SESSION 1M

NEURONAL PLASTICITY
Session Moderator: John Neumaier, Psychiatry  
284 MGH  
12:30 PM to 2:15 PM
* Note: Titles in order of presentation.

The Effect of Control on Tasks Involving Automatic Processing  
Sandrine Girard, Senior, Psychology  
UW Honors Program  
Mentor: Chantal Prat, Psychology  
Mentor: Theresa Becker Zolnikov, Institute for Learning and Brain Sciences

Bilinguals outperform monolinguals in tasks measuring executive functions; particularly, in tasks that measure inhibition and flexible behavior (e.g., task-switching), all of which require increased top-down control. One interpretation of this advantage in performance is that bilinguals may approach tasks in a top-down (goal-driven) manner, and given improved performance in certain tasks, top-down control is typically viewed as beneficial. Only one study has investigated the possibility that increased top-down control may result in a cost in terms of the influence on bottom-up (automatic, non-goal-driven) processing. To further explore the potential cost of top-down control on bottom-up processing, this experiment investigated patterns of semantic priming in 50 monolinguals and 50 early bilinguals across three experiments in which the amount of top-down control required varied systematically. If bottom-up processes are impaired as a function of top-down control strategies, we hypothesized that bilingual individuals, who recruit more top-down processes, will exhibit fewer baseline semantic priming effects, and that all participants will exhibit less semantic priming as the top-down requirements of the tasks increase. The lexical decision task was used in isolation to measure baseline differences in automatic, semantic priming between monolinguals and bilinguals. An additional, task-switching paradigm, in which participants either performed a lexical decision task or decided whether the first letter of a word was between A-L or M-Z was created to engender a more top-down approach. Finally, a dual task in which participants identified changes in auditory tones while making lexical decisions, was used to attempt to decrease any top-down influence on the lexical decision task. Preliminary analysis of the data suggests that priming did not change as a function of task or language group. I will discuss the implications of this research for understanding individual differences in executive functioning.

SESSION 1S

NOVEL APPROACHES TO CONSERVATION
Session Moderator: Bonnie Becker, Interdisciplinary Arts & Sciences (Tacoma Campus)  
026 JHN  
12:30 PM to 2:15 PM
* Note: Titles in order of presentation.

Shifts in Energy Allocation in Response to Changes in the Environment in Mytilus trossulus  
Michelle M. (Michelle) Mc Cartha, Senior, Environmental Science, UW Tacoma  
Mary Gates Scholar  
Mentor: Kenneth Sebens, Biology, SAFS  
Mentor: Emily Carrington, Biology  
Mentor: Bonnie Becker, Interdisciplinary Arts & Sciences (Tacoma Campus)  
Mentor: Laura Newcomb, Biology

As intertidal communities face predicted increases in temperature and hydrodynamic disturbances due to climate change, organisms may find it necessary to reallocate energy among normal physiological processes for survival. Specifically, mussels must distribute energy among processes such as attachment, shell growth, metabolism, and reproduction, all of which may be influenced by seasonality and other natural environmental fluctuations (temperature, pCO2, etc.). Examining energy distributions is the first step in predicting responses to environmental change. In the present study, we investigated the energetic cost of byssus production for the intertidal mussel Mytilus trossulus. After performing an initial pilot study to establish methods for manipulating byssal threads (ie. daily, weekly, never), we exposed collected mussels to each treatment in triplicate for a four-week period. We then assessed the energetic cost associated with byssus production in relation to energy allocated...
to other processes such as growth and development. For all measures (length, width, height, shell mass, etc.), forcing the mussel to produce more byssus resulted in a decrease in growth rate; this was significant for length and shell mass. For this study, activities for making longer shells were first to be forfeited as mussels were manipulated into manufacturing greater amounts of byssus during a season where developing reproductive structures were of highest priority. This research identifies byssus production as a major energetic constraint in mussels, which play an important role both economically through aquaculture as well as in intertidal marine ecosystems. As these globally marketed shellfish are placing more amounts of energy towards byssus production, less energy is available for growth. Coupled with modeling predictions, this information could be useful for aquaculture practices as well as understanding physical changes mussels undergo in response predicted climate change.

**Poster Session 2**
Commons East, Easel 58
1:00 PM to 2:30 PM

**Mobilization of Blasts and Leukemia Stem Cells by Anti-CXCR4 Antibody BMS-936564 (MDX 1338) in Patients With Relapsed/Refractory Acute Myeloid Leukemia**

Lauren Beyerle, Junior, Biology (Physiology)
UW Honors Program
Mentor: Pamela Becker, Medicine

Acute myeloid leukemia (AML) is a heterogeneous clonal disorder of hematopoietic progenitor cells, also known as “blasts,” that fail to both differentiate normally and properly respond to normal proliferation regulators. The consequences include possible organ infiltration as well as impairment of normal blood cell production that can result in fatal infection or bleeding. Retention of leukemia cells within the bone marrow microenvironment enables survival from chemotherapy treatment. This retention is largely mediated by surface membrane receptors, such as the chemokine receptor CXCR4. CXCR4 facilitates cellular migration towards high concentrations of the stromal derived cell factor CXCL12 (SDF-1), a chemokine that is released from bone marrow stromal cells. A CXCR4 small molecule inhibitor, plerixafor, has been shown to improve response to chemotherapy treatment in murine leukemia models, by disrupting interactions with the microenvironment, releasing leukemia cells into the bloodstream, and conferring sensitivity to chemotherapy. Our objective was to assess the functionality of an anti-CXCR4 antibody, BMS-936564, to similarly enhance chemotherapy cytotoxicity. We assayed CXCR4 expression by the leukemia blasts and stem cells, observed the time course of mobilization of leukemic blasts and stem cells, and examined the induction of programmed cell death (apoptosis) in patient samples through analysis for Annexin V expression. Mobilization of leukemia blasts and stem cells was monitored by flow cytometry. We found a significant correlation between CXCR4 expression by leukemic blasts and patient response to therapy, with high CXCR4 expression (≥20%) linked to complete remission (p<0.05). It is intuitive that the antibody to CXCR4 would require CXCR4 to be expressed by blasts. These data provide a method to predict outcomes for patients undergoing combination treatment with anti-CXCR4 antibody and chemotherapy. Our ultimate objective is to overcome adhesion mediated chemotherapy resistance in order to improve outcomes for patients with AML.

**Poster Session 3**
Commons West, Easel 12
2:30 PM to 4:00 PM

**Effect of Fluoroquinolone and β-Lactam Antibiotic Classes on Neurological Outcome Following Post-Stroke Infection**

Leia Noelle (Leia) Fecteau, Senior, Mathematics
Mary Gates Scholar
Mentor: Kyra Becker, Neurology

Infection occurs in about 30% of patients with stroke and is associated with worse outcomes. Data suggest that certain antibiotics used to treat post-stroke infection may be neurotoxic (fluoroquinolones) and others may be neuroprotective (β-lactams). We are studying the outcome of rats who are subjected to ischemic stroke then pulmonary infection. Rats are treated with either ceftiofur (β-lactam class), enrofloxacin (fluoroquinolone class) or normal saline and outcome determined by a series of behavioral tests administered over the ensuing four weeks. The behaviour tests include the rat’s ability to stay atop a rotating drum (rotarod), ability to retain their footing while walking on a grated surface (foot fault test), and tendency to turn in circles (neurological score). Outcome of rats treated with enrofloxacin and ceftiofur will be compared to the outcome of rats treated with normal saline. Outcome that is better than in saline treated rats would suggest the antibiotic is neuroprotective, while outcome worse than in saline treated animals would suggest that the antibiotic is neurotoxic. The results of the study could have immediate and direct applications to clinical care as it could influence the antibiotic choice in patients who develop post-stroke infection.
Mussel Cultivation as a Mitigation Tool for Eutrophic Waters in Puget Sound, Washington
Ashley Nicole (Ashley) Lawton, Senior, Environmental Science, UW Tacoma, Tacoma Dual Enrollment
Mentor: Bonnie Becker, Interdisciplinary Arts & Sciences (Tacoma Campus)

Eutrophication, an excess of nutrients from anthropogenic sources, can lead to a range of environmental problems including hypoxia and loss of biodiversity. This study, a collaboration between University of Washington Tacoma and the Pacific Shellfish Institute, examined the potential of using mussel cultivation as a mitigation tool in eutrophic waters. Mussels are filter feeding bivalves that have the ability to remove nitrogen and other nutrients from the water through bioextraction. Artificial habitats similar to what is used in mussel farming were created in Budd Inlet Olympia, WA and in the Thea Foss Waterway Tacoma, WA to collect naturally occurring sets by the native bay mussel *Mytilus trossulus*. The purpose of this study is to determine the viability of mussels as a tool for remediation in Puget Sound by monitoring their growth, biomass and nutrient content. We are examining how various factors such as location, depth, time of deployment, and season affect a range of parameters, in order to create a set of best practices for future mitigation work. Next steps include the composting of resulting biomass, and analysis for pollution uptake within the mussels.

Detection of Transiting Exoplanets using Kepler Lightcurves
John Mark (John) Mehlhaff, Senior, Computer Science, Physics: Comprehensive Physics
NASA Space Grant Scholar
Mentor: Eric Agol, Astronomy
Mentor: Andrew Becker, Astronomy

Exoplanets are planets outside our solar system. The discovery and characterization of exoplanet systems informs us of the types of worlds found in nature and whether they might support life. There have been an unprecedented number of exoplanet detections in recent years spurred in large part by the advanced observing capabilities of NASA’s Kepler Space Telescope. The Kepler Spacecraft continuously monitors a large, fixed set of stars and collects time series photometric data that are unparalleled in both quantity and precision. Plots of stellar brightness against time called lightcurves are the canonical representation of Kepler data. The goal of our research is to detect exoplanets from the characteristic features they produce in these lightcurves known as transits. A transit occurs when an orbiting planet partially eclipses its stellar host, reducing the brightness observed by the telescope and recorded in the lightcurve. To detect transits, we use the Quasi-Periodic Automated Transit Search Algorithm (QATS). As an automated tool, QATS is instrumental in reducing the effective size of the Kepler dataset. However, QATS is sensitive to variability of the target star and to systematic artifacts of the telescope just as it is to transits. Thus optimal detection efficiency requires removal of all non-transit signals prior to applying the algorithm. Determining the best way to do this is the present focus of our work because it bounds our ability to detect planets whose size, composition, and orbital parameters are conducive to life.