an enslaved family in India and two islands, Réunion and Mauritius, in the eastern empires of France and Britain, 1750-1850. A tale of legal intrigue, it reveals the lives and secret relationships between slaves and free people that have remained obscure for two centuries. The Bengali child, Madeleine, was pawned by her impoverished family and became the slave of a French woman. She accompanied her mistress to France as a teenager, but she did not challenge her enslavement on the basis of France's Free Soil principle, a consideration that did not come to light until future lawyers investigated her story. In France, a planter couple purchased her, despite laws prohibiting the sale of slaves within the kingdom. They transported Madeleine across the ocean to their plantation in Reunion Island, where she eventually gave birth to three children: Maurice, Constance, and Furcy. One died a slave and two eventually became free, but under very different circumstances. On 21 November 1817, Furcy exited the gates of his master's mansion and declared himself a free man. His freedom lawsuit ultimately brought him before the Royal Court of Paris, despite the extreme measures that his putative master deployed to retain Furcy as his slave. A meticulous work of archival detection, Madeleine's Children investigates the cunning, clandestine, and brutal strategies that masters devised to keep slaves under their control while painting a vivid picture of the unique and evolving meanings of slavery and freedom in the Indian Ocean world.

GPSA Research Exposition Participant
Board Placement: 220

The Humanity Project: A Jazz Suite

Primary Author: Alison Poteracke
Faculty Advisor: Shannon Scott

Primary College/Unit: College of Arts and Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

The Humanity Project: A Jazz Suite is a six-movement programmatic suite for multiple soloists and big band. It was written with the intention of starting a conversation – a conversation about the disease of violence dictating the way we live in our modern world. Each movement refers to a recent act of violence and calls upon multiple improvisers to tell the story of each conflict and drive the discussion. The Humanity Project was written to display the beautiful differences we all have as unique human beings despite the violence we witness on a daily basis. This suite calls into question what we, as a society, will do to resolve our legacy of violence. In order to heal, we cannot forget the atrocities of the past, we cannot turn a blind eye to the conflict we face in the present, and we cannot conveniently choose when to stand up and say, “Enough is enough”.

Academic Showcase Participant
Board Placement: 195

Building an Organelle-specific artificial microRNA Library to Identify Elusive Chloroplast Transporters in Arabidopsis thaliana

Primary Author: Anna Pratt
Faculty Advisor: Henning Kunz

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The chloroplast plays a central role in plant cell function; despite this, the majority of proteins active in the chloroplast have yet to be studied. A high-throughput screening method that efficiently targets the entire chloroplast proteome would be a powerful tool in elucidating the complex network of gene expression and physiological function. Here, I describe a mechanism for this methodology using an artificial microRNA (amiRNA) library in a large-scale mutagenesis screen, coupled with automated phenotypic analysis, which will allow the identification of genes whose products are responsible for calcium (Ca2+) transport within the chloroplast. This amiRNA library will cause efficient and simultaneous knock-down of entire gene families, bypassing the problem of functional redundancy while generating phenotypes with a single transgenic event. Our own primary objective of the application of this tool is to identify plastid Ca2+ transporters; however, this is only a single possibility with respect to the utility of this tool. Exploration of plastid development, immune response, central metabolism, hormone and secondary metabolite production, drought tolerance and other abiotic stress responses are a few examples of the diverse processes that could be studied using the chloroplast amiRNA library. In conclusion, the creation of an amiRNA library targeting genes responsible for the chloroplast proteome is expected to be a novel and powerful genetic tool for the exploration of plant physiology.

Academic Showcase Participant
Board Placement: 83

Contribution of oxygen and hyperbaric pressure to hyperbaric oxygen (HBO2) suppression of naloxone-precipitated withdrawal in morphine-dependent mice

Primary Author: Raymond Quock

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

We recently reported that both 30- and 60-min treatments with HBO2 suppressed naloxone-precipitated withdrawal signs in morphine-dependent mice [Nicoara et al., Brain Res. 1648:434-7, 2016]. We seek to identify possible mechanisms for the biomedical effects of HBO2. This study was conducted to investigate the relative individual contributions of oxygen and hyperbaric pressure to suppression of withdrawal signs by HBO2 treatment. Male NIH Swiss mice received s.c. injections of morphine sulfate or saline twice a day for 4 days, the daily morphine dose increasing progressively from 50 mg/kg on day 1 to 125 mg/kg on day 4. On day 5, different groups of animals were treated with normobaric air (NBA), normobaric 100% oxygen (NBO2), hyperbaric air (HBA) or hyperbaric 100% oxygen (HBO2) for 30 min. Normobaric was set at 1.0 atmosphere absolute (ATA), while hyperbaric was set at 3.5 ATA. Ninety min after gas treatment, opioid withdrawal was precipitated by i.p. injection of 5.0 mg/kg naloxone, and withdrawal signs?withdrawal jumping, wet-dog shakes, forepaw tremors, rearing, and defecation?were videorecorded for 30 min and later counted. Results showed a main effect of oxygen on rears, a main effect of hyperbaric pressure on tremors, and main effects for both oxygen and hyperbaric pressure on fecal boli. No significant results were found for withdrawal jumping or wet-dog shakes. Based on these findings, the suppressant effect of HBO2 on opioid withdrawal appears to be attributed to an effect of either oxygen or hyperbaric pressure or both, depending upon the specific endpoint under investigation.

Academic Showcase Participant
Board Placement: 182

Distinct Aspects of Psychomotor Vigilance Test (PVT) Performance during Sleep Deprivation

Primary Author: Samantha Riedy
Co-Author(s): Hans Van Dongen
Faculty Advisor: Hans Van Dongen

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Elson S. Floyd College of Medicine
Campus: Spokane

Abstract

Introduction: The psychomotor vigilance test (PVT) is a 10-minute cognitive performance task that measures sustained attention through speeded responses to stimuli, which appear at random 2-10s intervals. The PVT is sensitive to performance impairment during sleep deprivation. PVT performance impairment may be quantified using a variety of outcome metrics that describe various aspects of the response time (RT) distribution. We investigated whether PVT metrics used in the literature reflect distinct aspects of performance impairment during sleep deprivation. Methods: 99 healthy subjects (ages 22-37, 50 females) participated in in-laboratory studies with a 10-hour baseline sleep opportunity followed by 38 hours of extended wakefulness during which the PVT was administered every 2 hours. For each test administration, 36 different metrics were calculated. Results: Subjects completed 1,034 PVT test bouts. Principal component analysis revealed three distinct dimensions of performance impairment. One dimension captured response slowing. Another dimension captured response variability. The remaining dimension captured premature responses (false starts). Conclusion: Different PVT metrics captured multiple, dissociable aspects of performance impairment during sleep deprivation: response slowing, response variability, and premature responding. Different PVT metrics may thus capture performance impairment in distinct sets of cognitive processes during sleep deprivation. Research supported by NIH, ONR, and FAA.

Academic Showcase Participant
Board Placement: 188

Providing online lectures for regular classes: how does it impact attendance and student performance?

Primary Author: Sian Ritchie

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The availability of online material is increasingly expected for undergraduate classes, even if the class is taught in a regular classroom. In addition to providing slides / study guides, Instructors are also being asked to record their lectures and post them online. The theoretical benefits to providing online lectures include the ability for student to catch up due to occasional absences, and the ability to review the material and cover it at the students' preferred pace. One worry in providing so much material online is that students will not attend class, not be involved in discussion about the material, and ultimately not perform as well in the class. This study looks at the use of online lectures as supplemental material in two different types of class, one a 100-level non-major's general education science class, and one a rigorous upper division major's science class. Data was compared between two semesters for each class: in the first semester no online lectures were available, in the second semester online lectures were posted on the learning management system and available throughout the semester. The content and instructors of both classes being studied was the same in each class. The availability of online lecture material did negatively impact attendance for both classes. The average overall class grades were not impacted; however the data was also examined more closely to determine if particular subsets of students (as assessed by their overall GPA) benefitted or did worse as a result of the online lectures being available.

Academic Showcase Participant
Board Placement: 191

Phylogenomic analyses reveal extensive gene flow within the magic flowers (Achimenes, Gesneriaceae)

Primary Author: Wade Roberts
Faculty Advisor: Eric H. Roalson

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The Neotropical Gesneriaceae (African violet family) is a lineage known for its colorful and diverse flowers, as well as an extensive history of hybridization, particularly among the magic flowers (Achimenes) and other closely related genera in Mexico and Central America. Despite numerous studies seeking to clairfy the evolutionary relationships of these lineages, relatively few studies have sought to infer specific patterns of gene flow despite evidence of widespread hybridization. Gene flow and hybridization within the magic flowers has likely occurred numerous times given the large number of natural hybrids. To explore the utility of phylogenomic data for reassessing phylogenetic relationships and inferring patterns of gene flow among species, we sequenced RNA from flowers in 12 species. We used a variety of phylogenetic methods to infer the species tree, examine gene tree discordance, and infer patterns of gene flow using network approaches. Phylogenomic analyses resolved species relationships with high support. In contrast to previous analyses, we recovered strong support for several new relationships despite a significant amount of gene tree discordance. We present evidence for at least two introgression events between two species pairs that share pollinators and suggest that the species status of A. admirabilis be reexamined. Our study demonstrates the utility of RNA data for phylogenomic analyses and inferring patterns of gene flow despite gene tree discordance. Moreover, these data provide another example of prevalent gene flow among Neotropical plants that share pollinators.

GPSA Research Exposition Participant
Board Placement: 218

Challenging Media Misrepresentations and Underrepresentation of Asians and Asian Americans through Detournement

Primary Author: Sherwin Sales
Faculty Advisor: Ashley Boyd

Primary College/Unit: College of Arts and Sciences
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Principal Topic

Images in the media greatly shape who people view themselves to be; therefore, misrepresentations and underrepresentation contribute to the shaping of identity. My belief is that one can challenge these issues individually through learning one's positionality and using what Nancy Fraser (1990) calls "counterpublics" in popular culture to examine how that positionality is structurally situated and perpetuated. For Asian and Asian-American identities specifically, Debord's (1967) "spectacle" shows that a false reality is deeply-rooted, historically embedded, and reaffirmed by family and environment, so much that it becomes an assumed reality of what they believe they should be. A rearrangement of existing images—a detournement—can challenge the way society looks at the "spectacle" and disrupt internalized representations.

Method

I have created a multimedia video incorporating media depictions of Asians to demonstrate both misrepresentation and underrepresentation. Using iMovie and Debord's framework, I spliced these various representations and interposed them with performances by Asian-American slam poet, Beau Sia.

Results/Implications

This method of detournement is particularly significant in education, as a piece of public pedagogy. Also, this method can be applied in a classroom by asking students to reconsider and revise misconceptions of Asians and Asian-Americans. While individuals are aware of the contradictions inherent in the spectacle of Asians and Asian-Americans, they may lack understanding of how dominating forces, such as Hollywood, influence this type of thinking. The creation of my detournement thus acts as a counterpublic in an accessible medium to counter images that may be detrimental to identity development.

Academic Showcase Participant
Board Placement: 134

Innovations for Piano Duo: Premiere of Daniel Ott's "Fantasy on a Falling Line"

Primary Author: Jeffrey Savage
Co-Author(s): Karen Savage

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

The piano duo 88squared holds as one its longstanding missions the performance and promotion of new works for two pianos. As part of its ongoing work in this area, the duo of married pianists Karen and Jeffrey Savage premiered a composition by Daniel Ott, a native of the Pacific Northwest who resides in New York City and teaches at Juilliard and Fordham University. Ott's composition for two pianos, Fantasy on a Falling Line, uses several extended compositional techniques that pose unique challenges for two pianos. Three of the most prominent include phasing, indeterminacy, and metric modulation. The opening motive of the work (the "falling line") is introduced by a combination of the two pianists, but very soon in the twenty-minute work, the motive is time-shifted between the two instruments. This results in a slow phasing of the main theme. In other sections of the work, the rhythmic relationship between the two pianists is not specifically proscribed, deriving unique results in every performance. In the middle section of the work, one of the most difficult sections for the ensemble revolves heavily around the concept of metric modulation, using ratios of note-lengths to change the tempo of the music. 88squared premiered the new composition at Fordham University in April 2017, and gave its Asian premiere at Ho Chi Minh City Conservatory in Vietnam in May. The composer is currently pursuing external funding for 88squared to record the work for a CD of Ott's compositions in the summer 2018.

Academic Showcase Participant
Board Placement: 177

Testosterone and Cortisol Modulate the Metabolic Effects of Sleep Restriction: A Randomized Order Placebo Controlled Dual Clamp Mechanistic Study

Primary Author: Darian Sidebottom
Faculty Advisor: Hans van Dongen

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
College of Veterinary Medicine
Campus: Spokane

Abstract

Introduction: Sleep restriction (SR) promotes insulin resistance (IR) and increases the risk of type 2 diabetes mellitus. Through a dual hormonal clamp intervention, we investigated whether the impacts of SR on testosterone and cortisol, the main anabolic and catabolic hormones, may induce IR. We hypothesized that hormonally induced anabolic-catabolic imbalance due to SR leads to IR. Subjects and Methods: 34 healthy men (ages 33.3 ± 6.4, BMI 25.4 ± 2.5 kg/m2) were admitted to a Clinical and Translational Research Center. After one night of baseline sleep (10 hours), their sleep was restricted to 4 hours for 4 consecutive nights. This pattern was repeated on two separate occasions. Different treatment conditions were administered during SR in randomized order: dual testosterone and cortisol clamp, or matching placebo. An intensively sampled oral glucose tolerance test was performed after the baseline night and after the fourth SR night to calculate measures of IR. Results: Following SR, IR was increased in both conditions, but the increase was dampened in the dual clamp condition. This was seen in the Matsuda index of IR ($F=4.90$, $p=0.029$), insulin area under the curve (AUC) ($F=6.54$, $p=0.012$), and insulin/glucose AUC ratio ($F=5.44$, $p=0.022$), with a trend for the HOMA-β index of β cell function ($F=2.88$, $p=0.093$). Conclusion: A dual testosterone and cortisol clamp in a sample of healthy young men dampened the negative effects of SR on IR. Our results show that anabolic-catabolic imbalance may underlie the effects of SR on IR. Research supported by NIH grants R01HL124211 and UL1TR001881.

Academic Showcase Participant
Board Placement: 55

Changing Times: The Downsizing of USAF Big Bands

Primary Author: Frederick Snider

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Over the past several decades, with the downsizing of the American work force due to monetary restraints, the expression "doing more with less" has become a standard catchphrase. Downsizing to save money has become part of the American fabric in all walks of life including the United States Air Force (USAF) band program. USAF jazz big bands have downsized from standard seventeen-member groups to smaller ensembles known as "little big bands" with ten members. This situation has created a need for arrangements for these little big bands. This year, several USAF bands have requested arrangements from me, since it is difficult to get good, professional arrangements from commercial publishers for this instrumentation. Furthermore, I am able to customize each arrangement for the specific band which requested it. In 2017, I adapted several big band classics to be playable by little-big bands including Artie Shaw's Begin the Beguine, Pee Wee Ellis's The Chicken, Dizzy Gillespie's A Night in Tunisia, Earth, Wind and Fire's Africano/Power and Don Menza's Groovin' Hard. Providing arrangements for little-big bands is becoming an increasing interest for publishers. Walrus Music, a division of Jazz Lines?a top firm which publishes music from the libraries of Frank Sinatra, Ella Fitzgerald, Duke Ellington, Oliver Nelson and many others?has expressed interest in publishing my little big band arrangements.

Academic Showcase Participant
Board Placement: 94

STEM meets Stage

Primary Author: Mary Trotter-Gonzales

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Scientists need the theatre to tell their stories. Silent Sky, by Lauren Gunderson, shines a light on the life of Henrietta Leavitt (1868-1921). The play will be produced by WSU Performing Arts and directed by Mary Trotter-Gonzales, with six performances in March and April 2018. As theatre is an art of collaboration many disciplines will aid in the creation of the final production, including faculty from the Department of Physics and Astronomy (CAS) and staff from the School of Design and Construction (CEA). Based on the true story of astronomer Henrietta Swan Leavitt, "Silent Sky" explores a woman's place in society during a time of immense scientific discoveries, when women's ideas were dismissed?until men claimed credit for them. Leavitt discovered the relation between the luminosity and the period of Cepheid variable stars. After Leavitt's death, Edwin Hubble used her discovery, together with spectral shifts first measured by fellow astronomer, Vesto Slipher, at Lowell Observatory, to determine that the universe is expanding. It is now known as Hubble's Law. Social progress, like scientific progress, can be hard to see when one is trapped among earthly complications; Leavitt and her female peers believed in both, and their dedication changed the way we understand both the heavens and Earth, regardless of who gets credit. Performances are in Jones Theatre, Daggy Hall, March 30 and 31, April 6 and 7 at 7:30 p.m. plus 2:00 p.m. Saturday matinees. "Silent Sky" is presented by special arrangement with Dramatists Play Service, Inc., New York.

Academic Showcase Participant
Board Placement: 7

Measuring Police Violence: Analyzing Fatal Encounters Data

Primary Author: Dale Willits
Co-Author(s): Rachael Brooks

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Despite a large degree of concern regarding the use of lethal force by the police, there is no current official database which tracks lethal force incidents. The most widely used measure of police lethal force is derived from the FBI's Supplementary Homicide Report (SHR). While some information can be gleaned from this and other official databases, prior research has shown that these sources systematically undercount lethal force incidents. A number of media and public-led efforts to generate systematic data have emerged in response to this information gap. This study analyzes data from Fatalencounters the largest of these data sources which are hosted at Fatalencounters.org. The Fatal Encounters (FE) data compiles information on lethal force incidents from media reports through a mixture of crowdsourced and paid coding. After an intensive data cleaning process, the FE data on lethal force incidents were compared to SHR data on lethal force. Results comparing three years of data indicate that the SHR captures approximately 1/2 of all lethal force incidents. Patterns in lethal force and related outcomes are discussed, as are future research steps.

Academic Showcase Participant
Board Placement: 49

Iron Stars

Primary Author: Guy Worthey

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Stars are approximately spherical, so they can be reduced to a series of layers, each labeled by thermodynamic quantities such as temperature, density, and elemental composition. Local stars are 98% hydrogen and helium and 2% heavy elements. With the aid of new numerical models, I show that some of the more common elements within that 2%, such as carbon, magnesium, and iron, have unexpected influence on a star's evolution and fate, should their abundance differ from the norm. This is important because in other galaxies, the mixture of heavy elements does differ from the norm; our estimates for age and composition in distant galaxies may be systematically in error.

Academic Showcase Participant
Board Placement: 2

A Wealth of Commissions

Primary Author: Gregory Yasinitsky

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

Greg Yasinitsky, WSU Regents Professor of Music, began 2017 with the premiere of his Jazz Concerto for Piano and Orchestra by soloist Willis Delony with the Baton Rouge Symphony. The piece was subsequently nominated for the Pulitzer Prize in Music and was named a finalist for the American Prize. Greg was then commissioned by WSU Director of Bands, Danh Pham, to create a wind ensemble version of the Concerto which will be performed in China in the summer of 2018. Greg was also commissioned by the Las Vegas Academy, a nationally recognized arts magnet school, to compose Partial Eclipse for jazz band, in commemoration of the 25th anniversary of the Academy, and was commissioned by the Colorado Repertory Jazz Orchestra to create an arrangement of Stevie Wonder's Creepin' for compact disc release. Additionally, Greg was commissioned by Vanessa Sielert, Director of the Hampton School of Music at the University of Idaho, to compose Heartfelt and Diabolical for saxophone and piano, which will be previewed at the WSU Festival of Contemporary Art Music and premiered at the national conference of the North American Saxophone Alliance. Finally, Greg has an active commission to compose a work in commemoration of the 10th anniversary of the Jazz Education Network, arguably the most important academic organization for jazz. The piece will be premiered at the 2019 international JEN conference and will feature some of the world's finest jazz performers including trumpeters Jon Faddis and Sean Jones, saxophonist Jeff Coffin and bassist John Clayton.

Academic Showcase Participant
Board Placement: 196

Ultra-sensitive potassium magnetometer for studying the magnetization field produced by hyperpolarized helium-3

Primary Author: Sheng Zou

Primary College/Unit: College of Arts and Sciences
Associated College(s)/Unit(s): College of Arts and Sciences
Campus: Pullman

Abstract

We present here a novel approach to acquire the absolute magnetization field produced by polarized 3He atoms based on detection of the spin precession signal with an ultra-sensitive potassium magnetometer. By analyzing the transient time-domain response of the magnetometer, we obtained the relevant damping ratio and natural frequency. When the damping ratio reached a maximum value (in our particular case, 0.0917), the combined K-3He magnetometer reached a dynamic equilibrium from which we could determine the magnetization fields of both the polarized K atoms and the hyperpolarized 3He nuclei. In our particular case, we measured these fields to be 16.12 nT and 90.74 nT, respectively, corresponding to polarizations of 84.5% and 2.2%, respectively. In this configuration, the nuclear magnetization field offsets disturbing magnetic fields perpendicular to the orientation of the electronic spin, thus stabilizing the electronic spin polarization axis.

Academic Showcase Participant
Board Placement: 10

Teacher education's preparation on culturally responsive practices and Response to Intervention: A multi-campus evaluation and exploration

Primary Author: Brenda Barrio
Co-Author(s): Kira Carbonneau
Kelsey Mahaffey

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

In an era of more than a decade of using pre-referral systems (e.g., Response to Intervention (RTI)) that were designed to support students with and without disabilities from diverse backgrounds, it is imperative to explore the use of culturally responsive practices (CRP; Gay, 2010) in such models. More specifically, it is key to understand the teacher's preparation to use culturally responsive RTI models in order to address the persistent issue of disproportionality (Artiles et al., 2010; Klingner et al. 2005) in special education. Therefore, the purpose of this study was to compare 428 pre-service teachers' perceived beliefs and knowledge about CRP within the RTI model as means to assess efforts by teacher preparation programs from across two regions of the U.S. to ameliorate issues of disproportionality in special education. Findings show the need to focus on adapting instruction, building home-school collaborations, and assessing students for pre-service teachers to feel prepared to use CRP within an RTI model in inclusive settings.

Academic Showcase Participant
Board Placement: 59

Case-Based Instruction for Culturally Responsive Teaching

Primary Author: Kira Carbonneau

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

It is commonly agreed that practicum-based learning is essential for success in many professional careers (Martin & Leberman, 2005). This is especially true for educators responsible for educating our society's youngest generation. Pre-service teachers are required to exhibit not only their knowledge of educational theory, but also their professional capacity through practicum experiences. This expectation requires that students gain exposure to the different situations that they will encounter as professionals (Merseth, 1996). In addition, in K-12 settings, the rapid growth of culturally and linguistically diverse (CLD) populations has increased the need for preparing culturally responsive teachers (Gay, 2002). Yet, many pre-service teachers feel unprepared to work with CLD students (Nieto, 2010). Due to this challenge of connecting educational theory to classroom practices, teacher preparation programs have turned to case-based instruction (CBI) to provide students with an authentic practicum-like experience of the school environment (Derry, Hmelo-Silver, Nagarajan, Chernobilsky, & Beitzel, 2006). Therefore, our study examined the efficacy of teaching pre-service educators about teaching CLD students with a CBI sequence. Through a five-week intervention, 79 pre-service teachers were randomly assigned to learn about CLD students in a CBI or textbook condition. Preliminary results suggest that pre-service teachers who engage in the CBI sequence not only performed better at recalling instructional strategies for working with CLD students, $t(77) = 3.24$, $p < .001$, $d = .73$, but also had more positive attitudes towards teaching CLD students, $t(77) = 2.26$, $p = .026$, $d = .45$.

Academic Showcase Participant
Board Placement: 97

Hands on activities can improve education in a lecture-only qualitative biomechanics (functional anatomy) course

Primary Author: Robert Catena

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

A qualitative biomechanics (functional anatomy) course is a typical course in Kinesiology curriculum. Most evidence suggests that biomechanics learning could be improved with the inclusion of laboratory experiences. However, implementing labs into biomechanics curriculum is difficult due to cost and time constraints. This study was conducted to develop a curriculum to nullify those administrative constraints by evaluating whether hands on activities in lecture improve qualitative biomechanics education. A typical lecture format was compared to the same course with low-tech (skeletal models practice) and high-tech (electromyography and isokinetic dynamometry) hands on activities included during lecture. Student performance and student evaluations were compared between lecture formats to determine if hands on experiences improve learning. The hands-on group performed significantly better on comparable test questions and they evaluated those hands on experiences as beneficial to their learning. The findings suggest that hands on experiences do not have to include expensive technologies. The hands on experiences seem to provide an embodied cognitive learning experience, facilitating retention of learned material through three-dimensional and tactile mental representations. Findings from this research are shaping how biomechanics education is taught to students at this university and could at other universities as well.

Academic Showcase Participant
Board Placement: 217

Critical Components of an Online Developmental Mathematics Course

Primary Author: Candace Chappelle
Faculty Advisor: Molly Kelton

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Arts and Sciences
College of Education
Campus: Pullman

Abstract

A number of students who have been accepted to Washington State University (WSU) are underprepared to enter into a required mathematics course mandated by their selected area of study. In the fall of 2013, 10% of the entering first-year class, 414 students, placed into Mathematics 100 based on the WSU Mathematics Placement Assessment. In response to this issue, WSU created a mathematics course, Mathematics 100 to strengthen students' basic mathematics skills. In addition to the face-to-face Mathematics 100 course, a parallel virtual course was proposed in hopes of reaching students who selected the WSU Global Campus. The online Mathematics 100 course was designed with the intent to aid the global students in learning the mathematics materials while simultaneously increasing the course completion rates of the face-to-face version of the course. The pilot version of this course was conducted in Fall 2014 and the main data collection during Spring 2015 and Summer 2015. Further analysis found that certain modifications to the online course are critical in order to produce successful results. Each modification phase lead to increased amounts of course completion rates with both the Mathematics 100 online and face-to-face course. In particular, online students need a great deal of encouragement, a review of effective study habits, a syllabus that clearly details class expectations in terms of performance and deadlines, and a skillful, patient, caring, firm, and encouraging instructor. The results of this project provide insight into the factors that contribute to students' success or demise with this Mathematics100 course.

Academic Showcase Participant
Board Placement: 185

A Generalizability Study of the Motivational-Developmental Assessment for University Students

Primary Author: Brian French
Co-Author(s): David Alpizar
Avi Kaplan
Bill Davis
Laura Hill

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
College of Education
Temple University
Campus: Pullman

Abstract

To support student success, universities place emphasis on student support structures to increase the probability of graduation. Washington State University's Transformational Change Initiative is one major student success effort that focuses on improving the quality of instruction across all disciplines through targeted programs. A critical aspect of these efforts is capturing student information to understand the program's influence on different domains, such as student motivation and development. This study examines score dependability of an innovative motivational-developmental (MD) assessment for students through the lens of univariate generalizability theory. The new MD assessment uses four writing prompts to assess students' MD (non-cognitive) attributes for domains critical to student success, including self-awareness, self-authorship, coping strategies, and self-concept. We focus on MD attributes because of their strong relationship to college academic achievement. Perhaps most important is the relationship to social-behavioral educational outcomes, which are essential to retention and completion of a postsecondary degree, such as intentions to remain in college, use of available resources and supports, and strategic accumulation of necessary academic credentials. We collected prompt responses from students (n=224). Trained raters (n=4) each coded all prompts. We used a univariate Generalizability Theory model, including D-studies, to assess score stability, variance related to prompts and raters, and the number of raters to maximize score reliability. Our results inform revisions, the necessary number of raters, and rater calibration improvement. Such information allows for consideration of how to be resource-efficient with an innovative measure to capture non-cognitive attributes essential to college student success.

Academic Showcase Participant
Board Placement: 114

Foul Ball, Spectators Distracted From Their Own Safety in Ballparks

Primary Author: Chris Lebens

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

In the case of Blakeley v. White Star Line (1908), the court held that visitors of a ballpark or stadium assume the risk of injury because of the very nature of the game. When the limited duty rule, affectionately known as the "baseball rule" was first introduced, fans attended games dressed in their Sunday best, and had very few distractions from the game. However, as we move into the digital age, fans are not only invited to the stadium to watch a professional sporting event, they are asked to take part in a digital experience. This experience provides countless opportunities for distraction, raising the question of whether or not the baseball rule should still apply to the sport today. While the limited duty rule restricts tort liability of stadium owners, in regards to spectator's injury from objects inherent to the game, if the owner offers optional protected seating, in professional ballparks only premium priced seating is currently available under protection (Khare, 2010). This research is analyzing the increasing number of spectator injuries in the digital age in comparison with prior incidents to conclude that the limited duty rule shall not apply to sport venues as it has for over a century due to the distraction doctrine, a legal rule that states that the injured party cannot be held liable of contributory negligence if their attention is diverted from known danger.

Academic Showcase Participant
Board Placement: 26

Twitter Activity of the International Basketball Federation

Primary Author: Simon Licen

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

Seven in ten Americans use social media for informational, entertainment, or social purposes. One of the fields greatly influenced by social media are sports, which use them to distribute their product in new ways, interact with customers, reach new markets and expand their fan base. Research on social media and sport can be classified into three categories: studies examining the strategic role and function of social media from a brand's perspective, investigations of how brands use social media on a daily basis, and surveys of fans' demographics and their motivations, constraints, perceptions and preferences. Most studies were conducted in the United States even though many influential organizations, as well as most fans, reside on other continents. To this end, we studied a year's (2015) worth of content published on social media?specifically, Twitter?by FIBA, the Switzerland-based global governing body of basketball and one of the most successful international sports federations on social media. Results indicate that tweets that attracted significantly greater engagement ("likes" and "retweets") included messages focused on men (rather than women) and those including pictures and graphics (but not videos). The time of publication and the nations mentioned also influenced engagement. Differences, however, were not correlated with indicators of technological development (e.g., Internet or cell phone penetration) nor basketball rankings. Discoveries challenge some common theoretical notions and point to the need of a multi-theoretical approach to the topic. Insight provided by FIBA's Director of Digital helped contextualize some findings and relate them to the federation's corporate strategy.

Academic Showcase Participant
Board Placement: 136

Contributions of Tracking, Literacy Skills, and Attitudes to Science Achievement of Students with Varied English Proficiency

Primary Author: Anna Karin Roo
Co-Author(s): Yuliya Ardasheva
Sarah Newcomer
Margarita Vidrio Magaña
Faculty Advisor: Yuliya Ardasheva

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

This study examined contributions of academic ability tracking, disciplinary attitudes (science anxiety and self-efficacy), and discipline-specific literacy skills (science and academic vocabulary knowledge) to students' science achievement in a sample of 104 Grade 8 students (78% current or former English learners [ELs]) enrolled in high- versus low-track (50/50) classrooms at a Pacific Northwest urban junior high school. The final regression model explained 46% of the variance in students' science reading comprehension scores; 11% of the variance in reading scores was uniquely explained by science vocabulary knowledge, above and beyond anxiety, self-efficacy, and tracking. Similarly, the final regression model explained 41% of the variance in students' end-of-the unit science test scores; 20% of the variance was uniquely attributed to science vocabulary knowledge above and beyond anxiety, self-efficacy, academic vocabulary knowledge, science reading comprehension, and tracking. From a practical perspective, the results suggest that students need more explicit science vocabulary instruction to perform better on reading and achievement tasks, regardless of their track designation. From a policy perspective, current ELs' underrepresentation in higher-track classes calls into question the equity of instruction provided to students. Recommendations to increase ELs' access to academic content are discussed including test format and classroom accommodations. Discussed methods to address the growing level of educational iniquity for ELs could include implementing more culturally responsive teaching techniques to allow for more EL participation in the science classroom (Lyon, Tolbert, Solis, Stoddart & Bunch 2016).

GPSA Research Exposition Participant
Board Placement: 15

Depictions of Anthropomorphic Immigrant Characters in Multimodal Texts

Primary Author: Vera Sotirovska

Primary College/Unit: College of Education
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Very little has been written and published on anthropomorphic depictions of characters in picture books portraying immigrants. This study examines the relationship between power and the depictions of immigrant anthropomorphic characters in multimodal texts. Using Kress and Van Leeuwen (2006) theoretical framework for analyzing visuals in multimodal texts, the author examined the representational, interpersonal, and compositional meanings of the illustrations in the sampled texts. The following research question was addressed: How are anthropomorphic immigrants illustrated in multimodal texts and why? A critical content analysis of the texts and images revealed narratives following the colonizer/colonized, immigrant/non-immigrant, and illegal immigrant/authorities narrative dichotomy. Key compositional elements demonstrated the lack of salience of immigrant characters across all narratives; the size, color, and contour parameters for salience in the visuals portrayed marginalized and alienated characters with limited agency and even lesser social impact over their storied identities. The findings established that despite their didactic and creative potential, children's picture books with immigrant anthropomorphic characters are rare and underutilized in school contexts, and their problematic narratives are left unquestioned. Given the current climate of racist immigrant discourse and changes to U.S. immigration policies, it is up to teachers to introduce narratives that can help dispel stereotypical images of immigrants by considering how they are depicted in texts. This study fills this gap by addressing topics of immigration through children's literature and highlights the versatile potential of multimodal texts to battle monotonous, didactic, and stereotypical stories about immigrants and immigration.

Academic Showcase Participant
Board Placement: 146

Prospective secondary mathematics teachers' conceptions of proof and proof teaching

Primary Author: Kalei Titcomb
Faculty Advisor: Kristin Lesseig

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Vancouver

Abstract

This research project explored how prospective secondary mathematics teachers (PSMTs) in Australia and United States perceive the importance and purpose of proof in the context of mathematics teaching and learning. Using an 11-item qualitative survey distributed to 22 students across the two countries, responses were analyzed and coded in three parts. In part I, we explored PSMTs conceptions of the nature and role of proof in mathematics and teaching mathematics. PSMTs' most common response was that the purpose of proof is to build an axiomatic system with previously established facts, and that this characteristic is important when deciding whether an argument is a proof. PSMTs also felt that proofs serve as an instructional tool for expanding students' mathematical skills, with the main constraint on teaching proof being the mathematical knowledge that students possess. In part II, we explored what PSMTs attend to when evaluating whether or not student generated arguments are proofs. We found the primary response to be the generality of the presented argument, that is, whether it covered all possible cases in question. In part III, we explored what PSMTs attend to when deciding what kinds of arguments are most helpful for a group of students working on the statements from part II. We found the most common response to be proofs that involved multiple or visual representations of the arguments, as well as the clarity of the argument. Overall, PSMTs in both countries had very similar responses.

Academic Showcase Participant
Board Placement: 1

Examining Cultural Congruity and Environmental fit of Diverse Graduate Students in STEM fields at Research Universities: A Collaborative Research

Primary Author: Kelly Ward
Co-Author(s): Chioma Ezeh

Primary College/Unit: College of Education
Associated College(s)/Unit(s): College of Education
Campus: Pullman

Abstract

Although strategies to support the academic success of STEM graduate students across ethnic and racial backgrounds abound in literature (National Academy of Sciences, 2011), the degree to which culture influences socialization experiences still needs more examination. The purpose of this study is to describe the extent to which graduate students from different racial and ethnic groups perceive cultural congruity and the university environment. The Social Science Research Project of the Pacific Northwest Circle of Success for Mentoring Opportunities in STEM Alliance used surveys and case studies for data collection. We developed and administered an online Qualtrics survey to all graduate students in STEM at 13 research universities between 2015-2017. The instrument contained demographic questions, participant characteristics, and psycho-social constructs and was validated by the research team. The survey focused on constructs related to the graduate student experience and culture (including cultural congruity, university environment, identity, resource usage, peer interaction, faculty interaction, academic perceptions, and intercultural experiences in STEM). Two models (cultural congruity and university environment by age, gender, and race/ethnicity) were compared with Analysis of Variance. Overall, results showed that differences associated with age, gender, and race/ethnicity are more pronounced when the examination focuses on cultural congruity than when it focuses on university environment. Hence, institutional characteristics seem to be more important than individual characteristics in accounting for students' fit and congruity. Our findings can inform policies for diverse graduate students. This presentation comprises an overview of the project, the method (including the descriptive statistics) and the full survey results.

GPSA Research Exposition Participant
Board Placement: 63

Computer-Based Learning of Mathematics from Worked Examples: Focused and Menu-Based Self-Explanations

Primary Author: Rachel Wong
Co-Author(s): O. O. Adesope
K. J. Carbonneau

Primary College/Unit: College of Education
Category: Social Sciences
Campus: Pullman

Abstract

Principal Topic:

Worked examples (WE) and self-explanation (SE) are effective multimedia instructional strategies that promote initial skill acquisition. The WE effect based on the cognitive load theory serves to mediate the amount of cognitive load (CL) novice learners experience when learning novel information, particularly in subjects like mathematics. Prior research on the effectiveness of these strategies with college populations show an increase in learning performance, and decrease in CL. Despite the benefits with college populations, these learning strategies have not been researched extensively with other populations.

Method:

To examine the robustness of findings with a different population, this study compared the effectiveness of four instructional formats (WE and menu-based SE; WE and focused SE; problem-solving and menu-based SE; and problem-solving and focused SE) on reducing cognitive load and increasing learning performance with sixth graders (N = 122). This classroom-based study used a 2 × 2 experimental design with knowledge and transfer of mathematics skills as outcomes. Participants received a pre-test, introductory geometry lesson, and an immediate post-test.

Results:

Results show that problem-solving conditions outperformed WE conditions, providing insight into the relationship between instructional formats and CL. A contribution is that this study extends research on multimedia learning to a middle school population in a classroom setting. The educational implications are that multimedia learning tools provide sufficient scaffolding for low prior knowledge learners, however high prior knowledge learners do not need as much guidance. Findings will be discussed further in terms of their theoretical and practical implications for future multimedia learning research with K-12 students.

Academic Showcase Participant
Board Placement: 20

Risk for Overeating to Cope with Pain Among Obese Adults with Chronic Pain

Primary Author: Teresa Bigand
Co-Author(s): Marian Wilson
Kenn Daratha
Ruth Bindler
Faculty Advisor: Dr. Marian Wilson

Primary College/Unit: College of Nursing
Associated College(s)/Unit(s): College of Nursing
Campus: Spokane

Abstract

PRINCIPAL TOPIC Obesity and chronic pain are related. Pain intensity and pain-related disability increase as body mass index (BMI) increases. The relationship between obesity and pain is unclear; a potential contributor may be overeating to soothe discomfort. Co-occurring pain and obesity is complex; research is needed for clinicians to address both simultaneously. METHOD Adults with a self-reported pain condition were recruited from physicians' offices to complete surveys. An author-created item asked whether participants eat less, eat more to feel better, or do not change eating habits when in pain. Participants provided height and weight from which BMI was calculated. Chi-square analyses were conducted to compute relative risk ratios. RESULTS/IMPLICATIONS In total, 233 participant data were analyzed. Adults classified as obese were three times more likely to report increased eating as compared to adults with normal weight (RR = 3.75, 95% CI = 0.98, 11.00, $p < 0.01$). For adults with overweight compared to normal weight, the risk was more than double, however this finding was not statistically significant (RR = 2.76, 95%CI = 0.79, 9.58, $p > 0.05$). When comparing adults with obesity versus overweight, obese adults had a 19% greater risk of reporting overeating when in pain (RR=1.19, 95%CI= 0.55, 2.55, p

Academic Showcase Participant
Board Placement: 32

Evaluating the Impact of a Bioinformatics Intervention on HIV Screening Rates in a Federally Qualified Health Center: A Quality Improvement Study

Primary Author: Kristine Simpson
Faculty Advisor: Dr. Linda Eddy

Primary College/Unit: College of Nursing
Associated College(s)/Unit(s): College of Nursing
Campus: Vancouver

Abstract

The Centers for Disease Control and Prevention (CDC) and the United States Preventative Services Task Force (USPSTF) have recommended routine universal screening for HIV since 2006 and 2013, respectively. National and local data suggest a failure of the primary care provider community to adhere to these longstanding CDC and USPSTF guidelines, with less than one-half of all eligible Americans having been screened for HIV and one in 10 HIV infected Washingtonians being unaware of their infected status. A failure to screen in accordance with guidelines results in missed opportunities for diagnosis and diagnoses occurring late in the course of disease. Using Lippitt's model of change as a guide, the Washington-based SeaMar Community Health Centers will implement an HIV screening prompt within the electronic medical record (EMR) to identify individuals in need of screening. This will be coupled with role-specific HIV trainings at select Clark County clinics. The aim of this practice transformation project is to increase screening rates among eligible adults (screening saturation) in this Federally Qualified Healthcare Center. Pre-and post-intervention screening saturation and positivity rates will be analyzed for comparison and statistical significance. Anticipated findings include an increase in screening saturation at all clinics exposed to the EMR prompt, with further benefit expected at clinics receiving the additional targeted HIV trainings. Implications for practice include a model for HIV screening practice assessment and transformation in Federally Qualified Health Centers and for health systems in low HIV prevalence areas.

GPSA Research Exposition Participant
Board Placement: 79

Discovering Novel Genes Utilized in the Insect Immune Response to West Nile Virus

Primary Author: Laura Ahlers

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Principal Topic

The World Health Organization estimates that over half of the world population is at risk for a vector-borne disease, which are transmitted to humans via an animal. Many are transmitted by mosquitoes, for example West Nile virus (WNV). Notably, WNV is present in eastern Washington and there is currently no treatment. To address this unmet need in community health, we study the insect immune response to WNV to identify targets for therapeutic design that could stop the spread of WNV in the mosquito. Because laboratory techniques to study mosquitoes are limited, we use the fruit fly Drosophila melanogaster, a well-established model organism, to understand insect immunity to WNV.

Method/Hypotheses

We screened for novel components of insect immunity utilizing the Drosophila Genetic Reference Panel, a living library of wild-type inbred fly lines with sequenced genomes. We used a Genome-Wide Association Study to identify candidate genes with susceptibility to infection. We subsequently validated these candidate genes and identified insulin receptor as a novel component of the immune response to WNV. We hypothesize that the insulin response pathway is required for full immunity. Future work will investigate the mechanism of the insulin response pathway during WNV infection in both Drosophila and mosquitoes.

Results/Implications

Our work utilizes the fruit fly as a model for mosquito immunity and identifies a novel immune response pathway to WNV. Because mosquitoes initiate WNV morbidity in humans, the study of insect immunity is foundational to the development of therapeutics for vector-borne diseases that affect this community.

GPSA Research Exposition Participant
Board Placement: 138

Evaluation of Biofilm Formation and Contribution to Antibiotic Resistance of Staphylococcus Pseudintermedius

Primary Author: Adriana Alire

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Staphylococcus pseudintermedius is a common opportunistic bacteria among canines responsible for several infections. A factor contributing to its pathogenicity is production of biofilm since it provides a stable environment and protects bacteria from environmental conditions and antimicrobials. At most diagnostic laboratories, antibiotic susceptibility minimum inhibitory concentration (MIC) tests are performed on planktonic bacteria, but do not test bacteria within biofilm which may be more clinically relevant. The objectives of the study aimed to 1) characterize S. pseudintermedius isolates based on biofilm production via microtiter plate assays and 2) to determine the concentration of enrofloxacin, vancomycin, and rifampin required to eradicate bacteria within biofilm via antibiotic susceptibility test with preformed biofilms. Forty-eight isolates were obtained from four different clinical environments: clinical surfaces such as exam room floors, colonized healthy animals, urinary samples, and surgical site infections. Most (47/48) isolates were classified as strong biofilm producers, but no significance in biofilm production was noted when comparing the origin of isolation. Thus, all isolates had similar capabilities of producing biofilm regardless of their external environment. The concentration necessary to eliminate >50% of the preformed biofilm was considered the minimum biofilm eradication concentration (MBEC50). Biofilm producing S. pseudintermedius isolates were most susceptible to rifampin and showed resistance to enrofloxacin and vancomycin. In conclusion, established MIC thresholds for susceptibility may not be applicable to biofilm producing S. pseudintermedius since higher antibiotic concentrations were required

to eliminate bacteria. Further studies need to be conducted to determine actual concentrations required to eradicate S. pseudintermedius in biofilm.

Academic Showcase Participant
Board Placement: 140

Defining CLAMP, a pan-apicomplexan microneme protein, as a novel vaccine candidate against Babesia bovis

Primary Author: heba alzan
Co-Author(s): Marta Silva
Carlos Suarez
Faculty Advisor: Carlos Suarez

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Babesia bovis parasites are responsible for bovine babesiosis, a global neglected tropical disease, requiring improved control. A Toxoplasma widely apicomplexan-conserved claudin-like apicomplexan microneme protein (CLAMP) was recently identified as cell invasion key factor. CLAMP is essential during blood stages of Plasmodium falciparum and is a strong candidate for developing subunit vaccines. It is suggested that conserved sequence and structure will have conserved function. Thus, the goal of current study is defining CLAMP in B. bovis genome. Hereby, a single copy gene coding for CLAMP in B. bovis was identified using bioinformatics tools. B. bovis CLAMP orthologues found among most apicomplexan parasites so far sequenced have a conserved in silico predicted secondary and tertiary structures and are syntenic. In silico secondary structure analysis of CLAMP proteins suggests presence of at least three transmembrane domains supporting that CLAMPs are integral membrane proteins. Predicted B. bovis CLAMP is smaller in size than Toxoplasma and Plasmodium homologues but with 9.57pI like a basic pI 9.4 and 9.19 in Toxoplasma and Plasmodium suggesting they remain negatively charged at physiological pH. Multiple sequence alignments, demonstrated the presence of a conserved aa motif among CLAMP that is present in proteins functioning as ions exchangers. RNA sequencing analysis shows high transcription levels of CLAMP in B. bovis asexual stages, consistent with its demonstrated role in cell invasions in Plasmodium and Toxoplasma parasites. In conclusion, in silico data and transcroptomic analysis support exploring functional role of CLAMP in B. bovis and its possible testing as a novel vaccine candidate.

GPSA Research Exposition Participant
Board Placement: 172

Prospecting Marine Natural Products Identifies Tartrolon E as an Inhibitor of Cryptosporidium and Related Parasites

Primary Author: Gregory Bowden

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

The parasite Cryptosporidium causes cryptosporidiosis, a waterborne infection that causes significant disease in children and adults world-wide. In 2016, the CDC reported a mean incidence rate of 4.1 cases cryptosporidiosis per 100,000 individuals in the US and estimated the economic impact of the disease to exceed $45 million annually. Unfortunately, current treatment for cryptosporidiosis are ineffective. Our goal was to identify and characterize a new drug for cryptosporidiosis. To achieve this goal, we mined potentially antimicrobial compounds of symbiotic bacteria of shipworms and identified the compound Tartrolon E (TrtE) to inhibit growth of Cryptosporidium at very low concentrations. Additional screening verified the inhibitory effect of TrtE against many related parasites of human and veterinary importance including: Toxoplasma gondii, Sarcocystis neurona and Babesia bovis. Our work determined TrtE to be more effective against many parasites than currently available drugs. To characterize the activity of this broad-spectrum compound, we investigated changes in parasite gene expression during treatment with TrtE. Gene expression data from T. gondii parasites treated with TrtE identified a gene of unknown function that was rapidly and highly expressed in a dose-dependent manner. We also found variations of this gene in other parasites suggesting a possible shared response to TrtE treatment. Although there are inherent difficulties associated with investigating a gene of unknown function, investigating the inhibitory effect of TrtE will aid development of a new drug for a variety of important parasitic diseases and our understanding of a previously unknown biologic process of Cryptosporidium.

Academic Showcase Participant
Board Placement: 153

Oxidative Stress and Sleep

Primary Author: Priyanka Bushana
Co-Author(s): Jonathan Wisor
Faculty Advisor: Jonathan Wisor

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
College of Veterinary Medicine
Campus: Spokane

Abstract

Cognitive impairment as a result of sleep loss is known to impact performance on tasks which require sustained attention, spatial memory, and object recognition. Lapses in sustained attention which result from sleep deprivation have been implicated in every day accidents ?this is what causes sleepy driving to look like drunk driving ? and large-scale environmental disasters such as the Exxon Valdez oil spill. The only known remedy for these sleep-loss associated deficits in cognition and attention is sleep, itself. However, the mechanisms by which sleep facilitates the recovery of these neural functions remain unknown, as do the mechanisms by which sleep loss impairs them. On a molecular level, one of the most robust and reliable correlates of sleep is a change in brain metabolism - and a decrease in consumption of oxygen and glucose. Our lab is exploring the possibility that sleep functions to reduce the damage which is built up in the brain during the high metabolic activity required of wakefulness. Our research aims to demonstrate that sleep protects neurons from the damaging effects of this activity. Our current study shows that systemic application of the antioxidant N-acetylcysteine has the potential to preserve cortical oscillations which are implicated in cognition (gamma) and sensory processing (beta), during and after sleep deprivation. Collectively, our data indicate that prophylactic treatments which are capable of increasing antioxidant defense in the brain may be capable of preserving brain function during and after sleep deprivation, potentially staving off sleep deprivation-related cognitive impairment.

Academic Showcase Participant
Board Placement: 111

Antimicrobial resistance in Tanzania is related to cultural practices influencing bacterial transmission but not antibiotic use

Primary Author: Mark Caudell
Co-Author(s): Douglas Call
Beatus Lyimo
Murugan Subbiah
Faculty Advisor: Douglas Call

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

The WHO Global Action Plan on Antimicrobial Resistance emphasizes improved antimicrobial stewardship, sanitation and hygiene. While prioritization amongst these objectives is essential, particularly in resource-constrained countries, the factors contributing most to antimicrobial resistance at the community level are typically unknown. Using detailed socio-economic and biological surveys of three geographically proximate but culturally diverse communities in Tanzania, this study shows that antimicrobial resistance is not generally associated with antibiotic use. Instead, the dominant drivers of risk are behaviors that increase exposure and consumption of resistant bacteria. Consequently, improved antimicrobial stewardship may not be effective in the near term, and controlling antimicrobial resistance on a global scale requires attention to the local cultural practices that drive the transmission of resistant bacteria at the community scale.

GPSA Research Exposition Participant
Board Placement: 85

Dimethyl adenosine transferase (KsgA) contributes to structural and functional integrity of the cell envelope in Salmonella Enteritidis

Primary Author: Kim Lam Chiok

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Principal Topic: Dimethyl adenosine transferase (KsgA) methylates the bacterial small ribosomal subunit during ribosome biogenesis. Deficiency of KsgA induces various phenotypes associated to impaired cell envelope health in Salmonella Enteritidis (SE), a leading cause of foodborne gastroenteritidis in humans. The aim of this study was to investigate a potential role for KsgA in Salmonella cell envelope fitness as a mechanism underlying these phenotypes.

Method: We tested wild-type SE, KsgA-deficient mutants, and mutants expressing either active or inactive KsgA (dimethyltransferase competent and incompetent, respectively). Chemically permeabilized E. coli was used as a complementary model. Cell envelope structural and functional integrity were assessed by transmission electron microscopy and intra-bacterial accumulation of ethidium bromide, respectively.

Results/Implications: KsgA-deficiency induced undulation and loss of continuity of the cell envelope, impairing its structural integrity. KsgA-deficiency increased intracellular accumulation of ethidium bromide, indicating defective cell envelope permeability barrier. Active KsgA restored structural and functional integrity, while inactive KsgA enhanced both defects. Thus, KsgA contributes to cell envelope fitness in SE and this role is associated to its dimethyltransferase activity. Moreover, active KsgA improved permeability barrier in chemically permeabilized E. coli, while inactive KsgA further debilitated it, suggesting that this function is conserved in gram-negatives. Our study links the universally conserved KsgA to cell envelope physiology, affording new avenues to dissect and manipulate bacterial envelopes and virulence mechanisms reliant on this structure. Specifically, enhanced bacterial permeability is desirable to improve entry of antimicrobial compounds and disinfectants, while envelope disorganization might aid in combating envelope-mediated antimicrobial resistance mechanisms.

GPSA Research Exposition Participant
Board Placement: 36

Complexes of α6β4 Integrin and Vimentin Signal to Regulate Epithelial Cell Migration

Primary Author: Zachary Colburn

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Many biological phenomena, including wound healing, development, immune response, and metastasis depend on cell migration. In the field of cell migration, the focus has been on the interaction of focal adhesions and the cytoskeleton. However, in some cell types, another type of adhesion structure composed of β4 integrin may be involved. Our objective was to evaluate the role of the interaction between β4 integrin and the vimentin cytoskeleton using a combination of cell biological and super-resolution microscopy techniques.

METHODS AND RESULTS

Clusters of β4 integrin, organized into distinct puncta, localize along vimentin filaments within the lamellipodia at the cell edge of A549 cells, as assessed by interferometric photoactivated localization microscopy. Moreover, puncta and vimentin filaments exhibit a dynamic interplay in live cells viewed by structured-illumination microscopy with β4 integrin puncta that associate with vimentin persisting for longer than those that do not. Interestingly, in A549 cells β4 integrin regulates vimentin cytoskeleton organization. When β4 integrin is knocked down vimentin collapses around the nucleus and there is a loss of vimentin filaments from lamellipodia. Although β4 integrin organization is unaffected in vimentin-deficient A549 cells, such cells move in a less directed fashion. They exhibit reduced Rac1 activity, mimicking the phenotype of β4 integrin-deficient A549 cells.

IMPLICATIONS

The aberrant motility of both β4 integrin and vimentin-deficient cells is rescued by expression of active Rac1, leading us to propose that complexes of β4 integrin and vimentin act as signaling hubs, regulating cell motility behavior.

GPSA Research Exposition Participant
Board Placement: 57

Cell Density Regulates Heat Shock Protein Expression in Human Cervical Carcinoma Cells

Primary Author: Lydia Lam

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Rapid cancer cell division can lead to the development of dense solid tumors. Overcrowding reduces oxygen levels, resulting in a hypoxic environment. Some tumor cells increase heat shock protein (HSP) production to protect themselves from hypoxia and a variety of chemotherapeutic agents. Others have shown that hypoxia induces changes in HSP expression, but the contribution of cell density to this response is not well established.

METHOD

We hypothesized that plating cell density transcriptionally regulates HSP expression in human tumor cells. Human cervical carcinoma HeLa cells were plated for 24 hours. We used Western blotting to establish that HSP levels vary with plating density. We found that cells plated at higher densities (7.6x10^4 and 3.8x10^4cells/cm^2) had significantly greater Hsp72 protein levels compared to cells plated at low density (4.7x10^3 cells/cm^2). We then used reverse transcription polymerase chain reaction to establish that this increase is correlated with changes in HSP gene expression. We found that cells plated at high density had greater Hsp72 mRNA expression compared to low density.

RESULTS/IMPLICATIONS

We found that Hsp72 mRNA levels are elevated at higher plating densities. This supports our hypothesis that density influences HSP gene expression. We conclude that the high cell density environment of tumors transcriptionally activates HSP expression. Future work will evaluate possible regulators such as secreted factors. This is important as identifying the factor(s) that regulate HSP expression in tumors may have future implications for cancer treatment. Inhibiting HSP expression through the cell-density pathway may make cancers more responsive to chemotherapy.

Academic Showcase Participant
Board Placement: 19

Understanding the Role of DksA in Chlamydia trachomatis Development

Primary Author: Cameron Mandel
Faculty Advisor: Anders Omsland

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Chlamydia trachomatis is a leading cause of sexually transmitted infections. Upon infection, the pathogen invades host cells and replicates intracellularly via a biphasic developmental cycle consisting of a vegetative reticulate body and an infectious elementary body. In Escherichia coli, the alarmone guanosine pentaphosphate (ppGpp) and the transcription factor DksA (DksAEc) allosterically modulate RNA polymerase (RNAP) in response to nutrient availability. The chlamydial genome contains an apparent DksA ortholog (DksACt), but genes for ppGpp synthesis are missing. Genetic determinants of C. trachomatis morphological transitions are poorly defined, but likely include genes encoding proteins involved in sensing nutrients required for replication. We hypothesize that DksACt is expressed in response to nutrient availability, and serves to regulate chlamydial development via modulation of RNAP. We tested this by elucidating the protein expression profile of DksACt throughout development to detect if protein expression levels are associated with morphologic transition. The structure of the DksACt protein will also be derived to determine if it is consistent with an RNAP binding protein. Preliminary experiments suggest DksACt expression is temporally regulated, with maximal expression at approximately 20 hpi, coincident with initial RB-EB differentiation. In silico modeling of the DksACt protein also closely resembles the prototypical structure of DksA proteins, despite low sequence identity. Biophysical analysis of DksACt structure will allow for conclusive determination of protein structure. Temporally regulated expression, and a 3D structure similar to RNAP-binding DksA homologs are consistent with a role for DksACt in regulating timepoint dependent aspects of C. trachomatis biology.

Academic Showcase Participant
Board Placement: 93

Instructor-generated feedback as a critical component of evidence-based instructional practices

Primary Author: Erika Offerdahl
Co-Author(s): Aramati Casper
Jeff Boyer
Melody McConnell

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Significant learning gains have been associated with evidence-based instructional practices (EBIPs), yet there is notable variability in the magnitude of these outcomes. A common hallmark of EBIPs is the emphasis on student engagement, construction of knowledge, and frequent feedback on in-progress learning. We hypothesize that diversity in instructors' formative assessment (FA) and feedback practices contributes to differences in the learning outcomes of EBIPs. To test this hypothesis, we adopt a fidelity of implementation (FOI) framework to (a) describe FA and feedback during evidence-based instruction and (2) characterize students' perceptions of and actions in response to feedback. We video-recorded teaching episodes in large-lecture undergraduate biology and documented variations in what instructors do after initiating a FA cycle using a refined FA observation protocol (k = 0.82). We noted the (a) cognitive level of all FA prompts (k = 0.85), as well as (b) frequency and types of instructor-generated feedback and associated student responses. We surveyed students to determine the degree to which students detect instructor-generated feedback and how they report putting the feedback into action. Our data reveal marked differences in the FOI of FA between instructors with similar pedagogical training, and in patterns of student responses. We discuss implications for faculty pedagogical training and research on EBIPs efficacy.

GPSA Research Exposition Participant
Board Placement: 113

Environmental MRSP Surveillance in Small Animal Primary Care Hospitals: A Cross-Sectional Multi-Clinic Study

Primary Author: Andrea Perkins

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Methicillin - resistant Staphylococcus pseudintermedius (MRSP) is a bacterium of concern due to its rapid emergence and increasing resistance to many important antimicrobials. Although mainly a pathogen of dogs, MRSP can also affect other animals and humans. Infections can occur in various body locations and may be recurrent and/or difficult to treat. MRSP can persist on environmental surfaces which may play an important role in exposure and transmission of MRSP in small animal primary care hospitals.

METHOD

An observational, cross-sectional study was conducted to establish baseline prevalence of MRSP in small animal primary care veterinary hospital environments, determine the proportions isolated from predominantly hand versus predominantly animal contact surfaces, and assess factors contributing to MRSP contamination. 374 environmental samples were collected from 11 hospitals, half from animal contact surfaces, half from hand contact surfaces. A questionnaire also covered hospital infection control protocols.

RESULTS/IMPLICATIONS

MRSP was isolated from 13% of samples. Hand and animal surfaces were equally contaminated, but animal surfaces were cleaned significantly more frequently. High staffing was positively associated with MRSP isolation. Indistinguishable MRSP strains were detected using pulsed-field gel electrophoresis within, but not between hospitals. Hand hygiene and/or cleaning and disinfection may be deficient and humans may play an important role in transmission and persistence of MRSP in small animal primary care hospitals. Modifications to hospital infection control protocols may help mitigate environmental exposures and/or development of hospital-associated infections with MRSP in small animal veterinary patients.

Academic Showcase Participant
Board Placement: 52

Three Pillars of Society

Primary Author: Andrew Rader

Primary College/Unit: College of Veterinary Medicine
Campus: Pullman

Abstract

As researchers examine the societal threats and benefits related to various political and social philosophies, a device that examines the foundations of long-term growth and distribution of power would be useful to continuing discourse. Power, originating in the individual, must be transferred for a society to function and eventually flourish. Influencers inevitably collect and consolidate that free power, using it to control the population in either a beneficial or a corrupted manner. Across civilizations and millennia, this power has collected in predictable groups. As a result, comparative analysis of the consolidation of power is possible. This essay details the Three Pillars tool and examines how the microcosm of individual decision-making relates to the growth of larger power structures within the macrocosm of a society. Using a visual metaphor, pillars of values, commerce, and knowledge consolidate power and act as extensions of the qualities considered by individuals. Pure and applied arts comprise communication networks that tether the pillars. Ultimately, a supported platform of governance ideally serves to bring balance to the pillars and provide a level foundation for the construction of a growing society. By examining relationships between the five elements, causality behind the success and failure of different societal initiatives can quickly be identified and discussed.

Academic Showcase Participant
Board Placement: 130

Plasma and Urine Lipidomic Signature of Healthy Domestic Cats

Primary Author: Sol Rivera
Co-Author(s): Nicolas Villarino
Sandy Chen
Faculty Advisor: Nicolas Villarino

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

The study of lipids in biological fluids has led to substantial advances in diagnosis and therapeutics of human obesity, cancer, and kidney diseases. Considering that most of these conditions also afflict cats, we hypothesize that lipids could also serve as biomarkers for studying and diagnosing diseases in cats. However, there is a paucity of literature concerning the occurrence of lipids in feline biological fluids. Considering this gap of knowledge, the objective of the study was to characterize the lipid composition in plasma and urine samples of healthy young-adult cats (n=8). Lipids were analyzed using liquid chromatography/mass spectrometry. One hundred eighty four and 28 lipids were characterized in the feline plasma and urine, respectively, comprising fatty acyls, glycerolipids, glycerophospholipids, sphingolipids, and sterol lipids. The origin of these metabolites was mainly from food and endogenous compounds. Of note, 150 out of 212 lipids identified in this study have not been reported previously in cats. This is the first study describing the lipid composition in plasma and urine of healthy cats comprehensively. Interestingly, some lipids found in this study have been used as biomarkers in human medicine for different pathologies including linoleic and arachidonic acids for kidney diseases; SM(38:1) and SM(42:1) for insulin resistance and nonalcoholic fatty liver disease; LPC(16:0), LPC(18:0), PC(34:1), PC(34:2), PC(36:4) and cholesterol for hepatocellular carcinoma, among others. Thus, the novel information generated in this study could lead to the discovery of novel biomarker candidates for detecting and studying feline diseases and individualized treatments for cats.

Academic Showcase Participant
Board Placement: 167

Modeling the interstitial-fluid environment provides a novel infection-model system for Coxiella burnetii

Primary Author: Savannah Sanchez
Faculty Advisor: Anders Omsland, Ph.D.

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Coxiella burnetii, the etiological agent of Query (Q) fever in humans and coxiellosis in other species, including several domesticated animals, is a highly contagious obligate intracellular bacterium. In humans, this disease presents as an acute febrile disease; however, infection can progress to both chronic and severe illnesses (i.e., hepatitis and endocarditis). C. burnetii replicates exclusively within a host-derived compartment of phagocytic cells, the Coxiella Containing Vacuole (CCV). While the obligate intracellular nature of C. burnetii has historically posed challenges to experimentation with C. burnetii, use of continuous eukaryotic cell lines has facilitated research on the bacterium. Current infection models for C. burnetii, however, utilize nutrient rich and not necessarily physiological relevant conditions to support host cell growth. This technique simplifies experiments by prioritizing maximal growth rates for the host but at the risk of masking any natural phenotypes. Since tissue-cultured cells are extrapolated to model infection, it can be assumed that if host phenotypes are masked then infection phenotypes may be affected. Here, we introduce a novel infection system, the Interstitial-fluid Modeled Medium (IMM), which is more characteristic of one environment supporting the Coxiella-host interaction (i.e., interstitial fluid). In a proof of principal study we assessed the relevance of our IMM system using variables related to rates of replication, phagocytosis and autophagy; and compared to current techniques prioritized in the Coxiella field. We show that compared to traditional techniques, IMM aids in (i) finer resolution of C. burnetii infection phenotypes and (ii) improved control of nutrient availability.

GPSA Research Exposition Participant
Board Placement: 27

The proteasome inhibitor bortezomib halts herpes simplex virus infections at two distinct steps in the infectious cycle

Primary Author: Seth Schneider
Co-Author(s): Suzanne M. Pritchard
George A. Wudiri
Darin J. Weed
Anthony V. Nicola

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Herpes simplex virus (HSV) is a lifelong human pathogen that can establish latency within the host and cause repeated infection of the orofacial or genital regions. HSV infections are particularly dangerous to individuals with weakened immune systems, including infants, and can be fatal. Current treatments for HSV include acyclovir, a nucleoside analogue that terminates viral DNA replication upon incorporation. Mutant HSV strains resistant to acyclovir have arisen and have resulted in fatalities, asserting the need for new treatment options.

METHOD

HSV depends on the proteasome for productive infection, thus the proteasome inhibitor bortezomib might be a viable antiviral candidate. Targeting a cellular process could circumvent the emergence of resistant viral strains. We showed that bortezomib is effective at inhibiting infection of wild-type and acyclovir-resistant HSV. Additionally, bortezomib is most effective when present at early stages of infection.

RESULTS/IMPLICATIONS

Here, we show that bortezomib is also effective against a clinical strain of HSV-1 isolated from an encephalitis patient, with an effective concentration of about 50 nM. Bortezomib blocks viral entry by inhibiting the transport of incoming HSV nucleocapsids to the host cell nucleus. HSV-1 infection disrupts nuclear domain 10 (ND10) bodies, which leads to lytic viral replication. We show via immunofluorescence that bortezomib blocks ND10 disruption. These results establish bortezomib's potential as an anti-HSV drug and shed light on the mechanism by which it inhibits HSV infection. Future work will determine the pre-clinical efficacy of bortezomib in a murine model.

GPSA Research Exposition Participant
Board Placement: 143

Host Cell-Free Culture Allows Identification of Factors Defining Niche Restriction and Uncovers Metabolic Capabilities of *Coxiella burnetii*

Primary Author: Eduardo Vallejo Esquerra
Co-Author(s): Hong Yang
Savannah E Sanchez
Anders Omsland

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC
Coxiella burnetii is a highly infectious bacterium that causes Query (Q) fever in humans. Replication occurs intracellularly under very specific nutritional and physicochemical conditions provided by the host. With the introduction of methods for gene deletion and culture of *C. burnetii* under host cell-free (axenic) conditions, the replication conditions for this pathogen can now be precisely determined. Characterization of factors that affect *C. burnetii* replication is important to improve understanding of pathogen physiology as this relates to pathogen virulence.
METHODS
To determine the physicochemical and nutritional requirements for pathogen replication, *C. burnetii* was cultured in specially designed axenic media under different pH, oxygen (O2) and carbon dioxide (CO2) concentration and also cultured in a chemically defined medium containing only 17 amino acids. To determine the importance of glycolysis and gluconeogenesis in replication, deletion of the gene *pckA*, encoding Phosphoenolpyruvate Carboxykinase (first committed step in gluconeogenesis), was performed and *C. burnetii* replication on gluconeogenic substrates determined.
RESULTS
C. burnetii replication depended on acidic pH, low O2 concentration, and presence of CO2. A nutritionally limited axenic medium containing only 17 amino acids supported *C. burnetii* replication. Out of these 17 amino acids, glutamate was identified as a major carbon source. Deletion of *pckA* in *C. burnetii* showed that in addition to utilizing gluconeogenic substrates during replication, glucose can also support replication. Overall, this study identifies physicochemical and nutritional factors that dictate *C. burnetii*'s replicative environment, and demonstrates that *C. burnetii* has the capacity to utilize glucose as a carbon source.

Academic Showcase Participant
Board Placement: 71

Symmetric dimethyl arginine as biomarker for detecting kidney disease induced by the repeated administration of the non-steroidal anti-inflammatory meloxicam

Primary Author: Nicolas Villarino
Co-Author(s): Broughton Liam
Suarez Martin

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Symmetric dimethylarginine (SDMA) could be an early marker for detecting kidney damage caused by meloxicam in cats. The objective of this study was to determine if the serum concentration of SDMA and creatinine increase in cats with meloxicam-induced kidney damage. A randomized placebo-controlled prospective study design was implemented. Twelve female cats were randomly allocated to 2 experimental groups: control group (n=6) and meloxicam group (n=6). Cats in the control and meloxicam groups were treated with saline and meloxicam, respectively. Serum SDMA and creatinine concentrations were assessed before the administration of the treatments and monitored every 5 days during 47 days after starting the induction of kidney disease. Histopathology was performed on kidneys from all cats. In the meloxicam group, we observed severe tubular changes in 5 out of 6 cats treated with meloxicam including swollen tubular epithelial cells with granular cytoplasm. Before starting the administration of the treatments, all cats had comparable serum concentrations of creatinine (

GPSA Research Exposition Participant
Board Placement: 60

Cognitive dysfunction in circadian disruption and aging

Primary Author: Naomi Wallace
Co-Author(s): Derrick J. Phillips
Ilia N. Karatsoreos

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Principal Topic: Circadian rhythms are patterns of physiology and behavior that vary on an ~24h basis, preparing organisms for predictable daily changes in the environment. Normal aging is associated with dysfunction of these circadian rhythms, and also with a loss of working memory. Our lab has shown that environmental desynchronization of the circadian clock induced by housing young adult mice in 20h days reduces cognitive performance and alters prefrontal cortex (PFC) structure. The goal of the present research was to determine if disrupting the circadian clock in young adult mice would produce working memory loss and changes in brain structure similar to the effects seen during aging.

Method: In this study, we sought to compare the working memory deficits produced by circadian desynchronization and aging and investigate potential underlying mechanisms. To measure working memory, we used the Spontaneous Alternation Test in both circadian desynchronized and aged mice. Since neural function and brain metabolism are linked, we used novel biosensors to measure lactate, a component of brain metabolism, in young mice, young desynchronized mice, and aged mice.

Results/Implications: We report that aging and circadian desynchronization resulted in decrements in working memory that were of a similar magnitude. We found that desynchronizing the circadian clock significantly altered rhythms of PFC metabolism as measured by lactate, while aging did not. This research provides new information on the effects of circadian desynchronization on working memory, and shows that circadian desynchronization can be more detrimental than aging in terms of effects on brain metabolism.

Academic Showcase Participant
Board Placement: 219

Fatal pneumonia in bighorn sheep lambs: the critical role of carrier ewes

Primary Author: Logan Weyand
Faculty Advisor: Dr. Thomas E. Besser

Primary College/Unit: College of Veterinary Medicine
Associated College(s)/Unit(s): College of Veterinary Medicine
Campus: Pullman

Abstract

Epizootic pneumonia is a threat to bighorn sheep (Ovis canadensis) populations across western North and Central America (Besser et al. 2012, Manlove et al. 2016). The primary cause of this disease is Mycoplasma ovipneumoniae, thought to be introduced by its reservoir hosts, old world Caprinae. Initial M. ovipneumoniae introduction to naïve bighorn sheep populations triggers severe (20-80% mortality) pneumonia outbreaks affecting all ages, often followed by years or decades of pneumonia outbreaks in the lambs, significantly reducing recruitment and impairing population recovery. This recurrent lamb pneumonia is thought to result from transmission of M. ovipneumoniae from carrier ewes to lambs (Plowright et al. 2017); these studies were designed to clarify the role of carrier ewes in lamb pneumonia. Post-epizootic bighorn ewes (n=5) were commingled and longitudinally sampled over a 2-year period. One persistent carrier and 4 non-carriers were identified. After commingled breeding, the ewes were separated into 2 pens based on carrier status. We predicted that lambs raised in the carrier pen would develop pneumonia but lambs raised in the non-carrier pen would remain healthy. Both lambs raised in the carrier pen developed pneumonia (n=2), while all lambs raised in the non-carrier pen remained healthy (n=3). The results of our study support our hypothesis that M. ovipneumoniae carrier ewes precipitate pneumonia outbreaks in lambs.

GPSA Research Exposition Participant
Board Placement: 88

Investigating the role of bbd21 in tissue colonization of the mammalian host of the Lyme disease spirochete

Primary Author: Jessica Wong
Co-Author(s): Timothy Casselli
Troy Bankhead

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Principal Topic

Lyme disease, caused by Borrelia burgdorferi, is the most prevalent vector-borne illness in the United States. The bacterium initiates a multi-systemic inflammatory disorder that starts with fever, headache, and joint pain, and can progress to persistent infection involving arthritis, carditis, and neurologic conditions. Understanding the molecular mechanisms of B. burgdorferi infection and tissue colonization is critical for development of novel targets to prevent Lyme disease.

Method

The B. burgdorferi enzootic life cycle involves a tick vector and vertebrate host. It shuttles between them by differential gene expression of outer surface proteins. Previous work from our lab discovered a tissue colonization defect in an experimentally-truncated plasmid. Through process of elimination, we identified the gene, bbd21, which we hypothesize is associated with tissue colonization in the mammalian host. This gene has been previously reported as a putative homologue of plasmid partitioning proteins. However, we constructed a bbd21 deletion mutant, and preliminary results suggest it is not significant for plasmid stability since the mutant does not exhibit plasmid loss following numerous passages in vitro. Furthermore, our preliminary work in vivo suggests bbd21 deletion leads to decreased colonization, particularly in the murine heart and urinary bladder.

Results/Implications

Our preliminary data strongly suggest bbd21 is important for efficient tissue colonization during murine infection. Future work will elucidate the overall impact of bbd21 on pathogenesis and the mechanism of BBD21 in tissue colonization. We hope the combined research findings will lead to preventative therapies to disrupt the enzootic cycle of the Lyme disease pathogen.

GPSA Research Exposition Participant
Board Placement: 145

Nesprin-2G regulates focal adhesion protein expression and motility of fibroblasts

Primary Author: Alex Woychek

Primary College/Unit: College of Veterinary Medicine
Category: Medical & Life Sciences
Campus: Pullman

Abstract

Principal Topic: The nuclear envelope protein nesprin-2G is a component of the LINC (linker of nucleoskeleton and cytoskeleton) complex and is responsible for mechanical and signaling crosstalk between the nucleus and cytoskeleton. A published mouse model indicates that nesprin-2G knockout (KO) mice show delayed wound healing. Our goal was to elucidate the mechanism underlying delayed wound closure in this mouse model.

Method: We isolated primary keratinocytes and fibroblasts from wildtype (WT) and KO neonatal mice. KO keratinocytes exhibited increased α5β1 integrin surface expression compared to WT cells, whereas KO fibroblasts displayed increased α2β1 integrin compared with their WT counterparts. Nevertheless, we observed no defects in collective cell migration of KO keratinocytes. In sharp contrast, KO fibroblasts showed decreased speed and directed migration in both collective cell migration and single cell motility assays. Additionally, traction force microscopy revealed KO fibroblasts generated fewer traction forces compared to WT fibroblasts and exhibited decreased focal adhesion size and number. Consistent with this result, both paxillin and FAK expression levels were decreased in KO cells.

Results/Implications: In summary, our data implicate fibroblasts, rather than keratinocytes, in the reduced wound healing response of nesprin-2G KO mice. Moreover, our data indicate nesprin-2G in fibroblasts is a key regulator of expression of mechanosensitive focal adhesion components. By doing so, nesprin-2G determines the generation of traction forces, needed to induce contracture of the dermis during the healing of wounded skin.

GPSA Research Exposition Participant
Board Placement: 24

Objectifying Portrayals of Women in Advertising and Music Videos

Primary Author: Alicia Booth

Primary College/Unit: Edward R. Murrow College of Communication
Category: Arts, Humanities, & Design
Campus: Pullman

Abstract

Principle Topic

In this study, the researcher takes into account the potential effects of advertising in social media. A content analysis of advertisements that precede YouTube music videos across various genres was conducted. The framework considered were Uses and Gratifications, Social Cognitive Theory, Framing Theory, and Objectification Theory.

Method

Data was collected using the system screencast-o-matic which allowed the researcher to screenshot the computer while the advertisement and video were playing. A codebook was created using 6 variables: Scantily Clad, Helpless/Powerless, Objectified, Body Emphasized, Sexualized Dance, and Gaze. All of these categories were used to analyze both the advertisement and the music video. While looking at various aspects of these music videos, extreme levels of objectification of women occurred in both. The goal was to discover if those translated into the music videos. Four research questions were considered: The connection between advertisement length, music genre, song ranking and number of views on YouTube, the connection to products being advertised, frequency of women in preceding advertisements, and the portrayal of women across three music genres.

Results

Communication is consistently changing and varies across media. Overall, the researcher compares the percentage differences in numerous phases which results in a positive indication that objectification of women in advertisements has a strong connection to objectification of women in music videos. This research is important because it shows the prominence of suggestive behaviors for women in society through the media and allows others to interpret the potential effects this will have on the next generation.

Academic Showcase Participant
Board Placement: 86

Bad for me or bad for the planet? An experiment testing the effect of media framing drought as an environment or health hazard

Primary Author: Amanda Boyd
Co-Author(s): Alyssa Mayeda
Jessica Willoughby

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Drought is a natural hazard with the potential to affect millions of people worldwide. Understanding public attitudes about water shortage and how media frames may influence public perceptions about drought is an important area for communication research because this information can provide directions for public policy and developing effective risk messages. An experiment (N = 494) was conducted to examine how framing drought as a risk to public health versus a risk to the environment may influence risk perceptions. Results show that framing drought as a health risk, in comparison to framing drought as an environmental risk, resulted in less concern about drought and lower intent to conserve water. The negative impacts of drought were also perceived as being more likely to affect distant populations rather than local populations. The findings provide insight into how the framing of drought may influence risk perceptions and intentions to take mitigating action.

GPSA Research Exposition Participant
Board Placement: 125

You should smile more: The role of gender, emotion, ideology, and hostile sexism in predicting candidate evaluation

Primary Author: Rebecca Donaway

Primary College/Unit: Edward R. Murrow College of Communication
Category: Social Sciences
Campus: Pullman

Abstract

Female politicians can often find themselves in a bind when it comes to displays of emotion. If they appear warm, they are often disregarded as weak or incompetent. If they appear stern, they might be asked to smile more or risk being deemed too cold for the office. Deciphering emotion can be especially difficult in still frame shots, like the cover of a newspaper or a still image used in television newscast. The research seeks to move away from anecdotes of double-standards and examine the nature of any disparities in evaluations based on emotional affect. Given the especially angry nature of the 2016 presidential election, we used two within-subjects experimental design studies to examine how visually-displayed emotion, gender, and ideology of fictional potential presidential candidates influenced evaluations of those politicians. Participants viewed images of real politicians either smiling or appearing angry and evaluated their qualifications for office. Results across both studies show that happy women were consistently evaluated more positively. Adding political ideology in the second study shows that individuals respond more favorably to politicians that match their own ideology, and that ideology is a better predictor of evaluation than is gender. Finally, considering belief in traditional gender roles and hostile sexism, we find the latter to be more influential in candidate evaluations. This line of research is important not only to candidates and their staff, but also to journalists, photo editors, and producer who chose the images shown to the public.

Academic Showcase Participant
Board Placement: 207

Adolescents' Understanding of Alcohol-Related Sexual Scripts

Primary Author: Stacey Hust
Co-Author(s): Kathleen Rodgers

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Adolescents develop dating and romantic scripts through experience and observation of relationships in their family, peer groups, and through a variety of media that include scripts about dating and romantic relationships (Ward, 2016; Ward & Rivadeneyra, 1999). To explore how adolescents make sense of alcohol-related sexual scripts, we conducted 16 focus groups with 106 youth and then conducted in-depth interviews and bedroom tours with 16 participants. Focus group participants watched short media clips selected to represent a variety of relationship and sexual content from popular music videos and television programs. After each clip, we prompted participants to discuss how the media portrayed romantic and sexual relationships and how this portrayal related to their daily lives. Later, two to three hour in-depth semi-structured interviews were conducted with 16 participants. Our participants' conversations indicated many of them viewed alcohol as a typical, if not necessary, component of sexual intercourse, and few acknowledged intoxicated individuals cannot legally consent to have sex in most states. Our analyses suggest most of our participants do not recognize sexual assault can occur when sexual partners are inebriated. Such a connection between alcohol and sexual activity is disconcerting given research has established alcohol use is associated not only with sexual assault, but also unplanned sexual activity (Klein, Geaghan, & MacDonald, 2007; Lorenz & Ullman, 2016). Sexual assault reduction programs that focus explicitly on the legal, emotional and health risks associated with having sex while drunk can help adolescents and young adults develop healthy strategies to avoid such circumstances.

Academic Showcase Participant
Board Placement: 203

Perceived Social Norms about Pro-Marijuana Messages on Social Media and College Students' Viral Behavioral Intentions: A Comparative Study on the Moderating Role of Opposite Marijuana Legislation

Primary Author: Jinho Joo
Faculty Advisor: Yoon-joo Lee
Cindy J. Price Schultz

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

The aim of this study is to investigate the relationship between social norms related to pro-marijuana messaging through social networking sites and college students' viral behavioral intentions. More importantly, we sought to determine whether intentions to spread pro-marijuana messages might vary by one's impressions of peer attitudes and one's legislative environment. To test varying normative and legislative environments, participants were sampled from Washington State, where recreational marijuana has been legalized for medical/recreational use, and Wyoming, where no laws legalize recreational marijuana. Using a combination of social norms theory and the theory of normative social behavior, we examined whether descriptive norms would interact with injunctive norms and normative group identity (being in a state where recreational marijuana is legal or illegal) to predict viral behavioral intentions. Interestingly, we found that injunctive norms interacted with the students' legislative group environment to predict college students' viral intentions to spread pro-marijuana messages. Interestingly, students who tend to only endorse injunctive norms (i.e., my peers would want me to do this") at a low level and live in an environment where recreational marijuana is illegal were more likely to spread viral pro-marijuana messaging than students in a group environment where recreational marijuana is legal. This study can help health practitioners establish better messaging to overcome interactive effects between social norms and legislative environments.

Academic Showcase Participant
Board Placement: 77

Exploring Participant Engagement in a Supplementary Facebook Component to the FoodMania Curriculum

Primary Author: Davi Kallman
Co-Author(s): C. Kit Kaiser
Michelle Kistler
Erica Austin
Faculty Advisor: Erica Austin

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

To investigate the role of a supplementary social media component of a larger curriculum designed to foster family communication about food marketing and promote healthier food behaviors. A private, optional Facebook group was created for parent participants for each of the five county sites in Washington State testing the family-based curriculum FoodMania: Kids & Food in a Marketing-Driven World. A posting schedule that rotated by message strategy and topic was created and implemented by WSU researchers. Beyond these initial "administrator posts," county educators and curriculum participants were encouraged to respond and share original content as well. Certain cognitive processing outcomes, nutrition outcomes, and family communication outcomes have thus far predicted overall participation in the Facebook group. These outcomes included critical thinking toward the source, wishful identification, advertising efficacy, social support for fruits and vegetables, utilizing nutrition facts labels, and positive and negative parental mediation. A participant's inclination to contribute an original response on Facebook was associated with critical thinking toward sources of information and with using information on nutrition facts labels to select healthier foods. Participants were more engaged with posts related to nutrition-based facts and to food marketing when county educators and other participants shared targeted tips, activities, and recipes. A targeted social media component paired with existing curricula may reinforce concepts presented in the curriculum sessions. Educators who cultivate participation in the social media component by using it themselves will most effectively engage participants and foster involvement with each other.

Academic Showcase Participant
Board Placement: 170

The Space in Stories Project: Transporting online millennials into the realm of space science

Primary Author: Alex Kirkpatrick
Faculty Advisor: Amanda Boyd

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): College of Arts and Sciences
Edward R. Murrow College of Communication
College of Education
Campus: Pullman

Abstract

The Space in Stories Project explored the process of creating web-based stories targeted at millennials, aged 18-30. Grounded in transportation theory, the project aimed to communicate space science and exploration (SSE) concepts via 3 bespoke examples of short fictional narrative (SFN). This study tested the short-term effectiveness of the SFNs in engaging millennials online, and effecting pre-existing attitudes and SSE literacy. Employing online pre-to-post-reading questionnaire surveys, this study applied quantitative paired t-test analysis to the attitudinal and literacy results of a volunteer sample of 13 millennials. Pre-existing attitudes towards SSE were found to be generally positive, although attitudinal results confirmed the null-hypothesis, where t=0, and no significant short-term deviation in pre-to-post-reading attitudes or beliefs was determined. Conversely, pre-to-post reading literacy results refuted the null-hypothesis, where t=2.18, and a significant improvement in short-term SSE literacy was determined, suggesting potential pedagogical benefits of employing online SFNs in science communication. Additionally, results suggested that more transported readers displayed greater acceptance and short-term recall of SSE concepts over those less transported individuals. Also, the more causal/prominent an SSE concepts within a SFN, the greater the acceptance and short-term recall of that concept or related facts, post-reading. Larger studies and more examples are called for to better explore the uses of fictional narratives in science communication.

Academic Showcase Participant
Board Placement: 149

"Liking" health information on Facebook and perceptions of credibility: The role of heuristics

Primary Author: Danielle Ka Lai Lee
Co-Author(s): Porismita Borah
Xizhu Xiao
Faculty Advisor: Porismita Borah

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

In recent years, a drastic increase in the usage of online health information has changed how individuals gather health information. However, with the proliferation of online health information, the spread of misinformation is common. At a time when misinformation is commonly found online, and more and more people are getting their health information from social media, understanding how individuals perceive credibility of health information is important. In the present study, we test Bellur and Sundar's (2014) model in the context of social endorsement on Facebook. Using a 2 (Prime: present vs. absent) by 2 (Social endorsement: high vs. low likes) experimental design, participants are exposed to a brief report from Pew Research Center as a manipulation for prime and Facebook posts. The prime is used to test the mediating role of heuristics in perception of credibility; the participants who are exposed to the prime read a brief report on how Facebook "likes" have been related to reliability of the information. Findings show that participants perceive both Facebook health messages with more "likes" as more credible compared to the health messages that are less endorsed. With regard to the effect of priming, our results show that participants primed with endorsement heuristics exhibit more trust in the Facebook health posts with higher number of likes.

Academic Showcase Participant
Board Placement: 156

Self-disclosure on Instagram and Twitter: The role of media richness and personality

Primary Author: Danielle Ka Lai Lee
Faculty Advisor: Porismita Borah

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

With online technologies, people can disclose information which facilitates offline relationships. However, they may also overdo the disclosure and harm interpersonal bonding. Since self-disclosure can both benefit and harm the media users, investigation into its mechanism is warranted. This research looks into self-disclosure on Instagram and Twitter, the former is primarily visually-oriented while the later is textually-oriented. According to Media Richness Theory (Daft & Lengel, 1986), the visual emphasis would render Instagram "rich" because visual contents enable closer approximation to real-life communication. As richer platforms inherit greater information-carrying capacities, it is hypothesized that wider and deeper self-disclosures would be expected on Instagram than on Twitter. Other than situational factors in media structure, previous studies found that dispositional personalities of users also influence one's behaviors in self-disclosure (Chen & Marcus, 2012). As such, the current study also investigates research questions about the roles of personalities in self-disclosure, including depth, breadth, and tendency with different technological modalities. Young adults who constitute the largest cohorts for Instagram and Twitter users are targeted. Questionnaire with perceived media richness, Big Five personality test, and self-disclosure is being constructed and revised. Data would be collected by February, and results would be available by March. Chen, B., & Marcus, J. (2012). Students' self-presentation on Facebook: An examination of personality and self-construal factors. Computers in Human Behavior journal, 28, 2091-2099. Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements: Media richness and structural design. Management Science, 32, 554-571.

GPSA Research Exposition Participant
Board Placement: 48

Influence of Viewing Movies on Intentions to Adhere to Sexual Consent

Primary Author: Jiayu Li
Co-Author(s): Stacey Hust

Primary College/Unit: Edward R. Murrow College of Communication
Category: Social Sciences
Campus: Pullman

Abstract

Principal Topic:

Young people are frequent consumers of movies (Fetto, 2010), and media scholars have been concerned about the potential effects of viewing sex and violence content in movies on young people's sexual health, such as their intentions to adhere to partners' sexual consent decisions. Particularly, X-rated movies, horror movies, and romantic comedy movies contain different themes, which could affect people differently. In addition, previous studies have suggested that individual differences such as perceived realism and rape myth acceptance can mediate the relationship between media consumption and sexual health outcomes (e.g., Hust et al, 2013; Peter & Valkenburg, 2010). Method:

The present study collected data from 299 college students using online survey to examine the potential effects of viewing X-rated movies, horror movies, and romantic comedy movies on college students' intentions to adhere to partners' sexual consent decisions, and whether this relationship was mediated by perceived realism and rape myth acceptance. We used structural equation modeling (SEM) to test the proposed hypotheses and research questions.

Results:

Findings from the structural equation modeling (SEM) suggested that the perceived realism, rape myth acceptance, viewing romantic comedy movies, and gender were significantly associated with intentions to adhere. The negative relationship between viewing X-rated movies and intentions were fully mediated by rape myth acceptance.

Academic Showcase Participant
Board Placement: 120

Political consequences of online discussion in authoritarian regimes

Primary Author: Qin Li
Faculty Advisor: Alexis S. Tan

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Political communication researchers are interested in how people discuss politics online and how contextual and individual features influence the process. Since online political discussion is likely to mobilize citizens for an engaged digital democracy, some researchers start looking into the political consequences of online discussion and other activities in authoritarian regimes. Yet, relevant empirical studies on deliberation in democratic states fall short to explain the prevalence of online deliberation in an authoritarian regime where state intervention is strong enough and an autonomous civil society is far from developed (Lei, 2013). Lei (2013) identifies a counter-public sphere where people discuss current issues and politics online to reach a consensus and challenge the state. Built on the literature of deliberation studies in democratic states and digital politics in China, this study examines the relationship between deliberative quality and contextual features of online forums, including diversity, moderation, and intervention. Previous research indicates state actors are likely to intervene and shape online discussions at different scales on government-controlled, private-owned, and state-owned platforms (King, Pan, & Roberts, 2014), and meanwhile commercial forces might neglect the deliberative purpose when designing the platform (Zhang, Cao, & Tran, 2013). In this sense, China provides a ground to study how design elements of diversity, moderators, and intervention shape online deliberation and decision-making process. An implication on the political consequence of online discussion is also discussed in this study.

GPSA Research Exposition Participant
Board Placement: 72

Clearing the Smog?: Examining the Relationship between State Media and Non-state Internet-based Media on Risk Information Seeking in China

Primary Author: Yanni Ma

Primary College/Unit: Edward R. Murrow College of Communication
Category: Social Sciences
Campus: Pullman

Abstract

The Chinese government has often been criticized for how much control they have over the flow of information within the country. This control has weakened in recent years with increased access to websites via the internet, and increased popularity of online discussion forums and social networking websites. In this paper, we test the relationships between two forms of communication (i.e., state media and non-state internet-based media) and important variables related to the RISP model. This paper finds that use of these two different modes of communication are associated with different perceptions of the issue of smog within China. Moreover, these different perceptions are associated with different levels of negative emotions and different information seeking tendencies. Across two data sets, our results show that state sources decrease concern, which ultimately decrease negative emotions and translate into less information seeking. We find the opposite pattern for online communication.

GPSA Research Exposition Participant
Board Placement: 101

Priming Effects on Instagram: An Analysis of How Messages on Photo-Sharing Social Media Can Affect Risk Perceptions and Information Seeking Behaviors

Primary Author: Nicole O'Donnell

Primary College/Unit: Edward R. Murrow College of Communication
Category: Social Sciences
Campus: Pullman

Abstract

Principal Topic

Health organizations frequently share messages on social media to educate and inform the public about potential health risks. A challenge for visual communication scholars is to establish how images are theoretically important to risk information seeking and processing on these platforms. This study explores the circumstances in which images on social media may prime individuals' risk perceptions.

Method

A total of 314 undergraduate students took part in a 4x1 posttest-only experiment. Individuals were randomly assigned to one of four conditions: (1) a narrative about processed food additives with health photos, (2) the narrative with science photos, (3) the narrative with no photos, or (4) a control group. Before exposure, individuals rated their nutrition label usage and views of science. After exposure, individuals rated their information processing and risk perceptions. Then, participants were provided the opportunity to continue learning about the topic.

Results/Implications

The results from a factorial ANOVA indicate significant main and interaction effects. Individuals in the science image condition had higher risk perceptions than individuals in the health image condition, which was moderated by nutrition label usage. The variable views of science was not a significant moderator. Additionally, 45% of participants sought additional information on the topic, which was predicted by systematic and heuristic information processing. Experimental condition assignment and participants' risk perceptions did not predict information seeking. Results reveal that individual and contextual factors need to be taken into consideration when examining the role of visuals in information processing and seeking.

Academic Showcase Participant
Board Placement: 192

Critical Issues Concerning the Role and Future of Media Literacy in Substance-Abuse Prevention

Primary Author: Bruce Pinkleton
Co-Author(s): Erica Weintraub Austin
Jackie Chen

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Young people are exposed to substantial amounts of media containing embellished, idealized depictions of potentially harmful behaviors including alcohol and this exposure associates with problematic drinking for young people. As a result, health campaign practitioners and scholars have underscored the need for interventions that can disrupt the influence of fictional media portrayals on young people and increase their ability to use accurate information and engage in informed decision making. Experts have examined the effectiveness of media literacy in helping young people develop the critical-thinking skills necessary to distinguish truthful information from fictional information when making decisions. While questions remain and researchers continue to conduct additional research, a substantial number of studies indicate that media literacy training for young people can help to increase their knowledge regarding media and marketing practices, correct their media-based misperceptions, and increase their critical thinking skills and skepticism toward media messages. In addition, media literacy can help correct participants' expectancies regarding negative behaviors and increase their perceived efficacy to resist the allure of glamorized media portrayals. As health-promotion experts and scholars expand their development and use of media literacy programming, there are important issues to consider in the successful implementation and evaluation of media literacy campaigns. Through appropriate research, experts can build upon past success and address critical issues that will help increase our understanding of media literacy and the effectiveness of media literacy training for health-related instructional programming.

Academic Showcase Participant
Board Placement: 13

Speak Unless Spoken To: Bumble Users and Gender Role Relationship Adherence

Primary Author: Stephanie Saracco
Co-Author(s): Stacey Hust
Faculty Advisor: Stacey Hust

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

The following research observes the attitudes and beliefs of different mobile dating application users. While dating applications like Tinder and PlentyOfFish emphasize appearance (Timmermans & De Caluwe, 2017), dating applications like Bumble focus on reversing typical relationship roles. Bumble is a mobile dating application that places women in the role of the pursuer. The overall goal of this study is to understand the characteristics of mobile dating participants and see if Bumble users subscribe to different gendered beliefs. For example, one of the hypotheses was: Bumble users will score lower on female expressivity than participants who do not use Bumble. 348 undergraduate students took a survey, which measured media use, dating application use, motives for using Bumble, and several scales related to gender norms and gender stereotypes. T-tests were used to analyze the results for any differences between male and female users and Bumble users and non-Bumble users. Overall, there were not any differences between Bumble users and non-Bumble users in gendered expressivity or sexual stereotypes. There were significant differences between male and female participants with regards to gendered expressivity and sexual stereotypes. While the emphasis of Bumble is to place the control into the hands of the woman, participants continue to subscribe to traditional gender norms and beliefs.

Academic Showcase Participant
Board Placement: 198

Comparing Virtual Reality on Presence, Flow, Immersion, Embodiment, and Emotional Response: Is VR that Much Better?

Primary Author: David Silva
Faculty Advisor: Myiah Hutchens

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

New media are often unveiled as disruptions to older media. These boasts are seldom supported because most new devices are merely iterative improvements to aspects of older platforms. The advent of virtual reality (VR) rang with similar optimism. This research asks how similar VR experiences are to other media. Specifically, a VR system is tested against a standard desktop computer on five outcomes. Flow is an experience of an ideal level of difficulty resulting in losing oneself in an activity. Presence is how much an individual feels they are mentally engaged in an experience. Immersion measures the fidelity of an experience. Embodiment is the extent someone feels they can physically interact with media content. Emotional response reflects a participant's level of enjoyment. The experiment exposed participants (N = 65) to the Google Earth program through two media systems: a VR headset and a desktop screen. The content across the two systems was identical in visual quality, and both featured 360-degree audio and video. Participants then responded to five multi-item indexes measuring outcome variables. Results of means testing show a non-significant difference in presence felt between conditions ($t(63) = 1.98$, $p = 0.053$), but significantly higher levels of flow ($t(63) = 3.32$, $p < 0.01$) immersion ($t(63) = 3.83$, $p < 0.001$), embodiment ($t(63) = 4.26$, $p < 0.001$), and positive emotion ($t(63) = 3.16$, $p < 0.01$) in VR. This data supports a surprisingly novel experience through VR systems and suggest more than an incremental improvement in user experience.

Academic Showcase Participant
Board Placement: 41

"Guys have the Power and the Girls are Dressed Slutty": Adolescents' and College Students' Perceptions of Objectification in Media

Primary Author: Whitney Stefani
Co-Author(s): Stacey Hust
Kathleen Rodgers
Adrienne Muldrow
Soojung Kang
Nicole Cameron
Faculty Advisor: Stacey Hust

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Entertainment media often objectifies women (Aubrey & Frisby, 2011). However, less is known about how viewers perceive media content that shows women in objectified and sexualized ways and how they respond to and/or identify with to such content. To address these questions, sixteen focus groups were conducted during Spring and Fall of 2014 with 67 college students and 45 adolescents. Of the 112 total participants, 55% were female and 45% were male. Participants were invited to view and discuss six popular media clips that portray romantic or sexual relationships. Two of the videos (the music video "Carry Out," by Justin Timberlake featuring Timberland, and a clip from the reality show "Jersey Shore") were selected for their sexually objectifying content. Participants were asked for their perceptions of and reactions to the portrayals of men and women in these videos. Findings show that participants are aware of the artificial and unrealistic nature of the music videos. Some participants saw the objectifying content as prescriptive, intended to show viewers how men and women should dress and behave. However, participants were ambivalent about who was responsible for the content of the videos. Participants suggested that in the clips, male sexuality was grounded in social display, while female sexuality was grounded in quid-pro-quo interactions. Some participants also saw positive aspects of the treatment of women in the video. Additionally, findings show that there was some endorsement of toxic masculinity. Implications related to media literacy and gender role acceptance are discussed.

Academic Showcase Participant
Board Placement: 102

Yakking Back: The role of self-esteem in social media

Primary Author: Colin Storm
Faculty Advisor: Amanda Boyd

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Being part of a community is a vital component of student life for a college student (Harris, 2006) for many reasons, from administrative (i.e., retention) to personal (i.e., self-esteem). With the rise and popularity of social media, students can connect and discuss with each other with ease. Beyond social networking, there are message-board-type apps which are gaining in popularity. One of the most popular apps in 2015 was the pseudo-anonymous message board, Yik Yak, which allowed users to anonymously share with other users within a certain proximity. Building on an existing body of literature of the relationship between self-esteem and social networking (i.e., Vogel, Rose, Roberts, & Eckles, 2014), this study examines how self-esteem is related to the specific use of Yik Yak, and what the primary motivators are for social media usage. Based on statistical tests using 2015 survey data, we found that those who feel part of the Yik Yak community are more likely to feel satisfied with themselves, and that entertainment and boredom are primary factors in social media use. This study lends itself to social media researchers, college administrators who preside during this new media landscape, and counselors who are interested in how social media is related to self-esteem and satisfaction with life. Results are discussed in the context of present and future research.

Academic Showcase Participant
Board Placement: 161

Selective exposure, candidate evaluation, and political participation: The moderating role of family communication patterns during the 2016 U.S. presidential election

Primary Author: Yan Su
Co-Author(s): Porismita Borah
Meredith Yiran Wang
Kyle Lorenzano
Faculty Advisor: Porismita Borah

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Over the past decade, the audience for partisan news has grown, due to both the shrinking broadcasting industry and the growing partisan media. For the first time our study examines the relationship among partisan media, partisan news choice and political socialization, specifically parent-child communication. Next, we move on to the consequences of exposure to partisan media on candidate evaluation. Finally, we examine the relationship between candidate evaluation and political participation. We use a cross-sectional survey with a national sample of young adults to test these relationships right before the 2016 U.S. presidential election. Our findings demonstrate the moderating effects of family communication on the relationship between partisan identity and partisan news choice. Moreover, our results show that partisan news affected audiences' evaluations of the two Presidential Candidates. Further, candidates' evaluations affected young adults' online participation and offline participation.

Academic Showcase Participant
Board Placement: 56

The impact of entertainment media and social media on young women's indoor and outdoor tanning behaviors

Primary Author: Jessica Willoughby

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Communication
Campus: Pullman

Abstract

Young women are a prime target audience for skin cancer prevention messaging as they may be more vulnerable to damage from ultraviolet light. Research has suggested that media use may be associated with skin damaging behaviors such as increased frequency of indoor tanning and outdoor sunbathing. This project used an online survey (N=502) to examine the relationship between demographic variables, entertainment and social media use, attitudes toward looking like celebrities and people in the media, and indoor tanning frequency and outdoor sunbathing frequency. We found that attitudes toward looking like people in media were a significant predictor of frequency of both indoor and outdoor tanning, above and beyond demographic variables, media use, and knowledge of skin cancer. Magazine use also predicted indoor tanning frequency and social media use was related to outdoor sunbathing frequency. Visual-oriented social media platforms such as Instagram, Snapchat and Pinterest were associated with increased frequency of sunbathing. Recommendations for future research and prevention efforts are discussed.

Academic Showcase Participant
Board Placement: 165

Exploring News Reporting About HPV and HPV Vaccine in China: A Content Analysis of Chinese Online News Information

Primary Author: Xizhu Xiao
Faculty Advisor: Porismita Borah

Primary College/Unit: Edward R. Murrow College of Communication
Associated College(s)/Unit(s): Edward R. Murrow College of Communication
Campus: Pullman

Abstract

Approximately 562 million women in China are at risk for cervical cancer, 70% of which are triggered by persistent infections of human papillomavirus (HPV). However, HPV vaccine was only recently licensed for use in China after a decade since its inception in 2016. The current study examined Chinese online news content 12 months before and after the HPV vaccine approval in China from four major players in Chinese online news media. The coding instrument captured frequencies of detailed information about HPV and HPV vaccine, as well as four frames: valence, gender, prevention and policy. A sample of 224 online news articles revealed that although 91.2% linked HPV to cervical cancer and 78.1% mentioned the efficacy of HPV vaccine, many of the indispensable details about HPV and HPV vaccine were missing. A severe gender bias was present in news headlines in which males were frequently left out of the issue. Over half of the sample employed cancer-prevention framing toward HPV vaccine, yet the aspect of STD-prevention of HPV vaccine appeared to be in oblivion. To the author's knowledge, the current research is the first study that examined Chinese online news content about HPV and HPV vaccine. The findings not only shed light on future news reporting about HPV and HPV vaccine in China, but also help health media better facilitate understanding of HPV-related issues among the Chinese population.

GPSA Research Exposition Participant
Board Placement: 33

The 360-Degree Drunk Driving Prevention Advertising: The Impacts of Gender Role Beliefs and Self-Referencing on Purchase Intentions and Drunk Driving Avoidance

Primary Author: Wen Zhao

Primary College/Unit: Edward R. Murrow College of Communication
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

Drunk Driving has always been a severe social issue in the U.S. during the past decades. Given its social importance, drunk driving prevention campaigns have been a central issue in the corporate social responsibility (CSR) strategies for various types of organizations. Thus, the primary purpose of this study was to examine the factors that influenced the effectiveness of the 360-degree CSR drunk driving prevention advertisement with nontraditional gender-role portrayals on consumers attitudes and behavioral intentions. A quasi-experimental design using 360-degree CSR advertisement sponsored by Johnny Walker was employed. The present study found that the gender role beliefs exerted positive influences on purchase intentions through two sequential mediators, self-referencing and attitudes toward the ad. Additional analysis suggested that gender role beliefs negatively affect individuals' avoidance of drunk driving through self-referencing. The results suggested the stronger traditional gender role beliefs hindered the intentions to avoid drunk driving when the consumers were highly cognitively engaged in self-referencing. This finding suggested that drunk driving prevention advertisement messages may have unintended effects on consumers' behavioral intentions. Results were discussed in light of the self-referencing and gender role beliefs in CSR advertising.

Abstract Summary:

The present study investigated the factors that influenced the effectiveness of the 360-degree CSR drunk driving prevention advertisement with nontraditional gender-role portrayals on consumers attitudes and behavioral intentions. Advertisers can promote consumer immersion experiences and increase purchase intentions by framing a nontraditional gender-role portrays in a 360-degree CSR advertisement.

Academic Showcase Participant
Board Placement: 64

Sleep as a phenotypic marker for drug screening in a Parkinson's disease fly model

Primary Author: Jason Gerstner
Co-Author(s): Inderbir Bains
Dunxin Shen
Laken Kruger
Travis Denton

Primary College/Unit: Elson S. Floyd College of Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
Campus: Spokane

Abstract

Parkinson's disease (PD) is the second most common neurodegenerative disease, has limited treatments, and no known cure. PD is characterized by a loss in dopaminergic cells located in the substantia nigra, leading to motor dysfunction such as shaking, mobility deficits, and slowness of movement. Non-motor symptoms also exist in PD, and include cognitive impairments and disruptions in circadian rhythms and sleep. Sleep disturbances affect two-thirds of PD patients, and include insomnia, restless leg syndrome (RLS), and excessive daytime sleepiness. Such non-motor symptoms often precede the onset of motor symptoms in PD patients. Sleep disturbances may therefore represent a preclinical PD marker, and an early indicator for timing of intervention for treatment to slow or halt PD progression. Mutations in PTEN-induced kinase 1 (PINK1) cause early-onset PD clinically, and mutations in the fly pink1 gene recapitulate phenotypes observed in PD. These include dopaminergic cell loss, mobility deficits, and reduced life span; however, the effects of the pink1 mutation on sleep remain unknown. The present study explores the pink1 fly as a potential model for assaying therapeutic strategies by screening phenotypes related to PD, including changes in sleep. Pink1 flies supplemented with 2-n-hexyl lanthionine ketimine-ester (LKE) displayed a partial rescue of daytime wakefulness, increased life span, and a recovery in climbing ability compared with pink1 flies treated with vehicle. Future studies examining sleep changes in pink1 mutant flies in conjunction with other phenotypes may serve to preclinically assay genetic and/or pharmaceutical therapeutic strategies for the treatment of PD.

Academic Showcase Participant
Board Placement: 139

Naturalistic field study of a flexible sleeper berth provision in US long-haul truck drivers

Primary Author: Senada Karmaj
Co-Author(s): Regan Permito
Hans Van Dongen
Kimberly Honn

Primary College/Unit: Elson S. Floyd College of Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
Campus: Spokane

Abstract

Background: Long-haul truck drivers' work hours are governed by federal Hours-of-Service (HOS) regulations. Current HOS regulations allow for driving up to 11 hours within a 14-hour duty period. Drivers can reset their available hours by taking either 10 consecutive hours off duty or 8 consecutive hours in the sleeper berth (bedroom area behind the cab) with another 2 hours off duty. Any additional sleeper berth time (e.g., a mid-duty nap), while helpful to combat fatigue, would not contribute to the mandatory 10 hours of rest time to reset the 14-hour duty clock. The current pilot program will give participating drivers the option to more flexibly split their 10 hours of required rest time into two sleeper berth periods. Methods: Drivers are currently being recruited for a pre-test in preparation for the large-scale (>200 drivers), naturalistic field study. Drivers will be given a regulatory exemption allowing them to use the flexible sleeper berth provision on any duty days they choose for up to 90 days. Drivers' performance, sleepiness and safety will be assessed each duty day through: an onboard monitoring system and reaction time tests, wrist activity monitoring for sleep/wake times, and safety critical events while driving. Hypotheses: Based on laboratory evidence, we hypothesize that split sleep will be as good as or better than consolidated daytime sleep (used by nighttime drivers) for performance, sleepiness, and safety. However, the effectiveness of the split sleeper berth provision may depend on how and when it is used by commercial drivers in the field.

Academic Showcase Participant
Board Placement: 108

Use Single-Neuron RNA Sequencing to Study Neural-Immune Communication in C. elegans

Primary Author: Yiyong Liu
Co-Author(s): Phillip Wibisono
Jingru Sun

Primary College/Unit: Elson S. Floyd College of Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
Campus: Spokane

Abstract

Increasing evidence suggests that the nervous system is a key regulator of innate immunity. However, the precise mechanisms of neural regulation of innate immunity remain largely unknown. We have demonstrated that in Caenorhabditis elegans, sensory neurons ASH and ASI suppress infection-triggered innate immune responses. It is unclear what signals these neurons utilize to inhibit immunity. Pathogen exposure has been shown to induce neuropeptides, neurotransmitters and neurohormones, and these molecules can modulate innate immunity. In the current study, we develop a novel single-neuron RNA sequencing technique to identify differentially expressed genes in ASH and ASI neurons upon pathogen infection, and then determine the roles of these genes in the regulation of immune responses. We have generated two transgenic worm strains that specifically express the Green Fluorescent Protein (GFP) in ASH and ASI neurons, respectively. These GFP-labeled neurons were dissociated from the transgenic worms and isolated by Fluorescence-Activated Cell Sorting. The isolated cells were used directly for cDNA synthesis followed by cDNA library preparation and Next-Generation Sequencing (NGS). We are in the process of analyzing RNA-seq data to identify differentially expressed genes and will determine the roles of these genes in the regulation of immune responses. We have developed a single-neuron RNA-seq technique to study neural-immune interactions at an organismal level. The information gained from this study is useful for better understanding neural-immune communications and could potentially benefit the development of more effective treatments for innate immune disorders.

Academic Showcase Participant
Board Placement: 28

Methylsulfonylmethane decreases inflammatory response to TNFalpha in cardiac cells

Primary Author: Lindsey Miller

Primary College/Unit: Elson S. Floyd College of Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
Campus: Spokane

Abstract

The development of various cardiovascular diseases (CVDs) are associated with chronic inflammation. Tumor necrosis factor-α (TNF-α) increases inflammation through activation of nuclear factor-κB (NF-κB), leading to increased expression of inflammatory markers, such as interleukin-6 (IL-6). Interventions to decrease each of these factors have been demonstrated to reduce the development of CVD. Methylsulfonylmethane (MSM) is a naturally occurring compound that demonstrates anti-inflammatory effects in vivo and in vitro. The effects of MSM include decreased NF-κB activation and decreased expression of TNF-α and IL-6. However, the effects of MSM within the heart had not yet been examined. Therefore, the goal of this investigation was to determine whether MSM protects cardiac cells from inflammation that occurs in response to pro-inflammatory stimuli. A novel immortalized human ventricular cardiomyocyte cell line, designated Ac16, developed and characterized in the laboratory of Dr. Mercy Davidson, Columbia Invention Report No. 823, U.S. patent No. 7,223,599 were utilized. Cells were treated with TNF-α, alone or in combination with MSM. To confirm an appropriate dosage of MSM, the effect of various concentrations on cell viability and IL-6 production were examined. The effect of MSM on transcript expression of pro-inflammatory markers and activation of NF-κB were examined with the established dose by real-time quantitative PCR and western blot, respectively. MSM significantly decreased IL-6 production and transcript expression compared to TNF-α alone, while other markers were unaffected. These findings indicate that MSM may protect against inflammation linked CVDs. Further study is warranted to determine the effect on cardiovascular health outcomes.

Academic Showcase Participant
Board Placement: 171

TLR4 Genotype Is Associated with Nocturnal Sleep Duration and Consolidation

Primary Author: Naghmana Sherazi
Co-Author(s): Samantha Riedy
Brieann Satterfield
Michelle Schmidt
Jonathan Wisor
Hans Van Dongen

Primary College/Unit: Elson S. Floyd College of Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
Department of Psychiatry
College of Medicine, University of Arizona, Tucson
Campus: Spokane

Abstract

Introduction: Toll-like receptor 4 (TLR4) is a sensor for the pro-inflammatory bacterial membrane component, lipopolysaccharide. TLR4 activation results in synthesis and release of sleep-promoting cytokines. Thus, TLR4 activation may be involved in sleep regulation. We investigated whether a rare single nucleotide polymorphism (SNP) of the TLR4 gene, A896G affects baseline sleep duration. Methods: 49 healthy normal sleepers (27.2±5.2 years old; 21 women) participated in in-laboratory experiments, which included a 10-hour nocturnal, baseline sleep opportunity (22:00-08:00) recorded by means of polysomnography. Blood samples obtained prior to the experiments were assayed for TLR4 genotype using polymerase chain reaction (PCR). In agreement with population allele frequencies, 44 subjects were homozygous for the A allele, 5 subjects were heterozygous, and none were homozygous for the G allele. Genotype effects on total sleep time (TST), wake after sleep onset (WASO), and sleep latency (SL) were analyzed using mixed-effects ANOVA, controlling for age. Results: TST was significantly greater ($F_{1,44}=8.49$, $p=0.006$) in heterozygous (A/G) subjects (572.3±18.6 minutes) than in homozygous (A/A) subjects (515.2±6.3 minutes). WASO was significantly reduced ($F_{1,44}=6.49$, $p=0.014$) in heterozygotes (17.6±14.0 minutes) compared to homozygotes (55.1±4.8 minutes). There was a trend for reduced SL ($F_{1,44}=3.66$, $p=0.062$) in heterozygotes (9.8±9.7 minutes) compared to homozygotes (29.4±3.3 minutes). Conclusions: Subjects with the relatively rare A/G genotype of the TLR4 A896G SNP exhibited longer and more consolidated baseline sleep compared to subjects with the A/A genotype. These data are consistent with the idea that TLR4 is involved in sleep regulation. Research supported by NIH, CDMRP, ONR, and FAA.

Academic Showcase Participant
Board Placement: 158

Regulation of Sleep and Synaptic Plasticity by Eiger in Drosophila melanogaster

Primary Author: William Vanderheyden
Co-Author(s): Jason Gerstner
Alan Goodman

Primary College/Unit: Elson S. Floyd College of Medicine
Associated College(s)/Unit(s): Elson S. Floyd College of Medicine
Campus: Spokane

Abstract

Lack of sleep has been shown to be a contributing factor to cognitive impairment and changes in synaptic morphology and function. However, phylogenetically conserved mechanisms underlying sleep regulation and how neuroplasticity is related remains still poorly understood. Tumor necrosis factor alpha (TNF) is known to regulate sleep and synaptic function in mammals, and may represent an evolutionarily ancient mechanism uniting these two processes. Here we characterize the contribution of Eiger, the Drosophila TNF homologue, in mediating sleep, sleep homeostasis, and experience dependent neural plasticity in flies. This work identifies Eiger as a critical molecule for regulating total sleep time and synaptic morphology of the fly brain. Further, knock-down of Eiger in astrocytes, but not neurons, significantly reduces sleep in flies. These data suggest that Eiger, a molecule typically found in glial cells, may be an evolutionarily conserved mechanism to regulate sleep and synaptic function across phylogeny.

Academic Showcase Participant
Board Placement: 43

Building a Community of Inquiry through Active Learning

Primary Author: NarayanKripa Sundararajan
Co-Author(s): Rebecca Vandevord

Primary College/Unit: Global Campus
Associated College(s)/Unit(s): College of Education
Campus: Global

Abstract

Community of Inquiry (COI) is a framework typically used to understand interactions in online courses. The COI framework approaches the course space, design, and interactions within the course space from three perspectives: cognitive presence, social presence, and teaching presence. Through a systematic review for instruments that target understanding COI, twelve publications that presented either a complete instrument of COI or presented an instrument for one of the three perspectives were identified. These twelve instruments were consolidated and piloted in Spring 2017 in Psychology online courses. Additionally, we piloted the instrument as a tool to understand interactions facilitated in an active learning classroom (Bryan 404) considering the similarities with online instruction. Further, this instrument was used to collect information on the development of a community of inquiry in the Spark classrooms in Fall 2017 - with particular emphasis on the round room (Spark G45) and the largest active learning classroom on campus (Spark G10). Findings from the pilot roll-out as well as findings from the Fall roll-out across the three perspectives of cognitive, social, and teaching presence are shared in this poster to generate discussions, collaborations, and feedback.

Academic Showcase Participant
Board Placement: 81

Multicultural student intervention: Health, academic, & personal goal attainment

Primary Author: Patricia Maarhuis
Co-Author(s): Rachel Wong

Primary College/Unit: Health and Wellness Service
Associated College(s)/Unit(s): Health & Wellness Services, Health Promotion (Student Affairs)
Campus: Pullman

Abstract

This poster examines the perceived importance and relevance of a multicultural health intervention program that (1) seeks to advance the health of students at Washington State University (WSU) and (2) improve academic and social experiences of students from a multicultural harm reduction health perspective. The program consists of culturally-based practice of prevention, health psycho-education, and harm reduction outreach interventions grounded in both empirical research evidence and culturally-focused strategies. Outreach workshops emphasize the importance of the relationships between mental health, social experiences and academic success to provide an all-rounded undergraduate experience at WSU. To this end, the intervention targets interrelated mental health concerns dealing with substance use, suicide prevention, sexual consent, and other health and academic related topics relevant for specific racial/ethnic populations and socioeconomically disadvantaged groups. Correlation analyses indicated strong correlations between students' perception of the usefulness of the outreach on academic and personal goals attainment and behavior change intents, $r = .51$, $p < .01$, and $r = .55$, $p < .01$. Chi square analysis indicated that a moderate association exists between students' perceptions that the content of the outreach was beneficial for behavior change (Strongly Disagree, Disagree, Neither, Agree, Strongly Agree) and academic and personal goals attainment after an outreach, $\chi2(16, N= 162) = 148.61$, r¬s = .462, $p < .01$ and $\chi2(16, N= 163) = 124.67$, r¬s = .512, $p < .01$. Findings suggest that this culturally-based health intervention program has positive implications for under-served communities.

GPSA Research Exposition Participant
Board Placement: 131

Newcastle disease vaccine adoption at the smallholder household level in Tanzania: Identifying determinants and barriers

Primary Author: Zoë Campbell
Co-Author(s): Thomas Marsh
Emmanuel Mpolya
Thumbi Mwangi
Guy Palmer

Primary College/Unit: Interdisciplinary: Paul G. Allen School of Global Animal Health
Category: Social Sciences
Campus: Pullman

Abstract

Principle Topic

Food security is critical to achieving sustainable growth, poverty reduction, and political and economic stability. Livestock have the potential to improve the food security of smallholder households in developing countries, but productivity is constrained by disease. The extent to which households adopt innovations such as vaccines impacts disease control, however the behavioral and economic predictors of household decisions to adopt or forgo vaccination are not well understood. We address this gap with a study of adoption of Newcastle disease (ND) vaccines by chicken-owning households in Tanzania.

Methods

A cross-sectional survey was administered to 535 households owning indigenous chickens in Arusha, Singida, and Mbeya regions in Tanzania. We measured potential predictors of ND vaccine adoption including knowledge, attitudes, and practices. Logistic regression was used to identify predictors correlated with three stages of household adoption: awareness of ND vaccines, prior use, and recent use (within four months).

Results

Eighty percent of households were aware of ND vaccines, 57% had previously vaccinated, and 26% had recently vaccinated (within four months). Knowing someone who vaccinated made a household 1.3 times more likely to have previously vaccinated (adjusted OR (95% CI) = 1.32 (1.14-1.53, p<.01). The larger the flock size, the higher the likelihood of previously vaccinating (OR = 1.03 for a one chicken increase, (1.01-1.05), p<.05). Usage of traditional medicine decreased the likelihood of previously vaccinating (OR = .58(.36-.95), p<.05). Our findings on factors affecting household decision-making can serve to increase vaccine coverage, enhance livestock health and productivity, and improve food security.

Academic Showcase Participant
Board Placement: 117

A Comprehensive Longitudinal Assessment of International Undergraduate and Graduate Students in Pathway Programs

Primary Author: Eman Elturki
Co-Author(s): Kate Hellmann
Justyna Hjeltness
Yang (Wendy) Liu

Primary College/Unit: International Programs
Associated College(s)/Unit(s): International Programs
Campus: Pullman

Abstract

A longitudinal research project has been initiated in Fall 2017 at Washington State University's International Programs to understand the academic and sociocultural factors that contribute to and/or hinder the success of the first cohort of undergraduate and graduate students in the pathway programs. The project specifically seeks to (1) assess international undergraduate and graduate students' expectations, unique needs, academic performances, and challenges during their first four semesters, (2) track how those unique needs, academic performances, and challenges change and/or develop over time, and (3) plan ways to increase student success based on the findings from the first two objectives. Data collection consists of surveys, student and faculty interviews, and student achievement data. The researchers will report on the results from the initial phase of this research project. Findings from needs analyses and one-on-one interviews with pathway students, language instructors, and WSU faculty provide insights into various implications including curriculum changes, instructional practices, and support services to better serve international undergraduate and graduate students at WSU. The findings of this research will also inform other higher education entities with international student populations.

Academic Showcase Participant
Board Placement: 68

Affordable Learning Project Outcomes

Primary Author: Talea Anderson
Co-Author(s): Rebecca Van de Vord

Primary College/Unit: Libraries
Associated College(s)/Unit(s): Libraries
Campus: Pullman

Abstract

This poster will present outcomes from the Affordable Learning Project?an effort funded by a WSU Student Success Seed Grant that aimed to increase use of low- to zero-cost course materials at Washington State University. As part of the project, five WSU faculty members received funds to revise their courses in summer 2017 to include low-cost resources for instruction in fall 2017. All five opted to adopt or create open educational resources (OERs), or educational materials that are openly licensed and freely available to students. Following instruction in the fall, project leads documented cost savings for students and learning outcomes in the affected courses, including grades and rates of withdrawal. The poster will present these outcomes as a means of assessing the effectiveness of directing university funding toward creation and adaption of OERs.

Academic Showcase Participant
Board Placement: 38

Challenges and Leadership, the Tenure of WSU President Ernest O. Holland (1915-1945)

Primary Author: Trevor Bond

Primary College/Unit: Libraries
Associated College(s)/Unit(s): Libraries
Campus: Pullman

Abstract

This research is part of a newly commissioned publication, the Washington State University Press will publish titled Legacy of Leadership, a biographical history of the Presidents of Washington State University from its founding. Each of the eleven presidents will be treated in a separate, illustrated chapter created by different authors focusing not only their leadership style and personality, but also how that leadership was applied in their specific time in society. Holland led WSU through a major conflict with the University of Washington over the duplication of courses, the 1918 influenza epidemic in Pullman resulting in an all campus quarantine, the Great Depression, and World War II. Trevor Bond will explore Holland's successes and failings during these challenging episodes and his personal, hands-on leadership style. Today, Holland is most closely associated with the library named for him, though the design of the building is not what he wanted. His collections of books and art survive on campus, but are not well known. However, WSU's status a comprehensive research University is due largely to Holland who won the political fight with the University of Washington to offer an expansive range of course and also built upon President Bryan's expansive vision of a land-grant college as providing both a practical and liberal education.

Academic Showcase Participant
Board Placement: 123

Information Literacy Skills Assessment: Evaluating Resources

Primary Author: Corey Johnson
Co-Author(s): Erica England
Erin Hvizdak

Primary College/Unit: Libraries
Associated College(s)/Unit(s): Libraries
Campus: Pullman

Abstract

Information Literacy (IL) is one of WSU's Seven Undergraduate Learning Goals. For the last decade, the Pullman Library Instruction Program has collaborated with a number of lower undergraduate courses to assess Information Literacy (IL) skill development. This learning outcome assessment work has largely focused on the source type identification and materials accessing facets of IL, along with source usage, building quality arguments, and providing proper source attribution. The Instruction Program's first foray into IL's sub-goal of information evaluation (2010-2013) included approximately 6400 first-year student responses to a multiple-choice quiz offered through General Education 110 and History 120/121. Overall, students scored better on the evaluating information questions than the accessing information questions, but worse compared to the source type questions. Four years ago, the first information evaluation-centered activity was deployed for use in ENGLISH 101 library instruction sessions, but ultimately few instructor/librarian pairs opted to use it. From the limited data gathered, librarians concluded that students generally understood the concepts of source authority, accuracy, currency, and bias; however, they lacked the knowledge to specifically verify these components. In the past two semesters, instruction librarians have fully implemented an evaluating sources lesson for ENGLISH 101. The timing of this work parallels American society's increased attention on the importance of evaluating information quality and accuracy. The results show ~60% of first-year students are proficient in basic information evaluation skills. Students performed best with primary/secondary and popular/scholarly source identification, yet struggled with identifying publishing and publisher implications for information quality.

Academic Showcase Participant
Board Placement: 162

The Tribal Digital Stewardship Cohort Program: Building a New Phase of Collaborative Curation

Primary Author: Lotus Norton-Wisla

Primary College/Unit: Libraries
Associated College(s)/Unit(s): Libraries
Campus: Pullman

Abstract

The focus of this poster will be the process of building the next phase of the Tribal Digital Stewardship Cohort Program at Washington State University's Center for Digital Scholarship and Curation. The TDSCP is a cohort-based educational program providing training in the lifecycle of digital stewardship. The program is designed to meet the needs of tribal cultural institutions. Many professionals working in tribal archives, libraries, museums, and other departments have many responsibilities and roles in their position. It is often difficult to get the necessary digital technology and archives management training due to workload, geographic distance, cost, and many other factors. The TDSCP strives to create a balance between a full Library and Information Science master's degree program and one-time workshops, conferences, or webinars. The cohort model encourages discussion and collaborative learning, and values the experience and expertise that our participants carry. The poster will present data and findings from two complete cycles of the program from 2015-2017, and examine the challenges and successes of the program as we prepare for the next two cycles from 2018-2020 with a greater emphasis on collaborative curation. The poster will highlight the importance of archival education and development focused on Indigenous community needs, shared learning, and collaborative curation with federal repositories. The TDSCP encourages improving education in digital stewardship, using digital technologies in culturally appropriate contexts, creating opportunities for equitable participation in the archives profession, and a holistic view of the digital stewardship lifecycle tied to community needs.
https://cdsc.libraries.wsu.edu/tribal-digital-stewardship-cohort-program/

Academic Showcase Participant
Board Placement: 144

Mukurtu Hubs and Spokes: A Sustainable National Platform for Community Digital Archiving

Primary Author: Michael Wynne

Primary College/Unit: Libraries
Associated College(s)/Unit(s): Libraries/Center for Digital Scholarship and Curation
Campus: Pullman

Abstract

The Center for Digital Scholarship and Curation (CDSC) promotes technology-driven, ethically minded collaborations with WSU's multiple publics, including faculty, students, staff, and local, regional, and national community members. In 2017, the CDSC was awarded a three-year National Leadership Grant from the Institute for Museum and Library Services (IMLS) for Mukurtu Hubs and Spokes: A Sustainable National Platform for Community Digital Archiving. The CDSC develops and maintains the codebase for Mukurtu CMS, and provides support, outreach, and training to users around the world. This grant builds on a successful previous IMLS grant to advance Mukurtu CMS with the support of new, regional Mukurtu Hubs located at the Alaska Native Language Archives at University of Alaska Fairbanks, University of Hawaii Mānoa's Department of Linguistics, University of Oregon Libraries, WiLS (formerly Wisconsin Library Services), and Yale University's Beinecke Rare Book & Manuscript Library. The Mukurtu Hubs are responsible for providing training and support to regional tribal archives, libraries, and museums (the Spokes) that promotes a sustainable national network of resources. In addition, the Hubs collect and report feedback and user needs from their Spokes, passing these local needs to the development team at WSU, where they are iterated on through a grassroots software development model. Mukurtu CMS is a free, open-source content management system developed with the unique needs of indigenous communities and digital cultural heritage management in mind. Mukurtu CMS empowers communities to appropriately manage and share their cultural heritage materials with users, and to provide rich, layered narratives in multiple formats.

Academic Showcase Participant
Board Placement: 176

Authority Control in Linked Data Environment

Primary Author: Lihong Zhu

Primary College/Unit: Libraries
Associated College(s)/Unit(s): Libraries
Campus: Pullman

Abstract

What is authority control? "Authority control is the establishment and maintenance of consistent forms of terms?names, subjects, and titles?to be used as headings in the bibliographic records of the library catalog. Headings must not only be consistent; they must also be unique." (What is Authority Control? https://library.fiu.edu/about-us/cataloging/authority-control). What is Linked Data? "The Semantic Web is a Web of Data ? of dates and titles and part numbers and chemical properties and any other data one might conceive of. The collection of Semantic Web technologies (RDF, OWL, SKOS, SPARQL, etc.) provides an environment where application can query that data, draw inferences using vocabularies, etc. However, to make the Web of Data a reality, it is important to have the huge amount of data on the Web available in a standard format, reachable and manageable by Semantic Web tools. Furthermore, not only does the Semantic Web need access to data, but relationships among data should be made available, too, to create a Web of Data (as opposed to a sheer collection of datasets). This collection of interrelated datasets on the Web can also be referred to as Linked Data." (Linked Data. https://www.w3.org/standards/semanticweb/data) . This study focused on the following research questions: (1) What is the changing role of authority control in linked data environment? What benefits and challenges? (2) What tools are needed for authority control in linked data environment? (3) What are the areas for further research in authority control in linked data environment?

Academic Showcase Participant
Board Placement: 194

The Use of Administrative Data to Further Evaluate Mixed Mode Response Differences for Those with Behavioral Health Disorders

Primary Author: Rose Krebill-Prather
Co-Author(s): Felix Rodriguez
Kent Miller
Kristen Petersen
Danna Moore

Primary College/Unit: Office of Research: Social & Economic Sciences Research Center
College of Nursing
Associated College(s)/Unit(s): Office of Research
Campus: Pullman

Abstract

Surveying those with a behavioral health disorder is challenging, since reporting on behavioral health is sensitive and there is a stigma associated with receiving services. For this study, a mixed mode survey was implemented in 2017 with a random sample of individuals pre-identified as receiving state funded outpatient behavioral health services in Washington. A telephone survey with internet option design allowed for an analysis of possible response differences by survey mode when reporting on quality of services received. Furthermore, administrative records pertaining to principal behavioral health disorder diagnosis were appended to the survey data and were used to further analyze survey mode response differences by behavioral health disorder. Among the 2,615 completed and 457 partially completed surveys, a mixture of both telephone and internet completes and partial completes were obtained. Results show there are significant survey mode differences in reporting on quality of services received. Moreover, those mode differences are significant for some behavioral health disorder groups and not for others. The results suggest there is an interaction effect with telephone interviewers for specific behavioral health disorder groups with the potential for satisficing on the telephone. The presence of an interviewer may also deter respondents from choosing the neutral non-committal response. The findings in this study are important for understanding differences in results using one survey mode over another when surveying those with a behavioral health disorder. The differences in results by survey mode also have implications for conclusions drawn in assessments of the quality of behavioral health services received.

Academic Showcase Participant
Board Placement: 179

Gender Effects Over the Airwaves

Primary Author: Nathan Palmer

Primary College/Unit: Office of Research: Social & Economic Sciences Research Center
Associated College(s)/Unit(s): Social & Economic Sciences Research Center
Campus: Pullman

Abstract

Survey organizations, government agencies, and marketing firms have several goals when conducting surveys or evaluations. Foremost among these, are the goals of keeping costs down, and staying within budget while at the same time collecting accurate and sufficient data to report valid information that represents a population. Additionally, most survey organizations are looking for ways to address decreasing response rates of not just minority, but all demographic groups. One way to potentially increase response rates is to evaluate what interviewer attributes result in a completed survey. This study looks mostly at gender effects on phone interviews. Though gender effects have been examined before, due to the evolving social environment it is still an important issue to explore and understand when implementing surveys. Examining phone surveys I will try to answer the following questions among others: Are male or female respondents more likely to agree to participate in a survey based on the interviewer's implied gender? Are male or female respondents more likely to complete a survey based on the interviewer's implied gender? Do responses differ based on the interviewer's and respondent's genders?

Academic Showcase Participant
Board Placement: 133

Are diversity initiatives relevant? A practical approach for establishing & relying on the diverse competencies of our leaders, colleagues & students

Primary Author: Rita Reinhardt

Primary College/Unit: Student Affairs: Career Development
Associated College(s)/Unit(s): Division of Student Affairs
Campus: Tri-Cities

Abstract

The relevance of diversity and inclusion in the workplace may be an overlooked topic due to the amount of time and resources required to implement professional development opportunities. Due to the complexity of initiating diversity efforts, leaders may lack the practical skills that reduce cultural barriers among team members. The purpose of this prospective study is to generate ideas and potential solutions for efficiently developing practices that encourage individuals to disclose and participate in the creation of innovative constructs that leads to improved approaches to inclusivity. Many organizations function under antiquated definitions and mission statements that may hinder overarching visions. Thus, organizations should consider the influence of change efforts when updating diversity and inclusion initiatives. When considering the neglected aspects of diversity and inclusiveness, organizational change could be a theoretical model that encourages continuous leadership development and employee engagement (Dougan, 2015, p. 62; Tavakoli, 2015, p. 48). The dismissal of modifying current practices could result in an increase of employee attitudes deeming diversity initiatives irrelevant. Bustamate, Nelson, and Onwuegbuzie (2009) offered solutions to the disparity that existed in school districts lacking diversity and inclusion initiatives (p. 805). Potential solutions may include assessing organizational: (a) policy, (b) programming, (c) climate, and (d) cultural competence (Bustamante, Nelson & Onwuegbuzie, 2009, p. 805). As a result, the goal and method of this research will be to research the contributions from leaders, staff, and students of a college or university to further examine if organizational definitions accurately depict practices that foster diversity.

Academic Showcase Participant
Board Placement: 201

Community Engagement for Student and Faculty Success

Primary Author: Melanie Brown
Co-Author(s): John Lupinacci
Molly Kelton
Samantha Gizirian
Mike Berger
Janet Peters
Sammy Perone

Primary College/Unit: Student Affairs: Center for Civic Engagement
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
College of Arts and Sciences
College of Education
College of Nursing
College of Veterinary Medicine
Student Affairs
Campus: Pullman

Abstract

A Community Engaged Faculty Fellows program was established at Washington State University in the spring of 2017 with a Student Success Seed Grant from the Office of the Provost. Students who are engaged in their college experience, academically and socially, are more likely to persist and graduate (Zhao & Kuh, 2004; Pascarella & Terenzini 2005; Astin 1993). Faculty have a critical role to play through pedagogical practices that engage students in and out of the classroom (Tinto 2006). High impact practices, including service learning, have been shown to have a "transformative influence" on the personal development and educational growth of students (Kuh 2008) and student civic engagement can be linked directly to student learning and success (Cress 2012). The Center for Civic Engagement has a long history of advancing student and faculty engagement with communities through service, leadership, and scholarship. Building on the programs and best practices of the CCE, this project expands the scholarship of engagement and the availability of service learning across the WSU system via a faculty fellows program. Nine Fellows from eight disciplines, five Colleges, and four campuses were selected to the inaugural cohort. This presentation will outline preliminary assessment outcomes related to the three goals of the program: 1. Establish a community of practice for engaged scholarship with emphasis on community engaged teaching and learning. 2. Develop and provide quality curriculum-based opportunities for students to participate in service learning and community engagement. 3. Address public issues and community-identified needs through authentic collaboration with community partners.

GPSA Research Exposition Participant
Board Placement: 92

A Study of Using Nutraceuticals on Chondrogenesis of Engineered Articular Cartilage using Histology and Biochemical Analysis

Primary Author: Haneen Abusharkh
Co-Author(s): A. Mallah
M. Amr
A. Gozen
J. Mendenhall
B. J. Van Wie
N.I. Abu Lail

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Articular cartilage (AC) is a non-vascularized connective tissue that lines articulating joints. It gets frequently damaged due to injuries or aging. The absence of vascularization makes it unlikely to regenerate upon injury, leading to osteoarthritis (OA). There is currently no cure for OA. More than 50 million adults are diagnosed with arthritis in the US. Various tissue engineering strategies are being developed to repair damaged AC as alternative means to joint replacement. Tissue engineering combines a cell source, a scaffold and growth factors in a bioreactor to enable the growth of a desired tissue that resembles the native tissue in structure and function.

We hypothesize that the addition of nutraceuticals to bovine chondrocyte micromass cultures will improve chondrogenesis, reflected by an increase in the production of major biomarkers, Collagen and glycosaminoglycan (GAG), of healthy cartilage. Nutraceuticals are nutritional chemicals capable of scavenging reactive oxygen species. Four nutraceuticals were tested, Catachein hydrate, Carvacrol, Ascorbic Acid and Alpha-Tocopherol. The effects of nutraceutical addition individually on chondrogenesis compared to a negative control (NC) were investigated. Quantitative assessment and qualitative characterization of the engineered AC was performed with biochemical analyses and histological analyses respectively for the biomarkers at days 3, 10, and 21. An increase of at least 1.3-fold in total GAG content at day 10 was observed in the Catachein hydrate treated culture in comparison to the other treatments and NC. Our findings indicate that Catachein hydrate, commonly found in green tea, may be useful as a home-based remedy for patients with OA.

Academic Showcase Participant
Board Placement: 46

Cellulose Nanocrystals reduce cold damage to reproductive buds in fruit crops

Primary Author: Jassim Alhamid
Co-Author(s): Changki Mo
Zhang Xiao
Peipei Wang
Matthew Whiting
Zhang Qin
Faculty Advisor: Mo, Changki

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Tri-Cities

Abstract

Economic loss from cold damage is one of the most prevalent recurring production issues in the temperate fruit industry, and poses a significant challenge to profitable and sustainable production. Despite its devastating potential (i.e., complete crop loss), there are no reliable solutions for reducing cold damage in fruit crops. In this work, we demonstrate a new effective approach to protecting fruit reproductive buds from cold damage. Electrostatic application of cellulose nanocrystals (CNC) dispersion to fruit buds forms a thin film with low thermal conductivity. The dispersion was applied to dormant grapevine (Vitis vinifera) buds and hardiness was evaluated by differential thermal analysis. CNC-treated buds were more resistant to freezing temperatures than untreated buds by 2-4°C. The hardiness of sweet cherry (Prunus avium L.) reproductive buds at the 'first white' stage of development was also tested comparing CNC-treated (2 wt.%) and non-treated clusters. Pistil mortality was evaluated 24 hrs after treatment. Untreated pistils were killed at ca. -1°C while the CNC-treated buds were hardy to ca. -4°C. The temperature at which ca. 10%, 50%, or 90% of untreated pistils were killed was ca. -1.5°C, -2.8°C and -5.5°C, the temperature at which ca. 10%, 50%, or 90% of treated pistils were killed was ca. -4.4°C, -6.5°C and -7.7°C. In general, CNC treatment improved cold-hardiness of grape and sweet cherry buds by about 2 to 4 °C. These results demonstrate great potential for field applications of CNC to improve specialty crop yield security by protecting reproductive buds from cold damage.

GPSA Research Exposition Participant
Board Placement: 163

Super-Stretchable Metallic Interconnects For Flexible Electronics

Primary Author: Yeasir Arafat

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Flexible electronics has emerged as an important area of research with applications in areas such as defense, sportswear, and healthcare. The flexible electronic devices are predicted to lead to the 'Internet of Things' (IoT) revolution over the next two decades. A flexible electronic device typically requires that its components (e.g., sensors, power sources, logic, memory and communication devices) be connected with each other on a flexible substrate using thin or thick interconnects. These interconnect films are expected to undergo numerous, large cyclic tensile and flexural strain without failure or reduction of electrical performance. To date, there has been attempts to produce stretchable interconnects using geometric manipulations and traditionally available metals (Gold and Cu) which have proven to be commercially not so viable.

METHOD

This work aims to address these challenges by engineering the metal-polymer interfaces and by using low cost, low melting-temperature ductile metals such as Indium to realize highly stretchable interconnects that do not show a degradation in electrical performance under large deformation. In particular, we investigated the deformation mechanics and mechanism of metallic interconnect films periodically bonded to a polymer substrate and subjected to large strains.

RESULTS/IMPLICATIONS

By using periodic bonding, we found experimental evidence that the necking instability in the film can be suppressed by localization of the strain at multiple locations rather than one, thereby increasing the strain to failure which enabled us to gain up to 100% linear strain on metal-polymer interconnects.

Academic Showcase Participant
Board Placement: 189

Mechanically initiated glucose oxidoreductase enzyme system: a top down approach for the conversion of lignocellulosic wastes into biofuels and value-added chemicals

Primary Author: Mohammadali Azadfar
Co-Author(s): Michael Wolcott
Faculty Advisor: Dr. Michael P Wolcott

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

The feasibility of biofuels and value-added chemicals production from lignocellulosic wastes by a simple, low cost and in high yield has been a great challenge since the very early development of lignocellulosic biomass conversion systems. Various top down approaches have been developed so far, for the commercial production of biofuels and chemicals. Among all, mechanical milling and enzymatic biomass deconstruction as environmentally-friendly approaches, have raised the need to research for the enabling technologies for the envisioned biomass conversion system. Glucose oxidase is known as an oxidoreductase that catalyses the oxidation of glucose to hydrogen peroxide and gluconic acid. To date, the main glucose oxidase enzyme utilization has been to use in commercial blood glucose meters sensors for the determination of free glucose in sera or blood plasma. Here we show that how combination of mechanical milling and glucose oxidase enzyme (Aspergillus niger) can provide a platform for amorphization of the plant cell wall and selective oxidation of lignin at the amorphous surfaces. In our experimental work we have demonstrated that how mechanical milling proved capable of micronizing and modifying wood pulp and forest residues and of inducing cellulose reducing end-groups. We elucidate that hydrogen peroxide, as primary oxidant for oxidation of lignin, is formed naturally when cellulose reducing ends react with glucose oxidase enzyme. In this green biomass conversion system, cationic species are produced from hydrogen peroxide in acidic condition and convert lignin into value-added products.

GPSA Research Exposition Participant
Board Placement: 193

Water-jet steerable needles

Primary Author: Mahdieh Babaiasl

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Despite long-standing usage of water jets in industrial settings, the use of water-jet technology in medical applications is a relatively new phenomenon. We present a new application of water-jet technology to control cutting at the tip of a needle with the goal of steerable needles. Steerable needles allow clinicians to reach places in the body that cannot be easily reached using conventional needles, and provides further advantages such as eliminating cutting force and providing better steerability.

Can water-jet technology be incorporated into steerable needles so that the cutting force is eliminated? For this purpose, a needle insertion system is designed and built, which has a water-jet nozzle attached to a Nitinol needle as its "needle". Insertion experiments with and without the water-jet enabled, conducted in tissue-mimicking simulants with varying stiffness, are performed and the associated force data is measured using a force sensor at the base of the needle.

Experimental results of force vs. displacement showed that water-jet eliminates the cutting force at the tip of the needle associated with traditional sharp needles. Depth of cut as a function of fluid velocity is also measured for different volumetric flow rates. The results show that the depth of cut is a linear function of fluid velocity when the width of the water-jet nozzle is sufficiently small and smooth. The presented work is a first step toward submillimeter controllable nozzles such that the direction of tissue fracture can also be controlled, in addition to the depth of cut described here.

GPSA Research Exposition Participant
Board Placement: 190

The contribution of atmospheric proxies to the vertical distribution of ozone over Summit Station, Greenland

Primary Author: Shima Bahramvash Shams
Co-Author(s): Von P. Walden
Samuel Oltmans
Irina Petropavlovskikh
Chance W. Sterling
Bryan Johnson
Laura Thölix
Rigel Kivi

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Ozone is a critical trace gas in the earth's atmosphere. While stratospheric ozone is essential to absorb ultraviolet radiation from sun beams, tropospheric ozone can be harmful to human health. Monitoring the ozone fluctuations in the vertical layers of the atmosphere is critical in understanding the earth's climate system. The ozone cycle varies at different locations because of the different parameters involved; these processes are not completely understood yet. The role of each parameter in ozone variation differs at different layers of the atmosphere. Therefore, to investigate the causes of ozone fluctuations, vertical layers of the atmosphere should be analyzed separately.

Arctic ozone analysis is challenging because of complex parameters involved and environmental conditions. In this study, vertical profiles of ozone derived from ozonesondes were used to investigate the effect of different proxies on the ozone cycle at Summit Station, Greenland Ice Sheet (2005 - 2016). We used a stepwise multiple regression technique to remove the seasonal cycle of ozone and investigate how seven proxies [solar flux, Quasi-Biennial Oscillation, El Nino-Southern Oscillation index, Arctic Oscillation, eddy heat flux, the volume of polar stratospheric clouds and tropopause pressure] affected the vertical distribution of ozone over Summit. Our results show that dynamical processes contributed significantly to ozone concentrations. Tropopause pressure and Quasi-Biennial Oscillation were the most effective predictors of ozone in the troposphere and lower and middle stratosphere. A simulation model of ozone over Summit explains the ozone cycle with a correlation coefficient (R2) of 82%.

GPSA Research Exposition Participant
Board Placement: 214

3D printing of resorbable porous calcium phosphate scaffolds with enhanced in vivo bone and blood vessel formation for bone tissue engineering

Primary Author: Dishary Banerjee
Co-Author(s): Samuel Robertson
Susmita Bose

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

PRINCIPAL TOPIC

3D-printing has made it feasible to create ceramic implants that closely mimic the geometry of human bone and can be custom-designed for unusual injuries or anatomy. Calcium phosphate(CaP) ceramics, being compositionally like the inorganic part of the bone, has shown significant promise towards bone graft applications. Fabricating CaP scaffolds with complex geometry using conventional techniques is grueling because of lack of precise control.

METHOD

The novelty of the study is to optimize the 3D-printing parameters for the fabrication of scaffolds, with complex geometry, made from laboratory-synthesized tricalcium phosphate(TCP) powder. This study intends to understand the mechanical and biological effects of incorporation of porosity and addition of Fe+3 and Si+4 in porous TCP scaffolds in rat distal femur model. We hypothesize that the incorporation of dopants into TCP improves the mechanical interlocking at the bone-implant interface and enhances osteogenesis and angiogenesis.

RESULTS/IMPLICATIONS

Scaffolds with different pore designs and volume-fraction porosity were designed to match the mechanical properties of cancellous bone. To mimic the natural porous bone structure, TCP scaffolds with 400ums interconnected porosity were fabricated to provide pathways for micronutrients and improved cell-material interactions. These scaffolds showed compressive strength of ~18MPa, closely matching that of cancellous bone. Addition of Fe+3 enhanced early-stage new bone. Neovascularization was observed in the Si+4 doped scaffolds. The findings emphasize that the 3D-printing of scaffolds with complex geometry from synthesized ceramic powder with modified chemistry is feasible and may serve as a candidate to introduce angiogenic and osteogenic properties, essential for accelerated bone healing.

Academic Showcase Participant
Board Placement: 105

In-situ Synthesis of Carbon-Coated Porous Silicon for Li-ion Batteries via Inorganic CO2 Reduction Route with Magnesium Silicide

Primary Author: Younghwan Cha
Co-Author(s): Panpan Dong
Xiahui Zhang
Faculty Advisor: Min-Kyu Song

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Carbon(C) coating step in silicon(Si) anode research has been considered as a necessity in order to enhance cycling performance by increasing electronic conductivity and bolstering stable Solid-Electrolyte Interphase(SEI) layer between Si host and liquid electrolytes. Typically the coating step requires additional efforts; cost-ineffective procedures, sophisticated equipment and, oftentimes, toxic chemicals. In this work, we develop novel strategy that can abridge the additional C coating step and yet simultaneously obtain C coating and porous structure on Si host via simple/one-step thermal treatment where CO2 is reduced down to C by inorganic magnesium silicide(Mg2Si). During the thermal treatment, CO2 and Mg2Si undergo spontaneous redox reaction and result in composite of MgO, Si, and C, confirmed by in-situ high temperature X-ray diffraction analysis. In this redox reaction, element Mg act as a reductant that takes O atoms away from CO2 molecules, leaving elemental C as a coating. After the MgO removal (sacrificing template for porous structure) via acid leaching, microstructural characterization reveals porous structures in Si host (pore size:100~200nm, BET surface area:67.6m2/g) and uniform C coating layers (thickness:20~40nm). Most importantly, having nano-scaled porous structures, the tap density of the material is 3~4 times higher than commercially available nano-Si powder, which is greatly beneficial to high energy Li-ion battery applications. Cycling performance test shows high initial coulombic efficiency(85~88%), good rate capability(>1000mAh/g at 1.0C-rate), and excellent long term cycling performance (~1300mAh/g after 300 cycles at 0.5C-rate & ~1000mAh/g after 500 cycles at 1.0C-rate).

GPSA Research Exposition Participant
Board Placement: 39

On-Site Assessment of the Severity of Organophosphorus Pesticide Poisoning Using Lens-less Smartphone Spectrum Apparatus (LeSSA)

Primary Author: Yu-Chung Chang

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Organophosphorus pesticide poisoning can cause acute parasympathetic system and neuromuscular junction dysfunctions, such as seizures, respiratory failure, and muscle weakness. Rapid diagnosis and treatment after OP poisoning as soon as possible can reduce hospitalization days and mortality. However, the hospitals in rural/remote regions are not well-equipped to immediately diagnose and treat patients with acute OP poisoning. To meet this urgent need, we developed a pocket-size low-cost lens-less smartphone spectrum apparatus (LeSSA) for on-site assessment of the OP poisoning. Firstly, to validate the capability of the LeSSA, we measured human Interleukin-6 (IL-6) in human serum using standard immunoassay kits. The quantitative ability of the LeSSA was examined by dose-response curve fitting, and the accuracy of the LeSSA achieved 99.5%. The limit of detection (LOD) using the LeSSA is 6.4 pg/mL – similar to LODs obtained using a laboratory instrument (5.5 pg/mL). Next, we assessed the capability of LeSSA to measure the activity of plasma cholinesterases (PChE) by spiking paraoxon as the OP model into human plasma. The consistency between the LeSSA and the laboratory instrument is up to 97.6%. Finally, we performed a clinical study in which plasma samples from 24 agricultural workers were tested by measuring the activity of PChE using the LeSSA. The results were compare with the lab instrument and both methods demonstrated excellent agreement (r2 = 0.92). This LeSSA costs ~$20 which is affordable. Clinicians can immediately determine the OP poisoning without transferring samples/patients to other locations, and can use results to immediately implement appropriate treatment.

Academic Showcase Participant
Board Placement: 155

Antifouling Performance of Two Dimensional Molybdenum Disulfide and Graphene Oxide

Primary Author: Indranil Chowdhury
Co-Author(s): Iftaykhairul Alam

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Fouling of membrane surfaces during water filtration seriously hampers the performance of most membrane technologies and remains a significant challenge. Two-dimensional (2D) materials, such as graphene oxide (GO) and molybdenum disulfide (MoS2), have shown potential for antifouling water filtration membranes and can also be used to modify the conductive polymer surfaces for the release of foulants from the membrane surfaces. Here, the antifouling performance of the materials was investigated by observing the deposition and release behavior of the different foulants (i.e.; natural organic matter, E. coli, bovine serum albumin etc.) from the material surfaces using electrochemical quartz crystal microbalance with dissipation monitoring (EQCM-D). Both GO and MoS2 demonstrate superior antifouling properties, as foulants attach 15-80% more slowly than to the bare polymer surface. In most cases, the deposition of foulants was less on MoS2 than GO due to the presence of functional groups on GO that bind more easily with the foulants. Moreover, it was possible to delay the attachment of the foulants on GO-PPy and MoS2-PPy surfaces upon the application of -0.5VAg/AgCl mainly due to electrostatic repulsion created by external negative voltage on the surface. During the release study, it was found that +0.74VAg/AgCl was effective to release the deposited BSA by NaCl electrolysis from GO-PPy and MoS2-PPy surfaces. Continuous generation of O2 and free Cl2 helps the degradation and breakage of complex structure of deposited BSA, hence there was release of the foulant from the surface.

Academic Showcase Participant
Board Placement: 47

Lignin modification approach Based on reactive oxygen species

Primary Author: Maryam Davaritouchaee
Co-Author(s): Rock J. Mancini
William C. Hiscox
Shulin Chen
Faculty Advisor: Rock J Mancini

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): College of Agricultural, Human, and Natural Resource Sciences
College of Arts and Sciences
Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Reactive oxygen species offer a novel method for lignin degradation and the potential for value-added products. Lignin is a complex heterogeneous polymer of coniferyl, sinapyl, and p-coumaryl alcohol subunits which could provide a viable source of renewable carbon. One bottleneck in this process of lignin valorization is that lignin resists degradation. However, biological systems such as wood-feeding termite, white and brown rot fungi can degrade lignin proficiently; lignin undergoes radical reactions in these systems. From this perspective, we studied the structural modification of Kraft lignin and guaiacol as a lignin model compound caused by base activated persulfate in an aqueous medium which is capable of producing hydroxyl radical, sulfate radical, superoxide radical anion and hydroperoxyl anion. The effect of this oxidative system was studied by FTIR, GPC, Py-GC/Ms, and 1H-NMR. The reaction patterns of the oxidative degradation reflected lignin ring demethylation, side chain cleavage, side chain aliphatic OH oxidation, and free CH3 group formation. Additionally, the reduction in Mn of Kraft lignin indicated that the lignin molecule was indeed fragmented into smaller units. Taken together, these results indicate that base activated persulfate is a viable oxidative radical method that can oxidize lignin and guaiacol.

Academic Showcase Participant
Board Placement: 84

Seeing is believing: A mixed methods approach to understanding the human-building interface.

Primary Author: Julia Day
Co-Author(s): William O'Brien

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

"In recent years, behavioral science theories and human-factors research have become important considerations in energy efficiency programs in the residential and commercial building sectors, and great advances have been made in both energy efficient technologies and behavior-based saving approaches. Slowly, but surely, we are finding a balance between technology and humans in the built environment and associated energy outcomes. However, even though great strides have been made in these areas, there is still a disconnect between the occupant and building interface. Behavior-based strategies will only work to the extent that the building interface or design allows. This paper presents findings from an international cross-disciplinary mixed methods study, which investigated adaptive comfort opportunities in commercial office buildings. An online survey was implemented to understand occupants' perceptions of thermal and visual comfort, as well as respective adaptive opportunities and corresponding behaviors (e.g. opening/closing windows). The survey integrated a novel photovoice approach to visually catalog and understand the different types of interfaces available to occupants; this qualitative method is commonly used in community-based participatory research to document and reflect reality. The researchers utilized this novel method, as well as open-ended survey questions and follow-up interviews, to better understand 1) what is really happening in buildings, and 2) why is there a disconnect between the occupants and the building interface? Ultimately, findings from this study provide major insights about the importance of (a) the human-building interface, (b) design missteps and lessons learned, and (c) understanding the building context when implementing behavioral approaches."

Academic Showcase Participant
Board Placement: 197

Design and Synthesis of Hierarchical SeS2/C Nanocomposites Cathodes for High Performance Lithium Batteries with Ether-based Electrolytes

Primary Author: Panpan Dong
Co-Author(s): Jung-In Lee
Younghwan Cha
Xiahui Zhang
Min-Kyu Song
Faculty Advisor: Min-Kyu Song

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Selenium disulfide (SeS2), with a theoretical specific capacity of 1342 mAh g−1, is a promising novel cathode material due to its attractive merits beyond individual sulfur and selenium. In this report, we first designed and investigated hierarchical network architectures of carbon as effective hosts for SeS2. By a facile two-step heat treatment method, we synthesized SeS2@KetjenBlack 600 (KB600) nanocomposites in which amorphous SeS2 were uniformly infused/distributed inside porous carbon while creating the carbon-rich surface layer. This unique hierarchical structure with well-interconnected carbon network can effectively confine dissolved SeS2 as well as provide excellent transportation pathways of both Li-ions and electrons. To further enhance the rate capability as well as protect lithium metal anode in Li/SeS2 batteries, we employed LiNO3 and ionic liquids (N-butyl-N-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide, Py14TFSI) as additives in ether-based electrolytes. It was observed that LiNO3 contributed to higher discharge capacity at a given discharge/charge rate while Py14TFSI was beneficial in suppressing the dissolution of polysulfides/polyselenides of Li/SeS2 batteries. Under optimized composition of electrolytes, hierarchical SeS2@KB600 electrodes showed good initial discharge capacity of 873 mAh g−1 at 250 mA g−1 and high initial Coulombic Efficiency of 98.3 %. The effects of LiNO3 and Py14TFSI on the electrochemical performance of Li/SeS2 batteries were further correlated with the changes in chemical composition of Li metal surface after cycling by combined electrochemical and microstructural analysis. Symmetrical Li/Li cells were also assembled in order to investigate the chemical/morphological stability of Li metal with various electrolytes in this work.

GPSA Research Exposition Participant
Board Placement: 12

Feature Selection for T4SS Effector Prediction

Primary Author: Zhila Esna Ashari Esfahani
Co-Author(s): Shira Broschat
Kelly Brayton

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

Bacterial pathogens, which cause infectious disease in humans and animals, have various methods for attacking the cells. One is by secreting effector proteins into host cell. Nine secretion systems are known, and the focus of this work is on type IV secretion systems (T4SS), that secret effectors directly. It is critical to identify these effectors among the full set of proteins in a genome of a pathogen and this has always been done experimentally. But then computer science has come to help biologists and some methods using scoring and machine learning algorithms have been proposed for predicting effector candidates. However, each work has proposed different sets of features for prediction.

METHOD

The goal of our work was to find an optimal set of features to use in machine learning algorithms. So, using literature, we built a dataset of effectors and non-effectors for four types of bacteria and gathered all the proposed features. Then, using statistical tests and dimensional reduction methods, we selected a set of optimal features. Then, we used a pathogen for testing our features and comparing them to a previous work.

RESULTS/IMPLICATIONS

We used a machine learning algorithm for testing and by use of confusion matrices, we were able to show that our set of features outperforms the previous proposed sets. The results for this research are valuable, because we have gathered all the proposed features and compared their effectiveness, which has never been done before. These results will definitely help with the progress of T4SS effectors prediction.

GPSA Research Exposition Participant
Board Placement: 82

The Effect of Poor Source Code Lexicon and Readability on Developers' Cognitive Load

Primary Author: Sarah Fakhoury
Co-Author(s): Yuzhan Ma
Venera Arnaoudova
Olusola Adesope

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

It is well documented that a large portion of the cost of any software lies in the time spent by developers in understanding a program's source code before any changes can be undertaken. One of the main contributors to software comprehension, has to do with the quality of the lexicon (identifiers/comments) that is used by developers to embed domain concepts and to communicate with their teammates. In fact, previous research shows that there is a correlation between the quality of identifiers and the quality of a software project. These results suggest that poor quality lexicon impairs program comprehension and increases the effort that developers must spend to maintain the software. However, we do not yet have any empirical evidence of the relationship between the quality of the lexicon and the cognitive load that developers experience in trying to understand a program. Given the associated costs, there is a critical need to empirically characterize the impact of the quality of the lexicon on developers' ability to comprehend a program.

In this study, we explore the effect of poor source code lexicon and readability on developers' cognitive load as measured using a cutting-edge and minimally invasive functional brain imaging technique called functional Near Infrared Spectroscopy (fNIRS). Additionally, we map cognitive load data to identifiers in the source code using an eye tracking device while developers perform software comprehension tasks. Our results show that the presence of linguistic antipatterns in source code significantly increases the developers' cognitive load.

GPSA Research Exposition Participant
Board Placement: 212

IntelliBra – A smart nursing bra for measuring human milk production, infant milk consumption, and breast temperature

Primary Author: Abhishek Gannarapu
Co-Author(s): Kimberly Lackey
Michelle McGuire
Arda Gozen

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Principal Topic

Exclusive breastfeeding for 6 months is the gold standard for infant nutrition. Yet, mostly due to perception of insufficient milk supply and mastitis (breast infection), many women stop breastfeeding prior to this milestone. Currently, there is no reliable, user-friendly way to measure milk production, infant milk consumption, or risk of mastitis. As such, our interdisciplinary team developed a non-invasive method of measurement that can be used daily by breastfeeding mothers – a prototype of a smart bra we refer to as the IntelliBra. Prior to development we hypothesized that this garment would be able to detect 1-to-200 mL changes in breast volume and 2oC changes in breast temperature.

Methods

The IntelliBra technology consists of a skin-soft silicone sensing element embedded with a room-temperature ionic liquid. The electrical impedance of the ionic liquid is sensitive to changes in the sensor shape (breast volume) and temperature. We fabricated and tested the sensor on a mock-mother setup, and characterized and modeled the variation in electrical impedance with temperature and volume, allowing development of an algorithm for accurate volume and temperature measurements.

Results/Implications

Our results indicate the sensor is capable of detecting volume changes as small as 1 mL at constant breast temperature. The algorithm can simultaneously predict breast volume with an accuracy of 15 mL in the 0-150 mL range, and temperature with an accuracy of 0.5oC in the 28-34oC range. We posit that the IntelliBra will ultimately increase the number of women who breastfeed exclusively for 6 months.

GPSA Research Exposition Participant
Board Placement: 175

Resolving Aluminum Speciation and Coordination Change Mechanisms in Caustic Mixtures through the Crystallization of Ionic Liquids

Primary Author: Trent Graham

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

The US Department of Energy plans to process high-level radioactive waste currently stored in large tanks at the Hanford site to yield a borosilicate glass waste form. However, aluminum (Al) rich waste forms polyphasic glass with poor material properties for long term waste storage. The removal of the Al colloids is performed through dissolution processes in caustic mixtures and involves a change in Al chemistry from octahedral to tetrahedral coordination. The tetrahedrally-coordinated Al in caustic mixtures undergoes rapid exchange between multiple Al species that are difficult to resolve. We investigated the tetrahedral Al species produced from the dissolution of boehmite, a solid phase found in Hanford high level radioactive wastes. The dissolution was conducted in sodium hydroxide monohydrate, an ionic liquid that crystalizes into a hydrated salt at 65°C. We utilized variable temperature, in-situ, 27Al magic angle spinning, nuclear magnetic resonance spectroscopy (NMR) to quench the reaction involved in the transition of solid phase octahedral Al to solution phase tetrahedral Al. The 27Al nucleus is sensitive to both the Al coordination and local chemical environment. Multiple tetrahedral species were well resolved and slowly crystalized into an octahedral phase at room temperature. This crystallization process was reversible with mild heating to 80°C. These results improve our mechanistic understanding of Al coordination changes in caustic solutions. Ongoing theory based NMR calculations are underway to refine the reaction network facilitating the Al coordination changes. Work is underway to vary the water activity of this ionic liquid to approach waste conditions at Hanford.

GPSA Research Exposition Participant
Board Placement: 169

Modified Bridgman growth of Cadmium Zinc Telluride via Accelerated Crucible Rotation.

Primary Author: Saketh Kakkireni
Co-Author(s): Santosh Swain
Jedidiah McCoy
Kelvin Lynn

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Solid-state radiation detection finds its applications in numerous fields ranging from nuclear medicine to astrophysics. Although Semiconductors offer better energy and spatial resolution than Scintillators, their market share is limited by the cost, availability and need for cryogenic cooling. Cadmium Zinc Telluride (CZT) is a compound semiconductor with attractive properties for compact device technology for detection of X-rays and Gamma-rays. Over the past few decades' numerous efforts are made to grow high-quality CZT, unfortunately to-date it's application is limited by large-scale production and cost. Poor thermo-physical properties of CZT coupled with no strong growth direction make it a challenge to achieve high yield of single crystalline material. Current industrial flux growth technique is inherently limited by slow growth rates and requires post-processing. The solution may be found in the Accelerated Crucible Rotation Technique (ACRT), where the crystal growth is achieved under a forced convective regime involving periodic rotation of the growth crucible. ACRT induced flow patterns can homogenize the melt thereby enabling faster growth rates and eliminate the need for post-processing. Our preliminary results, presented here, show that ACRT can reduce the production time by a factor of four. Additionally, the application of ACRT has provided the potential for scale up the growth process. Also discussed are challenges and future strategies in ACRT coupled CZT growth. Successful completion of this work will enable the use of CZT in the next generation imaging systems as well as provide a better foundation for understanding and implementing ACRT in other crystal growth systems.

Academic Showcase Participant
Board Placement: 78

Whole proteome clustering reveals a set of proteins conserved across all recognized bacterial phyla

Primary Author: Ehdieh Khaledian
Faculty Advisor: Kelly A. Brayton , Shira L. Broschat

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
College of Veterinary Medicine
Campus: Pullman

Abstract

The use of computational methods in comparative genomics has become central for studying early evolution and identifying essential genes. With the advent of high throughput sequencing techniques, more complete genomes have become available, and more networks can be constructed and explored. The combination of these networks with powerful network science approaches that allow the analysis of relationships within the networks gives us an unprecedented ability to understand more about organisms and the evolution of life. In this work, we applied Needleman Wunsch semi-global alignment algorithm using pClust software to cluster the complete proteomes from over 400 bacteria using a representational number from each of the 28 recognized bacterial phyla. We created a network of all the organisms and used network science approaches to find the essential genes. We identified 20 proteins that are shared among more than 99% of all the organisms and another 119 proteins that are shared among more than 94% of all the organisms. We postulate that these 139 proteins are evolutionarily conserved, as they are represented across the 28 phyla. Further, we suggest that these proteins are amongst the oldest proteins and are generally essential for life. Furthermore, our results determined there are several important organisms with a low percentage of GC content that are pathogens and Gram-negative and that also have strong connections with organisms from several other phyla. These similarities indicate that these organisms evolved from a common ancestor.

Academic Showcase Participant
Board Placement: 200

Comparison of Fault Current Limitation with Saturable Reactor and Dynamic Voltage Restorer (DVR)

Primary Author: Rabia Khan
Faculty Advisor: Dr. Noel N. Schulz

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

PRINCIPAL TOPIC The topic is "Comparison of Fault Current Limitation with Saturable Reactor and Dynamic Voltage Restorer (DVR)". Increased penetration of the distributed energy sources in the grid and the growth of complex electrical power networks can increase the short-circuit current level of the power system. This increased current level requires upgrading circuit breakers, switches, and other equipment, which can be expensive and cause high copper and switching losses. Fault current limiters are designed to address the impacts of high fault currents. METHOD Two different strategies to limit the fault current using a saturable reactor and a dynamic voltage restorer are investigated. By employing the magnetic saturation property of the core with DC bias control, the reactance inserted into the line is varied based on the fault. Fault current limitation through a saturable reactor is also implemented and compared with a dynamic voltage restorer. The case studies are performed on 1) a radial system and 2) the CIGRE-IEEE low-voltage system for both balanced and unbalanced fault conditions. RESULTS/IMPLICATIONS For the radial system, the fault current limited by saturable reactor has significantly smaller magnitude than the DVR, but for a complex interconnected system, this difference is small. Simulation studies performed in the PSCAD/EMTDC simulation environment show that as a fault current limiter, the saturable reactor limits the fault current faster than the DVR.

Academic Showcase Participant
Board Placement: 152

Co-Design Process Informs Streetscape Design Guidelines

Primary Author: Robert Krikac
Co-Author(s): Kathleen Ryan
Krisandrah Crall

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

College Place, Washington is a suburban community located in central Washington. It has many challenges that are associated with growth, one of which is the architectural character of its main street that defines its "downtown," College Avenue. The City of College Place requested the Rural Communities Design Initiative (RCDI) at WSU work with them to develop design guidelines that would ensure that buildings along College Avenue would: 1) create a "small town" atmosphere, 2) be a setting for a "slow pace of life" and 3) allow for flexibility and innovation. The RCDI, using faculty and students from the design disciplines of the School of Design and Construction, led a series of two co-design workshops where community stakeholders provided input as to the challenges the community is facing as well as specific needs and wants for the character of College Avenue. Co-design is "designing with" rather than "designing for" process. Workshops were informed by preliminary literature reviews and case studies. The major issues identified for the focus of the design guidelines were building design, streetscape design and public place design. The RCDI developed design guidelines that gave the community written and graphic views of how College Avenue could be designed to meet the above goals. Workshops were followed by presentations to Walla Walla University, City of College Place Planning Commission and City Council. Feedback from these presentations was incorporated into the guidelines for adoption by the City.

GPSA Research Exposition Participant
Board Placement: 210

Identifying and modeling the patterns of human activity routines

Primary Author: Beiyu Lin

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

Until recently, many theories of human behavior have been based on self-reported or human-observed information. With the new ability to collect data via sensors, we are able to better understand human behavior by collecting vast amounts of information and analyzing it through pervasive computing- and machine learning-based activity algorithms. The resulting mathematical models open up the possibility of understanding the general principles behind human behavior in everyday environments and the different behavioral norms between subpopulations.

Once differences in patterns are discovered, they can be used to better understand the impact that culture, age, and education have on daily routines. The design of technologies such as agent- and human-oriented software and hardware systems can greatly benefit from this new understanding. Researchers in the fields of sociology, psychology, and anthropology can align their theories more closely with actual human behavior.

Our study focuses on activity timings in 99 smart homes with diverse participants. We identify and model the patterns of daily routines based on the amount of time participants engage in an activity. We find that human daily activities follow certain patterns. This information will help researchers understand the general principles of activity routines and develop more sophisticated models combining other parameters. Eventually, the findings may also be used to automate diagnoses and design customized behavioral interventions.

GPSA Research Exposition Participant
Board Placement: 51

Automated Bayesian Approach for Missing Child Search

Primary Author: Yuchao Ma
Co-Author(s): Krishnamoorthy Sivakumar

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

More than 460,000 entries for missing children were reported annually to National Crime Information Center in 2014 and 2015. Current efforts to recover missing children mainly depend on empirical analysis from the police or relevant law enforcement departments. With a limited time frame for search action but large uncertainty in target's actual circumstance, there is a need to bring in computational approach, to automatically analyze possible situations and to evaluate the outcome of a search plan. This study introduces a framework for optimal search plan construction to maximize the probability of detection. This approach leverages statistical analysis and optimal search theory, to assist the initial search action. It first quantifies the information gathered from target's relatives and witnesses. Then, it estimates the prior distribution of target's moving trajectory and location corresponding to identified search regions. A detection function is defined for each search region, with respect to regional difference and the amount of time cost. This function computes the conditional probability of detecting the target in a given region. The latest searching results are used to update the future time allocation for all the search regions, which aims to achieve the highest posterior probability using Bayesian analysis. We also develop a web-based application for missing child search assistance, to provide visualization and free testing of our framework. To our best knowledge, this is the first attempt to design and develop a framework for missing child search using mathematical modeling and computational approach.

GPSA Research Exposition Participant
Board Placement: 110

Evaluating the Suitability of Existing Approaches to Extract Domain Knowledge from Undocumented Open-Source Projects

Primary Author: Yuzhan Ma

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

An ontology defines the explicit and formal specifications of terms and their relation in a domain. A well-established ontology is a crucial pedagogical tool in terms of knowledge sharing and information reuse. WordNet is an example of general natural language ontology and has been widely used in Software Engineering since most software artifacts are composed of natural language. However, WordNet is not sufficient for domain-specific usage due to the lack of domain-specific entities and relations. There have been existing efforts to address this issue by augmenting WordNet or creating a WordNet-like ontology. However, these approaches heavily rely on the presence of documentation and manual input.

In this paper, we conduct a large-scale empirical study involving 91,351 open-source applications to investigate the availability of documentation during open-source software development. Since over half (53.78%) of the applications do not contain documentation, we evaluate the suitability of existing approaches for automatic extraction of domain concepts and relations on projects without the use of documentation and propose additional heuristics for improvement. The enhanced approach is evaluated on 8 open-source Java applications within the Mathematics domain. We are able to improve the average precision for domain concepts from 35.61% to 53.90% while maintaining a high true positive rate of 73.80%. We are able to improve the average precision for domain relations from 18.28% to 26.45% while maintaining again a high true positive rate of 84.49%. We observe that the size of the applications affects the results.

GPSA Research Exposition Participant
Board Placement: 166

Composites Manufactured from Recycled Wind Turbine Blade Material

Primary Author: Seyed Hossein Mamanpush
Co-Author(s): Azadeh Tavousi Tabatabaei
Karl Engulnd

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Engineering, Physical Sciences, & Environmental Science
Campus: Pullman

Abstract

Energy is one of the most challenging issues for both developed and developing countries throughout the world. To further accentuate these challenges, society is demanding alternatives to fossil fuel based energy sources and the supply for renewable energy, and in particular wind energy has dramatically increased. However, the increasing in wind energy has brought about concern upon the recycling of wind turbine blades (WTB) made primarily of glass fiber composites. Currently, there are no economically viable recycling pathways for damaged or end-of-life WTBs. This research evaluated one of a series of economically viable composite fabrication systems using mechanically recycled wind turbine blade material with a thermoplastic resin. The WTB material was first milled and classified through a range of varying screen sizes, blended with high density polyethylene (HDPE) thermoplastic resin and extruded to a profiled composite. The refined particle size, resin content and coupling agents, both maleic anhydride polyethylene (MAPE) and methacryloxypropyltriethoxysilane (MAOPTES), were assessed for their influence on the properties of recycled composites. Static bending, coefficient of linear thermal expansion (CLTE) and water sorption properties were obtained for all composites. The current research presented that it is feasible and promising to mechanically recycle wind turbine blades to fabricate value-added high-performance composite.

Academic Showcase Participant
Board Placement: 213

Detection of Exomoses using Isotachophoresis on Paper-Based Cascade Channels

Primary Author: Devon McCornack
Co-Author(s): Elizabeth Wells

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Honors College
Campus: Pullman

Abstract

The early detection of cancer in point-of-care (POC) applications is of paramount importance because early detection can lead both improved prognosis and increased survival rates. Cancer cells excrete exosomes that contain pathological information presented by specific protein and miRNA markers of the parental cells. There is potential to use these exosomes for the clinical diagnostics of cancers at their earliest and least detectable stages. However, the lack of a cost-effective approach capable of rapidly isolating and identifying specific exosomes, along with the detection of exosomal markers from clinical samples hampers the any current progress. Current methods are either non-specific, laborious, time consuming, or lack ability to be adopted as a rapid and cost effective POC assay. This study aims to overcome the technical barrier by developing a disposable paper-based cascade isotachophoresis (ITP) technology for rapid exosome isolation and analysis. ITP can potentially concentrate samples by orders of magnitude in minutes with minimal sample consumption. To develop the technique, nitrocellulose membrane papers were used for fabricating cascade paper channels, followed by assembling the channels on a 3D printed cartridge device. For proof of concept, commercial exosome standards were treated and were used for anionic ITP experiments on the paper channel device. Our results showed a significant concentration enhancement of labeled exosomes and successful immune-capture on our paper-based device in less 15 minutes. These studies demonstrated potential use of anionic ITP with using porous membrane paper as transport medium, as a cost-effective POC technique for rapid analysis of disease derived exosomes.

GPSA Research Exposition Participant
Board Placement: 54

A Decomposition Scheme for System Optimal Dynamic Traffic Assignment with Multiple Origins and Destinations

Primary Author: Mehrzad Mehrabipour
Co-Author(s): Ali Hajbabaie

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

PRINCIPAL TOPIC

In this paper, we present a decomposition scheme to parallelize the System Optimal Dynamic Traffic Assignment (SODTA) problem by origin-destination pair. The proposed methodology can efficiently capture traffic realism, including such features as queue properties, signalized intersections, turning movements, spillback, and shockwave propagation. The approach can also decrease the computational efforts of central optimization approaches substantially.

METHOD

Each origin-destination pair as an independent sub-problem is assigned to an isolated computing power. The proposed methodology is based on the Dantzig-Wolfe decomposition algorithm. We use the SODTA formulation structure to divide the set of decision variables into several smaller sets by creating a master problem and several sub-problems. Each sub-problem is an optimization for one origin-destination pair. The interactive flow of different origin-destination pairs and cohesion (coupling) between sub-problems is considered in the master problem. This scheme reduces the computational complexity of the SODTA problem and creates the possibility of finding the optimal routes for any number of origin-destination pairs.

RESULTS/IMPLICATIONS

The proposed approach was tested on a case study of 20 intersections. The results show the decomposition algorithm converges with the optimal solution in fewer iterations compared to those in the convergence of the Simplex algorithm with the optimal solution. The decomposition algorithm can be stopped at any iteration, qualified, and run later in contrast to the simplex algorithm. Furthermore, adding more origin-destination pairs does not change each sub-problem's optimization for single origin-destination pair. The addition of these pairs only increases the number of sub-problems for single origin-destination pairs.

Academic Showcase Participant
Board Placement: 209

Real-time and adaptive traffic metering in connected urban street networks

Primary Author: Rasool Mohebifard
Faculty Advisor: Ali Hajbabaie

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Previous research has shown that proper metering of entry traffic to urban street networks, similar to metering traffic on on-ramps in freeway facilities, reduces traffic congestion, especially in oversaturated flow conditions. Building on previous research, this paper presents a real-time and scalable methodology for finding near-optimal metering rates dynamically in urban street networks. The problem is formulated into a Mixed-Integer Linear Program (MILP) based on the Cell Transmission Model (CTM). We propose a distributed optimization scheme that decomposes the network level MILP into several link-level MILPs to reduce the complexity of the problem. We convert the link-level MILPs to linear programs to reduce computational complexity further. Besides, we create distributed coordination between link-level linear programs to push solutions towards optimality. The distributed coordination and optimization solution algorithm is incorporated into a rolling horizon technique to account for stochastic demand and capacity and to further to reduce the computational complexity. We applied the proposed solution technique to a number of case studies and observed that it was scalable and real-time, and found solutions that were at most 2.2% different from the optimal solution of the problem. Like previous studies, we found significant improvements in network operations as a result of traffic metering.

Academic Showcase Participant
Board Placement: 180

A Non-Contact Method for Real-Time Monitoring of Conductor Sag and Average Core Temperature

Primary Author: Monish Mukherjee
Co-Author(s): Robert Olsen
Faculty Advisor: Dr. Robert G. Olsen

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

The amount of power carried by a high voltage transmission line is proportional to its voltage (essentially fixed by the design) and its current. Hence, the power (for many lines) is limited by the current flowing through the conductors. Excessive current produces excessive heating of the wires that may result in annealing, premature aging of components and/or excessive sag that may result in violations of safety standards. The purpose of this work is to validate a simple inexpensive non-contact method to accurately measure the conductor sag and hence indirectly measure the average conductor core temperature. Sag can be used to know whether the line power transfer limit has been reached. The method involves measurement of the space potential (amplitude and relative phase) near the transmission line conductor. The reason why this is attractive is that space potential is dependent upon the voltage of the transmission line (remains approximately constant) and geometry of the line with respect to earth. Hence, changes in sag cause changes in the space potential. The key to the new idea is to measure space potential in such a way that the measurement is sensitive enough to small changes in sag. This is achieved by placing a pair of space potential probes at two points symmetric with respect to the centerline so that the phase difference between the two points is 180-degrees. With this arrangement, it is possible to detect small changes in sag with relatively simple instrumentation. The method has been validated both theoretically and experimentally.

Academic Showcase Participant
Board Placement: 174

A Graph-theoretic Framework for Electric Power Distribution System Service Restoration

Primary Author: Shiva Poudel
Co-Author(s): Anamika Dubey
Faculty Advisor: Anamika Dubey

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Distribution system restoration (DSR) aims at restoring the service after a fault to the maximum number of customers while ensuring the satisfaction of critical system operating constraints. DSR is essentially a system reconfiguration technique that selects a combination of normally-open and normally-closed switches to obtain a new radial topology that optimizes a desired performance criterion related to service restoration. The problem is defined as obtaining an optimal switching sequence to transfer the interrupted loads in the out-of-service areas using backup feeders. Given the combinatorial nature of the associated search problem, the existing literature use either heuristic methods or present non-linear mixed integer models for DSR, both computationally intensive for a large distribution system. This work presents a graph-theoretic distribution system restoration strategy that maximizes the restored load by formulating the restoration problem as a mixed-integer linear program (MILP) while incorporating critical system connectivity and operating constraints. The novelty lies in variable selection and transformation that help incorporate integer decision variable with the continuous power flow variables. Simulation results presented using IEEE-37 node distribution system and multi-feeder test case demonstrate the effectiveness of the proposed approach.

Academic Showcase Participant
Board Placement: 89

Mapping stability of XYB14 crystal family by using materials informatics methods

Primary Author: Irmak Sargin
Faculty Advisor: Scott P. Beckman

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

The boron-rich XYB14 crystal family has a wide band gap, high hardness, excellent thermal stability, and high Seebeck coefficient making it a potential candidate as a high-temperature thermoelectric material. In this work, the detailed archived quantum mechanical data from the literature are collected and analyzed using material informatics methods. The gaps in the collected data are predicted by regression methods within the limits of uncertainty of the original data. Using the models trained for patching the data, we predicted quantum based materials properties, including the effective charge transferred and energy of formation, using bulk chemical attributes alone for 1681 compounds with 41 different elements. The stability of the compounds is mapped without the need for highly-detailed, time-consuming calculations. This approach reduces the overall accuracy but allows for a rapid screening of predicted quantum based material properties. In addition, by subdividing the data, we are able to isolate relevant chemical parameters to gain scientific understanding.

Academic Showcase Participant
Board Placement: 73

Nanocrystalline metal-organic frameworks/carbon nanotubes composites as catalytic cathode materials for lithium-oxygen batteries with long cycle life

Primary Author: Min Kyu Song

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

To meet the needs of emerging technologies such as all-electric vehicles with a long drive range, there are now strong motivations for the development of high-energy rechargeable batteries, so called "beyond lithium-ion batteries." Among these batteries, lithium-air (Li-O2) batteries have received much attention owing to their five times higher theoretic energy density (ca. 3500 W h/kg) than that of lithium-ion batteries. However, Li-O2 batteries still suffer from several challenges that hinder their practical applications, including low energy efficiency, short cycle life, and poor rate capability. To improve the performance of Li-O2 batteries, much effort has been devoted to searching for new catalytic cathode materials to promote oxygen reduction/evolution reaction (discharge/recharge) kinetics, which is crucial to lowering overpotential and improving the reversibility. Metal-organic frameworks (MOFs), a novel type of crystalline porous materials, are built with metal nodes and organic linkers. Herein, we report the nanocrystalline MOFs directly grown on carbon nanotubes (nMOFs@CNTs) as novel catalytic cathode materials for Li-O2 batteries. The direct growth of MOFs on CNTs can enhance the electronic conductivity as well as mitigate the agglomeration issues of MOFs nanoparticles, making these hybrid materials uniquely suitable for the applications of electrocatalysis. The as-prepared nMOF-74@CNTs hybrid cathodes showed improved cycling performance of Li-O2 batteries. We have also investigated the effects of chemically unsaturated and various redox-active metal sites on the catalytic performance in Li-O2 batteries. The fundamental mechanism of how MOFs enhance the performance of Li-O2 batteries was also investigated.

Academic Showcase Participant
Board Placement: 129

Development of High-Speed Sintering 3D Printing Machine

Primary Author: Hua Tan
Co-Author(s): Huicong Jiang
Amit Avhad

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Vancouver

Abstract

High-Speed Sintering (HSS) is a newly invented powder-based additive manufacturing process, where a thermal radiation absorbent ink is selectively printed on the surface of a powder layer using the inkjet technology followed by the sintering of powder with infrared lamps. HSS uses a low-cost energy source to sinter the desired area of the powder layer in one swath, greatly increasing the manufacturing throughput and dramatically reducing the production cost. The in-house developed HSS printer is based on an open-source binder jetting 3D printer, but incorporates an IR lamp to facilitate the sintering process. Initial testing consisted of checking/adjusting temperatures by raising or lowering the voltage input to the heater beds, checking sintering times in correlation to IR lamp distance from the bed, and optimizing the layer thickness. Our preliminary testing has shown that temperature control during the printing process is critical to the part quality. If the temperature of the material falls below the crystallization temperature, the printed part will warp. Because of the convective heat loss caused by current lid design, it was necessary to automate the printing process to achieve thicker prints. Automation allowed the process to be completed faster, which maintained the temperature of the top of the material. Further research will focus on how varying the amount of ink used for the print affects the material properties and how to minimize the dislocation of powder from the impact of the ink droplet.

Academic Showcase Participant
Board Placement: 34

Beta-Lactam multidrug resistant (MDR) modifications to the bacterial membrane of Escherichia coli as observed by atomic force microscopy

Primary Author: Samuel Uzoechi
Faculty Advisor: Nehal Abu-Lail

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

The world is intensely facing the growing health threat of infections caused by multidrug-resistant (MDR) microbes. β-lactam antimicrobial agents have been extensively used against most bacterial infections and as such, Gram-negative bacteria like E. coli have developed resistance to them. To combat MDR, fundamental understanding of how a bacterial cell alters its membrane's functionality to enable the mechanisms discussed above for improved resistance is needed. Here, atomic force microscopy (AFM) was used to probe the morphology, elasticity, roughness, and adhesion of four domestic MDR-E. coli bacterial strains that varied in their MDR abilities. In addition, macroscopic measurements of the abilities of these strains to form biofilms were performed. Three of the four strains arbitrarily labeled (D4, A9 and H4) elongated themselves in the presence of ampicillin. This elongation was associated with increased surface area, rougher surfaces of cells, longer biopolymer brushes, higher nanoscale adhesion and biofilm formation. All the above combined facilitated the MDR through enhanced biofilm formation and reduced bacterial permeability. In the fourth strain (A5), the opposite was observed in all the properties mentioned above. Cells displayed reduced surface areas, demonstrated anti-adhesion properties and reduced biofilm formation. Furthermore, the cells collapsed their bacterial surface biopolymers resulting in shorter biopolymer brushes on their surfaces and stiffer cells. The above collapsed biopolymers on cells' surfaces inhibited nutrients' diffusion to cells and resulted in the MDR for that bacterial strain. This investigation provides a proof-of-concept that AFM can provide mechanistic information on how bacterial cells respond to -lactams and develop MDR.

GPSA Research Exposition Participant
Board Placement: 208

CP-SAM –Cyber-Physical Security Assessment Metric

Primary Author: Venkatesh Venkataramanan
Co-Author(s): Adam Hahn
Anurag Srivastava

Primary College/Unit: Voiland College of Engineering and Architecture
Category: Administrative & Information Sciences
Campus: Pullman

Abstract

Recent cyber-attacks have been of increasing complexity and sophistication. These cyber-attacks, when targeted towards critical infrastructure such as the power grid can have a devastating impact. The concept of resiliency is gaining more importance as it is important for the power grid to withstand and adapt to such contingencies. In order to understand the impact of cyber-attacks, it is important to consider a holistic cyber-physical system with various layers, and the data generated by them. A cyber-physical metric considering security vulnerabilities, system model, and other factors is proposed.

The cyber-physical system typically consists of a physical layer, a communication layer, a management/application layer, and various devices associated with these layers. The system properties from all these different layers, and the data generated by them are combined using decision making techniques to compute a resiliency metric. Cyber-physical resiliency does not have a standard definition as yet, and decision making techniques such as Choquet Integral will help system operators prioritize different criteria involved in determining resiliency, and create a metric that will enable better visibility and control of the power grid.

The metric will be a valuable asset for (i) comparing the power-grid architectures during the offline design process; and (ii) online decision-making to select optimal countermeasures to drive the power grid towards tolerating adverse events. Use cases inspired by the Ukraine cyber-attack, Netflix's Chaos Monkey tool (for random failures), and other scenarios will be presented to demonstrate the usefulness of the metric.

Academic Showcase Participant
Board Placement: 124

Engaging Museum Visitors: Theatricality in Exhibition Design

Primary Author: Carrie Vielle
Co-Author(s): Jaime Rice

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

Memorable viewer engagement in today's museum environments has become a chief goal of museum curators and exhibition designers. The roles of "theater" and "entertainment" have been reconsidered as paramount design principles necessary for exhibit designers to complete dynamic programs to document historic events and material culture. This research explores how environmental conditions and display strategies relative to theatricality can affect a viewer's experience. WSU Interior Design and Exhibition Studies students participated in a week-long study tour of museums and monuments in New York City. Prior to departure, students engaged in selected readings, class discussions, and film screenings that addressed 1) the necessity for preservation of cultural memory and artifacts, and 2) common strategies and environmental factors "controlled" by today's museum exhibition teams to capture and hold visitor's attentions. While on site, students toured key museums and met with experts in the field of museum exhibition design to discuss their philosophies, best practices, and strategies for employing theatricality while avoiding sensationalism in their exhibit programs. Students completed analytical comparisons between notable exhibition displays and drew conclusions as they relate to success of viewer experience. Evaluating pre-departure and post-experience surveys, together with analyzing the students' observational and experiential comparisons of exhibits, reveals new understanding of environmental controls involved in exhibit design and the strategies for employing theatricality into an exhibit to promote visitor engagement.

Academic Showcase Participant
Board Placement: 204

From Carbohydrates to Phenol-rich Bio-oil Integrated with Syngas Production via Catalytic Pyrolysis over Activated Carbon Catalyst

Primary Author: Yayun Zhang
Faculty Advisor: Hanwu Lei

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Tri-Cities

Abstract

The catalytic pyrolysis of glucose over phosphoric acid-activated carbon catalyst (ACC) was investigated to obtain phenol-rich bio-oil and syngas production in a facile fixed-bed reactor for the first time. A central composite experimental design (CCD) was used to optimize the reaction condition. The effects of reaction temperature and catalyst to reactant ratio on product yields were investigated. The main chemical compounds of catalytic bio-oils were phenols, ketones and anhydrosugers, in which phenols were ranged from 4.8 to 100 % depending on different reaction conditions. The highest concentration of phenol in bio-oils was achieved at the reaction temperature of 450 °C with catalyst to reactant ratio of 1. Carbon monoxide, carbon dioxide, methane and hydrogen were the main gas fractions in gaseous products, where high concentrations of carbon monoxide (50.2 %) and hydrogen (9.2 %) could be attained. Additionally, catalytic pyrolysis of cellulose with various catalyst to reactant ratio at reaction temperature of 450 °C was also investigated and the results exhibited similar phenomenon to those of glucose. A high selectivity of phenols (96.7 %) could also be achieved intergraded with high concentration of carbon monoxide (42.1 %). The mechanism of phenol generation was studied and the "phenol pool" was proposed to describe catalytic function of ACC in catalytic converting volatiles to phenols. Our findings suggest that the catalytic pyrolysis of renewable and earth-abundant carbohydrates over ACC might provide a novel and viable route to generate high-purity phenols to ultimately advance the utilization of biomass energy.

Academic Showcase Participant
Board Placement: 8

Control of Future Electric Power System With No Conventional Power Plant

Primary Author: Saleh Ziaieinejad
Faculty Advisor: Ali Mehrizi-Sani

Primary College/Unit: Voiland College of Engineering and Architecture
Associated College(s)/Unit(s): Voiland College of Engineering and Architecture
Campus: Pullman

Abstract

An electric power system includes several power plants, transmission lines, and loads (consumers). Conventional power plants use the energy from a fuel to rotate a turbine that is coupled to an electric generator. The terminals of the generator are connected to the transmission lines via power transformer interfaces. The trend of modern power systems is to replace conventional power plants with renewable energy?based power plants. These new power plants use energy from a renewable source (e.g., solar panel or wind turbine) and are interfaced to the transmission lines via a power electronic converter. The controller of an electric power system guarantees that the system is stable, the load voltages are within standard ranges, and the load power is provided by the power plants. These controllers work on the basis of shaping the behavior of the electric generators of the conventional power plants. These controllers work effectively if a major share of the power is provided by the conventional power plants, which is still the case in most electric power systems. In future power systems, however, most of the power is provided by renewables?based power plants. Therefore, the power systems will require new controllers. In this project, we are working on a power system that is exclusively powered by renewables and batteries. We propose new controllers that provide power for the loads, control the voltage of the power system, maintain the system frequency at 60 Hz, and guarantee that the power plants work within their safe limits.

INDEX BY LAST NAME

INDEX BY LAST NAME

INDEX BY LAST NAME

INDEX BY LAST NAME

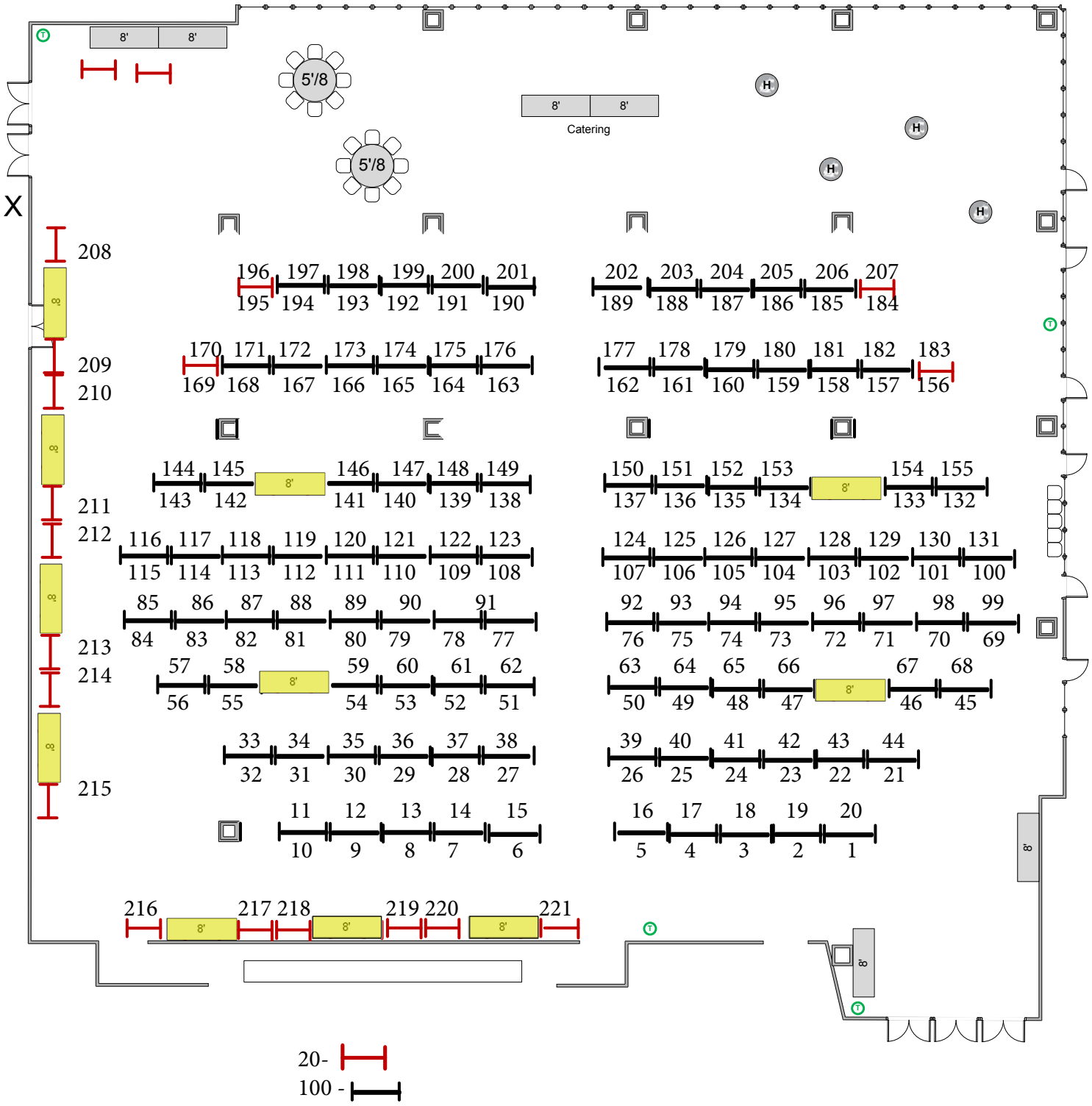
INDEX BY COLLEGE

** Denotes GPSA Research Exposition Participant*

INDEX BY COLLEGE

** Denotes GPSA Research Exposition Participant*

SHOWCASE 2018



SHOWCASE | WSU

Special thanks and acknowledgement to committee members responsible for planning the 2018 Showcase and GPSA Research Exposition events.

Showcase Steering Committee	Academic Showcase Committee	GPSA Strategic Planning & Scholarship Committee
Kelly Ward, Chair	Mary Sanchez Lanier, Chair	Jing Sun, Chair
Trevor Bond	Nehal Abu-Lail	Adesanya Adekunle
Doug Call	Amit Bandyopadhyay	Ruiying Cai
Phyllis Erdman	Sukanta Bose	Yu-Chung Chang
Chris Hoyt	Jim Brozik	James Hoopes
Mary Sanchez Lanier	Patricia Butterfield	Mehrzad Mehrabipour
Jenny LeBeau	Christina Chi	Kaylee Rose
Kristina Peterson-Wilson	Phyllis Erdman	
Mary Rezac	Hanjo Hellmann	
Molly Schotzko	Jonathan Jones	
Horace Alexander Young	Dave Kim	
	Laura Lavine	
	Ray Lee	
	Alex Merrill	
	Steve Simasko	
	Anurag Srivastava	
	Lori Wiest	
	Greg Yasinitsky	

VOX POPULI GPSA

GRADUATE & PROFESSIONAL STUDENT ASSOCIATION