Online Proceedings

Poster Session 1

Commons West, Easel 12

11:00 AM to 1:00 PM

Impact of Racial Differences between School Staff and Mental Health Clinicians on School Evidence-Based Practice Climate

Tiffany Y. Wang, Senior, Psychology
Mentor: Aaron Lyon, Psychiatry and Behavioral Sciences
Mentor: Chayna Davis, Psychiatry and Behavioral Sciences
Mentor: Jessica Coifman, SMART Center - Psychiatry & Behavioral Sciences

Many children in the United States experience mental health issues that impact their performance in school. Evidence-based practices (EBP) have demonstrated effectiveness at improving student outcomes for students impacted by their mental health. However, many factors affect the successful implementation of these programs. Mental health services, particularly those for youths with the most mental health needs, typically involve multi-organizational processes to implement EBP. The Inter-Organizational Alignment study strives to examine these multi-organizational frameworks, and how they impact the school mental health services provided. The research study examined the association between race and the degree of inter-organizational alignment on climate for EBP implementation. Researchers surveyed 28 school mental health clinicians and 57 school staff in the states of Washington and Minnesota. The sample included 22 white or Caucasian participants and 14 non-white participants. Non-white participants were either American Indian or Alaskan Native, Asian, Black or African American, multiracial, or other. Implementation climate of EBP in school settings was rated on a Likert scale of 0 (not at all) to 3 (great extent) on a standard, multi-item scale. Researchers evaluated schools on a range from an open and positive implementation climate to a closed and negative implementation climate. The degree of alignment was determined between clinician and school staff scores, with misalignment defined as a difference of one standard deviation. Quantitative analysis of the results suggested more alignment in implementation climate between clinician and school staff of different races, which suggests that racial factors impact EBP implementation in racially diverse environments. An independent t-test determined that these differences were statistically significant. Consequently, these findings suggest that EBP may be impacted when implemented by more diverse organizations.

Session 1E

Animal Behavior, Ecology, and Evolution

Session Moderator: Luke Tornabene, School of Aquatic and Fishery Sciences and the Burke Museum of Natural History and Culture

MGH 231

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Assessing Variation in Reliance of Brown Bears (*Ursus arctos*) on Pacific Salmon as Food in the Lake Aleknagik Ecosystem Using Stable Isotope Signatures

Hyejoo Ro, Senior, Aquatic & Fishery Sciences
Mary Gates Scholar, UW Honors Program
Mentor: Thomas Quinn, Aquatic & Fishery Sciences
Mentor: Aaron Wirsing, Environmental and Forest Sciences
Mentor: Jenny Stern, SAFS

Many environmental factors can influence foraging strategies of predators, such as availability of prey sources. Brown bears feed on many species of animals and plants but Pacific salmon are especially important to their diet. For example, brown bears in the Lake Aleknagik, Alaska ecosystem forage on sockeye salmon as well as other food items. Direct observations and motion-activated cameras have documented bears foraging on salmon but do not reveal variation among individual bears. This study used the distinctive carbon and nitrogen isotope signatures in salmon as a way to assess brown bear diet by processing samples of bear fur collected during the salmon spawning season. As fur sample collection is noninvasive, it provided the opportunity to "resample" bears (individually identified by DNA analysis) multiple times within a season and over the course of multiple seasons. This study demonstrated how various factors, including salmon availability, gender, and location, influence the extent of bear consumption of salmon over time. Understanding the association between brown bear diet and these factors can provide better insight into the importance of both sockeye salmon and alternative food sources to brown bears.

SESSION 1E

ANIMAL BEHAVIOR, ECOLOGY, AND EVOLUTION

Session Moderator: Luke Tornabene, School of Aquatic and Fishery Sciences and the Burke Museum of Natural History and Culture

MGH 231

12:30 PM to 2:15 PM

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Behavioral Response of Brown Bears (*Ursus arctos*) to Non-Invasive Hair Collection Methods

Katherine Anne Wold, Senior, Aquatic & Fishery Sciences
Mentor: Thomas Quinn, Aquatic & Fishery Sciences
Mentor: Aaron Wirsing, Environmental and Forest Sciences

The foraging patterns and populations of predators can provide a better understanding of the nutrient dynamics in ecosystems. Brown bears (*Ursus arctos*) are a particularly difficult species to study. However, brown bears are a key predator species to study due to their close relationship with Pacific salmon (*Oncorhynchus spp.*) populations. Noninvasive methods like hair collection and camera traps are emerging as effective ways to study brown bear populations, diet, and behaviors. This study aims to determine whether the use of these methods in the Wood River system (Aleknagik, AK) are unbiased and characteristic of the resident brown bear population. The data used in this study are part of a long-term study (beginning in 2012) taking place in this area involving brown bear predation on sockeye salmon (*Oncorhynchus nerka*) and other population studies. Using video footage from the 2016 field season, this study analyzes brown bear reactions and avoidance of the barbed wire used to collect hair samples. Expected results are a higher frequency of wire avoidance in adult bears, single bears, during daylight, and equal frequency of avoidance between creeks. The results of this study can establish whether these methods of studying bear populations are accurate, or if they need to be modified to collect more inclusive and representative data. Further study is required to develop a comprehensive appreciation for brown bear populations, habitat use, and other behavioral patterns.

SESSION 1K

PHYSICS: FUNDAMENTAL AND APPLIED

Session Moderator: Alejandro Garcia, Physics

MGH 254

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Effect of Wall Condition on Spheromak Plasma Density Profile on HIT-SI3

Kuan Wei Lee, Junior, Physics: Comprehensive Physics
Mary Gates Scholar
Mentor: Aaron Hossack, Aeronautics and Astronautics

HIT-SI, also know as steady-inductive helicity-injected torus experiment, uses three coplanar inductive helicity injectors to form and sustain a spheromak equilibrium. Spheromak is a configuration of the plasma that forms into a shape of smoke ring and it is a promising approach to nuclear fusion energy based on its long confinement time and the confinment achieved by the self-induced current. This project is centered around data analysis from a new tomography diagnostic system to assess the symmetry of spheromak plasma density while varying the key current drive parameters of the HIT-SI3 plasma physics and fusion energy. The tomography diagnostic system consists of four toroidal chord fans and three sets of three poloidal fans that provide 3D plasma emission information. Each fan expands from 130 degree wide angle lenses coupled to bundles of fiber optics. The light collected by the fiber optics is split, filtered at 668 nm and 728 nm, and imaged by a high-speed camera. Since the ratio of the 668/728 nm emission has a strong plasma density dependence within the range of typical HIT-SI3 plasma parameters, the 3D emissivity profile constructed by inverting line-averaged emissivity along chords can be related to the plasma density profile. The objective of this project is to find the correlations between parameters affecting wall conditioning and the plasma density profile, then use the results from the analysis to maximize the performance of the plasma toward the goal of improving confinement. The initial analysis will include all available data covering a variety of experimental plasma conditions. After the correlation is established from the initial analysis, a series of carefully controlled experiments will be conducted to test and improve the certainty of the initial results. In the controlled experiments, plasma discharges will be taken under more specific settings so the effects of different conditions on the plasma profile can be isolated and better understood.

POSTER SESSION 2

Balcony, Easel 97

1:00 PM to 2:30 PM

Optimized Expansion Microscopy through Thermally Facilitated Digestion

Jonathan Bryce (Jon) Perr, Senior, Biochemistry
Mary Gates Scholar, UW Honors Program
Mentor: Joshua Vaughan, Chemsitry
Mentor: Aaron Halpern, Chemisty

In recent years, researchers have dedicated much effort to

overcoming the ˜250 nm spatial resolution limit of light in order to reveal biological details that have been obscured by diffraction. A new form of super-resolution microscopy called expansion microscopy (ExM) relies on physically expanding a fixed specimen in a swellable hydrogel polymer and offers a simple, inexpensive approach to achieving ˜70 nm resolution with conventional confocal microscopy. A critical and understudied step in this process is the homogenization of the embedded sample by proteolytic enzymes, enabling artifact-free expansion. However, in large and complex samples like Drosophila, enzymatic digestion is time-consuming and sensitive to experimental parameters such as fixation, hydrogel composition, and tissue type. To overcome the limitations of enzymatic digestion, I have explored parameter space for rapid peptide cleavage using air-tight stainless-steel vessels to achieve high temperatures and pressures not typically accessible in the lab. Additionally, a small-molecule digestion agent, dimethoxyiodobenzene, was tested in order to provide site-specific peptide cleavage and enhance tissue homogenization. The modified digestion process was first validated using standard immunofluorescent microtubules in cell culture. Next, Drosophila tissue was treated using thermal digestion to confirm the applicability of this technique in robust, difficult-to-expand tissues. This improved ExM protocol holds the potential to increase sample throughput, reduce expansion-related sample distortions, and extend ExM to be applicable to a wide range of previously incompatible tissues types, enabling pathologists to better analyze and assess diseases in human tissues.

POSTER SESSION 2

Balcony, Easel 120

1:00 PM to 2:30 PM

Virtual Environments in Stroke Rehabilitation

Alvin B. Duong, Senior, Biology (Bothell Campus)
Mentor: Pierre Mourad, Neurological Surgery
Mentor: Aaron Bunnell
Mentor: Nina LaPiana, STEM, UW Bothell

Through the use of virtual and augmented reality technology, we want to record clinical interactions within the respective environments on acute stroke patients to help us design more acceptable gaming technologies for a wide range of ages and backgrounds in future studies. With the combined efforts of the computer science and electrical engineering team, we were able to produce two games; "Dolphin Days" for the augmented reality environment and "Apollo" for the virtual reality environment. "Apollo" will be available for play during the duration of the symposium. The purpose of exposing patients to these environments is to promote neuroplasticity in the recovery process. Neuroplasticity is when the brain can reform or grow new nerve endings to reconnect with the affected areas in order to accomplish a function. Clinically, our experience has been that patient motivation is key to obtaining good clinical outcomes. Stroke rehabilitation therapies can often be tedious and difficult to maintain interest in. These types of interventions, by incorporating the desired exercises into a motivating and game-like environment, could potentially address this issue. Additionally, these systems offer the potential advantage of not requiring the immediate presence of a skilled occupational and physical therapist. Cost and insurance limitations often mean patients get a limited number of skilled therapy sessions. Therapists skilled in the rehabilitation of stroke are often less available in rural regions and patients often struggle to travel to therapy appointments. All of these factors limit the patient's overall access to skilled therapeutic interventions. Our results found the overall patient census enjoying the environments while also having them engaged with the technologies. We believe using these technologies would further motivate patients undergoing stroke therapy to continue participation and ultimately reach a state where the patient feels confident physically and mentally to resume their daily tasks pre-stroke.

POSTER SESSION 3

Balcony, Easel 97

2:30 PM to 4:00 PM

Characterization of the *Sinorhizobium meliloti* HslUV and ClpXP Protease Systems in Free-Living and Symbiotic States

Jacqueline Marie Mc Aleer, Junior, Pre-Sciences
Mentor: Michael Kahn, Institute of Biological Chemistry, Washington State University
Mentor: Aaron Ogden, Integrated omics, Pacific northwest national labs

Symbiotic nitrogen fixation (SNF) in the interaction between the soil bacteria *Sinorhizobium meliloti* and legume plant *Medicago sativa* is carried out in specialized root organs called nodules. During nodule development, each symbiont must drastically alter their proteins, transcripts and metabolites in order to support nitrogen fixation. Moreover, bacteria within the nodules are under stress, including challenges by plant antimicrobial peptides, low pH, limited oxygen availability, and strongly reducing conditions, all of which challenge proteome integrity. *S. meliloti* stress adaptation, proteome remodeling and quality control are controlled in part by the large oligomeric protease complexes HslUV and ClpXP1. To improve understanding of the roles of *S. meliloti* HslUV and ClpXP1 in free-living conditions and in symbiosis with *M. sativa*, we generated ΔhslU, ΔhslV, ΔhslUV, and ΔclpP1 knockout mutants. Shoot dry weight of *M. sativa* plants inoculated with each deletion mutant was significantly reduced, suggesting a role in symbiosis. Further, slower free-living growth of ΔhslUV and ΔclpP1 suggest HslUV and ClpP1 were involved in adapting to heat stress, while ΔhslU

and ΔclpP1 mutants were sensitive to kanamycin. All deletion mutants produced less exopolysaccharide and succinoglycan, as shown by replicate spot plating and Calcofluor binding. We also generated endogenous C-terminal eGFP fusions to HslU, HslV, ClpX and ClpP1 in *S. meliloti.* Using anti-eGFP antibodies, native coimmunoprecipitation experiments of proteins from free-living and nodule tissues were performed and analyzed by mass spectrometry. The results suggest HslUV and ClpXP were closely associated with ribosomal and proteome quality control proteins, and identified several novel putative protein-protein interactions.