UNIVERSITY of WASHINGTON

Undergraduate Research Symposium May 18, 2018 Mary Gates Hall

Online Proceedings

Poster Session 1

Balcony, Easel 88

11:00 AM to 1:00 PM

The Effects of Family Size on Achievement Goals

Faarah Misbah, Senior, Psychology
Jeong Moon (Vanessa) Lee, Senior, Psychology
Mentor: Jenny Yang, Psychology
Mentor: Laura Brady, Psychology

Family size matters. As a family grows, parents dedicate less time as well as financial and emotional support to each child. Siblings often have to compete for parental resources whereas only children receive full support from parents throughout their lives. Previous research has found that competition leads people to adopt performance goals (i.e., motivation to perform better than others). In big families, competitive environments may signal that being more successful than others is important, making performance goals more salient than in a family where one is the only child, where mastery goals (i.e., motivation to master new skills) may be more salient. In an exploratory study, we examined whether family size shapes people's motivations for learning. We predicted that students with siblings would be more motivated to learn by competing with others (performance orientation) while only children would be more motivated by honing their skills (mastery orientation). To test this hypothesis, we recruited 328 participants (166 only children and 162 with siblings) for an online study in which they completed the Achievement Goal Questionnaire and provided information about their race and number of siblings. As predicted, only children more strongly endorsed mastery orientation (M=3.93, SD=.58) compared to students with siblings (M=3.80, SD=.62, t(326)=1.99, p=0.5). Students with siblings endorsed performance orientation (M=4.05, SD=.78) marginally more than only children (M=3.90, SD=.73, t(326)=1.90, p=.06). While further research is needed to understand why these differences emerge (e.g., due to competition or other differences in family environments), our study lends insight into how people's family experiences shape their academic motivation. These findings many help educators learn how to best motivate students from different types of families.

Poster Session 2

Commons East, Easel 51

1:00 PM to 2:30 PM

Analysis of TTBK2 Kinase Activity in a *C. elegans* Model of Tauopathy

Taylor Ann Vadset, Junior, Neurobiology
Mentor: Brian Kraemer, Medicine
Mentor: Laura Taylor

Alzheimer's disease (AD) is a neurodegenerative illness responsible for 60-80% of dementia cases in the United States. Studies have shown that the formation of two primary pathologies, amyloid plaques and tau tangles, are present prior to neuronal death that results in this loss of memory and worsened motor function. Our research focuses on understanding the role of tau in disease progression. Tau stabilizes microtubules in the cell, which function to maintain cell structure and assist in intracellular transport. To successfully regulate microtubules, tau is modulated by site-specific phosphorylation. Evidence points specifically to the hyperphosphorylation of tau by certain kinases in playing a key role in neurodegenerative dieases such as AD. One kinase that has been identified as a tau-phosphorylating agent is tau-tubulin kinase 2 (TTBK2). To understand the role of TTBK2 kinase activity in the context of tau, we created double transgenic *C. elegans* lines expressing both human tau and TTBK2. We assessed behavioral abnormalities in our subsequent populations using locomotor assays of the homozygous crosses. From the data that was generated, we observed a significant difference in the movement of the double transgenic tau/TTBK2 strains as compared to their controls. The crosses moved substantially less than the other strains, and exhibited a more uncoordinated phenotype. These results support the hypothesis that the abnormal phosphorylation of tau by TTBK2 results in worsened motor control and general health of affected individuals. Additional testing of protein levels within the double transgenic lines will enable us to determine the mechanisms underlying this effect, and could eventually lead to information that might inform treatments counteracting the activity of kinases such as TTBK2 involved in hyperphosphorylation of tau proteins. Furthermore, this research has the potential to aid in finding a cure for a currently incurable disease and providing a hopeful future for Alzheimer's-affected individuals.

POSTER SESSION 2

MGH 241, Easel 163

1:00 PM to 2:30 PM

Inhibition of Glycoprotein Horseradish Peroxidase from *E. coli* Receptor Protein, FimH

Chantalle Sasha Bell, Junior, Biochemistry
Mentor: Wendy Thomas, Bioengineering
Mentor: Laura Carlucci, bioengineering

The majority of urinary tract infections are caused by *E. coli* bacteria. *E. coli* infections are strengthened due to *E. coli*'s ability to bind to mannosylated cells. A receptor protein on *E. coli*, FimH, has two domains: a regulatory pillin domain and a lectin domain (LD). In the presence of a force, the pillin domain detaches from the LD allowing the LD to go from its low to high affinity state. The naturally occuring mannose sugars on Horseradish Peroxidase (HRP) are known to bind the LD of FimH. The mannose binding pocket is suspected to open transiently, even when bound to mannose sugars. Based on the interaction of HRP with FimH, HRP may not regularly dissociate during these episodes, but we suspect that free mannose can induce the dissociation of HRP from FimH in these moments. To determine if mannose can improve HRP dissociation from LD, we are using an assay similar to a competitive Enzyme Linked Immunosorbent Assay. We expect to see a decrease in HRP bound to LD in the presence of free mannose compared to the absence. Ultimately this experiment provides an explanation of mannose monomers as an inhibitor for longer chains of mannose binding and a premise for a larger study on alternatives to *E. coli* antibodies that can competitively inhibit FimH from binding mannosylated cells.

POSTER SESSION 3

Commons West, Easel 37

2:30 PM to 4:00 PM

Understanding French Phonology through the Language Game Verlan

Sierra Skye Anderson, Senior, Romance Linguistics
Mentor: Laura McGarrity, Linguistics

A language game is created when a group of speakers systematically alters the phonological forms of words in their native language in order to disguise the meaning of what they are saying from unwanted listeners. An example of this in French is a language game called Verlan, which is spoken primarily in the low-income suburbs of Paris by adolescents and young adults. This language game obscures the forms of the original French words, typically by reversing the order of the syllables (or through several other phonological methods) in order to create a coded language. It has been suggested by linguistics researchers, such as Natalie Lefkowitz, that language games can be used to "reveal the phonological structure of the languages in which they are played," as well as to provide corpus-external evidence for underlying phonological rules and constraints that govern the original language. For this research project, I sought to gain deeper insight into the hidden structures that underlie French phonology through native speakers' use of Verlan. By following similar experimental methods used to study other language games, I proposed an experiment that would examine French speakers' phonological representations of problematic consonant clusters by analyzing their Verlan productions of nonsense words. Different productions could reveal differences in speakers' internal grammars that are not readily seen in the native language phonology. This method of analyzing language games could give linguists another tool to use when investigating phonological rules of a language that couldn't previously be tested on naturally occurring words.

POSTER SESSION 4

MGH 241, Easel 150

4:00 PM to 6:00 PM

Examining Infant Primate Temperament in Relation to Cognitive Development

Nadia Rosanina Kako, Senior, Psychology
UW Honors Program
Mentor: Laura Little, Psychology

Temperament has become an important factor in understanding an individual's behavior. Gauging an animal's individual temperament has come to be a strong predictor of how they react in various settings. These include success of experimental performance, biochemical stress markers, and response to threatening situations. Analyzing temperament and individual differences in macaques can prove to be beneficial in a primate laboratory setting. Understanding temperament measures could not only lead to overall healthier and stress reduced facilities both for animals and the staff, but it could also lead to developing new experiments to more specifically understand the variances of temperament and what factors the variance might play both in the human and non-human animal realm. This study examined the relationship between temperament and cognitive successes in developing infant primate macaques (N=116). Principal component analysis was used to determine underlying temperament traits for each animal, and linear regression was used to determine whether there was a relationshp between cognition and temperament. The temperament traits were used as predictor variables for how well each animal performed on the cognitive tasks. While this study was exploratory in nature, we predicted that animals with bolder/exploratory temperaments would have greater success in the cognitive tasks performed. As far as we understand, no study to date has examined the role temperament plays in cognition. Understanding this relationship can have

numerous benefits for both non-human and human populations.

POSTER SESSION 4

MGH 258, Easel 188

4:00 PM to 6:00 PM

Estimating Small Mammal Density in Boreal Forests Using Camera Traps and Live Trapping Methods

Alishia Elizabeth Orloff, Senior, Environmental Science & Resource Management
Mentor: Mitchell Parsons, School of Environmental Forest Science
Mentor: Laura Prugh, School of Environmental and Forest Sciences

Abundance estimates are integral to wildlife management. In many cases however, abundance estimates are difficult to obtain due to excessive labor and costs. Alternatively, abundance indices can provide representative measurements of relative abundance. Furthermore, cameras are a convenient tool to obtain estimates of relative abundance using capture frequencies as indices, though are predominantly used on larger animals. Small mammal abundance is commonly used to measure for forest health, diversity, and prey availability, though is generally dependent on the use of live trapping. Broadening the application of camera traps can prove to develop better indices for abundance analyses. Through this study, we examine different indices of small mammal abundance to determine whether camera trap data can be used as an index of small mammal abundance. Using data collected from the field, an abundance estimate based on live trapping of mice, voles, and chipmunks is compared to our camera trap estimates of these three species. We tested three possible small mammal indices, two of which were camera based: proportion of cameras detecting a species, number independent detection events, and number of animals live captured on the first night. Each of the three indices that were tested gave an estimate of abundance which we compared with the live-capture density estimate to determine relative accuracy. The proportion detected estimate and the first night capture estimate were significantly correlated to the estimated population abundance of each species. The low population of voles influenced the results and are discussed further. This data may contribute meaningful data for future wildlife abundance analyses. By gaining an understanding of reliable indices, we are able to make better considerations for wildlife management decisions.

POSTER SESSION 4

MGH 241, Easel 164

4:00 PM to 6:00 PM

Cultural Model of Family: How the Role of Family of First-Generation College Students and Continuing-Generation College Students Influence Their College Experience

Suyi Leong, Senior, Early Childhood & Family Studies, Psychology
Mary Gates Scholar, UW Honors Program
Mentor: Yuichi Shoda, Psychology
Mentor: Laura Brady, Psychology

First-generation college students (FGs; students whose parents have not completed college) often experience more difficulties transitioning into college compared to continuing-generation college students (CGs; students with at least one parent who has completed college). We hypothesize that some of these difficulties stem from the different cultural roles and expectations among interdependent FG families compared to independent CG families. In two studies, we examined *cultural models of family* (i.e., patterns of ideas and practices implicit in the family context) among FGs and CGs. In Study 1, we documented the prevailing ideas and concepts that FGs and CGs (N=518) associated with family by coding open-ended free-association responses. Both FGs and CGs associated the idea of family with affection, support, immediate family members and personal development. Although not statistically significantly different, FGs tended to associate family more with biological lineage, negative emotions, extended family members, and interdependence. In Study 2, we used a close-ended design to further investigate the patterns that emerged in Study 1. For instance, we anticipated that while both FGs and CGs would associate the family with support, FGs would be more likely to think more of emotional support while CGs would be more likely to think of instrumental support (e.g., financial assistance, career advice). Socioeconomic status is largely invisible and often overlooked in the college setting. By understanding more about FGs' conceptions of families and their relationships to college, we hope to find ways to help FGs balance their roles as family members and college students and thus ease their transition to college.