

Undergraduate Research Symposium May 19, 2017 Mary Gates Hall

Online Proceedings

POSTER SESSION 2

MGH 241, Easel 160

1:00 PM to 2:30 PM

Analysis of Cyclic Force for Underbite Correction

Benjamin W (Ben) La Course, Senior, Integrated Sciences

Mentor: Susan Herring, Orthodontics

Mentor: Katherine Rafferty, Orthodontics

Underbites are when the lower jaw protrudes further than the upper jaw and can lead to respiratory and feeding complications. One method currently used to correct underbites is the reverse pull facemask which puts tensile strain on the nasofrontal suture to promote growth of the upper jaw. The reverse pull facemask has major shortcomings such as a long duration of the treatment (12-18 months 16-18 hours a day), and is aesthetically unappealing. An alternative treatment that may produce faster results is to use an oscillatory cyclic load on the nasofrontal suture to increase the growth rate of the upper jaw to correct the underbite in less time than the reverse pull facemask. However to know how effective this method is for underbite correction it is vital to understand how the cyclic treatment changes the nasofrontal suture. My question is how the cyclic load changes the suture gap and growth rate (Mineral Apposition Rate MAR) of the nasofrontal suture in farm pigs. To measure the effectiveness of this treatment, the nasofrontal suture was extracted from farm pigs after they had been treated with the cyclic load for 30 minutes for 5 days. The sutures were then embedded, sectioned and examined under a fluorescent microscope to measure the MAR and suture gap for the control, and cyclic treated pigs. The control pigs had a suture gap range of 157-179 μm (n=5) and a MAR range of 7.75-15.25 $\mu\text{m}/\text{day}$ (n=4). The cyclic loaded pigs had a suture gap range of 326-383 μm (n=2) and a MAR range of 29.9-33.2 $\mu\text{m}/\text{day}$ (n=2). These data suggest that our cyclic treatment increases the suture gap and MAR of the nasofrontal suture. However, more data will need to be collected to validate our preliminary findings.

SESSION 2J

MCNAIR SESSION - THE ART OF LEARNING: FROM ALGEBRA TO PREJUDICE

Session Moderator: Stewart Tolnay, Sociology

MGH 258

3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Playing Baroque Flute Music; A Method Book for Instruction

Cameron Trott, Senior, Music Performance, Instrumental, Bemidji State University

McNair Scholar

Mentor: Susan Nelson, Music, Bemidji State University

This project combines research and musical examples in which flutists learn how to use six different musical elements used in playing Baroque music, while also learning about the Baroque era, and history of the flute. Covered in this book are sections on how to articulate, use dynamics, interact with other parts, breathe properly, style ornaments, and define tempos in Baroque style music. Each Baroque element is discussed in detail, applying to the flute. Using online and paper resources, I gathered information on the Baroque era and style in order to write this method book. The goal of this book is to provide a resource for high school and college students for learning Baroque style at an introductory level. Students who use this book will learn how to interpret and perform Baroque music in the style it was written, while also gaining knowledge on basic histories of the Baroque era and flute.

SESSION 2K

PSYCHOLOGICAL AND INTERPERSONAL FUNCTIONING

Session Moderator: Todd Herrenkohl, Social Work

MGH 271

3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Effect of Motivational Pressure on Trust of Probabilistic Weather Forecasts

Linan Yue, Junior, Psychology

Chao Qin, Senior, Psychology

Mentor: Susan Joslyn, Psychology

Weather forecasts often contain some level of uncertainty. Previous studies suggested that probabilistic forecast with percentage probability information usually induces higher trust rates and better decision quality in subjects than does deterministic forecasts. Two recent studies at UW Decision Making with Uncertainty Lab found that the effect of better decision quality or higher trust ratings in probabilistic information was varied due to the existence of a motivational pressure driven by a goal with rewards or preference of a weather scenario. These findings were both unexpected and not part of original hypothesis. The purpose of this study is to find out whether motivational pressure moderates the effect of probabilistic information versus deterministic information on trust. The hypothesis is that the presence of motivational pressure leads to higher trust in probabilistic forecasts than in deterministic ones, while lack of motivation attenuates the difference in trust between probabilistic and deterministic forecasts. This study is designed to be a single-blind between-subject experiment with two distraction sections and one experimental section. In the experimental section the subjects are exposed to a hypothetical scenario where subjects are prompted to prefer high or low temperature or to have no preference, and be given 6 hypothetical temperature forecasts for which they will provide trust ratings. 90 subjects are recruited from Online Research Pool Program so far. The preliminary results indicate no significant preference in promoted temperature information in each condition. There is a trend shows higher trust ratings in deterministic information especially in low temperature condition, however, this result is not statistically significant at this point. It is possible for this result to become significant when a total of 360 subjects are recruited. The potential finding of this study may shed light on the role of motivational pressure in perceiving uncertainty, and facilitate in advancing forecast communication formats.

SESSION 2K

PSYCHOLOGICAL AND INTERPERSONAL FUNCTIONING

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MGH 271

3:30 PM to 5:15 PM

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Desirability Bias and Trust on Weather Forecast

Chao Qin, Senior, Psychology

Mentor: Susan Joslyn, Psychology

Desirability bias, or wishful thinking, denotes that our desire toward certain outcomes affects perception of predictive information. The effects include altered perception of probability of events and altered trust ratings towards information in line or not in line with the desire. Previous studies found the bias robust in fields such as card drawing, where subjects predicted the probability of the card drawn from a deck. I designed and acted as the sole investigator of this independent study to explore the effect of desirability bias in weather forecasting, a previous untouched area by desirability bias researchers, which in its essence involves uncertainty. This study also strived to detect a potential residual effect in trust on future forecasts. I speculated that the distrust caused by the bias targets the source of information, thus all future forecasts, even those not paired with a desire, are affected. Over 300 subjects recruited from ORPP, a UW program recruiting psychology students as research subjects, participated in a computer based single-blind test where they were exposed to 5 hypothetical weather forecasts predicting snow or no snow on respective days. A prompt was introduced in trial 3 to induce a desire for a certain weather. Trial 4-5 were used to measure residual effects. Trust ratings and probability estimation of weather events and self-reported awareness of the bias were measured. The result revealed a small but significant effect of desirability bias in both trust and probability estimation. However, I found no residual effect. Half of subjects reported aware of the bias. The result also suggested the potential role of motivational pressure as a moderator in the perception of probabilistic information, warranting future studies. This study casted light on the effect of desire in perceiving forecasts and helped us better understand how the public perceive weather forecasts under different circumstances.

POSTER SESSION 3

MGH 241, Easel 162

2:30 PM to 4:00 PM

Examining Mutations in Presenilin 2 Associated with Alzheimer's Disease

Leah Ariel Osnis, Senior, Biochemistry

UW Honors Program

Mentor: Suman Jayadev, Neurology

Mentor: Susan Fung, Neurology

Mutations in the gene Presenilin 2 (PSEN2) cause familial Alzheimer's disease (fAD). fAD shares clinical and pathological features of sporadic, late onset AD thus fAD cell models can be useful to study mechanisms relevant to all forms of AD which is critical to developing effective AD therapeutics. Presenilin 2 protein (PS2) forms the catalytic subunit of the

γ -secretase complex, which cleaves amyloid precursor protein and releases A β 1-42, considered a pathogenic contributor to Alzheimer's disease (AD). Our laboratory is interested in a fAD associated PSEN2 mutation, a frameshift two base-pair deletion (PSEN2 K115Fx). The PSEN2 K115Fx is predicted to either lead to a truncated protein suggesting that the mutation may create a shortened peptide that interferes with normal cellular function (dominant negative or toxic gain of function) or result in degradation of the RNA transcript and subsequent loss of normal amount of PS2 protein (loss of function). To better understand how PSEN2 mutations cause disease, we have two objectives. The first aim of this project is to determine if the PSEN2 K115Fx does indeed result in a truncated protein or influence levels of wildtype PS2. I will be collecting human cultured fibroblasts isolated from AD patients with the PSEN2 mutations or controls and prepare cell lysate for analysis by Western blot. My colleague will also be analyzing mRNA levels from those same samples to determine the stability of the PSEN2 mutant and wildtype transcripts in all cases. The second aim is to determine the impact of the mutation on PS2 enzymatic activity. I will culture the cells described above, then infect with a luciferase based enzyme reporter assay to compare the impact of PSEN2 mutations on γ -secretase mediated cleavage of APP. My work will help identify the candidate mechanisms by which the PSEN2 K115Fx mutation causes AD.

POSTER SESSION 3

Commons West, Easel 30

2:30 PM to 4:00 PM

Neural Circuit of Drug Addiction

Michelle Seo, Senior, Psychology

Mary Gates Scholar

Mentor: Susan Ferguson, Psychiatry & Behavioral Sciences

Mentor: Aaron Garcia, Neurobiology & Behavior

Drug addiction is a serious public health problem in the United States that impacts our society on multiple levels. It is known that drug addiction has major effects on both cortex and striatum; however, the exact role of different corticostriatal pathways in drug addiction is not completely understood. Our recent projects aim to deconstruct these circuits by examining a major population of cortical neurons, PT-type neurons that project to the striatum and affect the rewarding properties of the drugs. For this current project, I selectively manipulated these PT neurons in rats by placing a designer receptor called a DREADD (Designer Receptor Exclusively Activated by Designer Drugs) and examining how it changes the behavioral expression of drug reward. Changes of the behavior to a drug's rewarding properties are measured with a conditioning model called conditioned place preference (CPP). When rats are repeatedly given addictive drugs, such as cocaine, in a chamber with a specific environmental cue (walls with

horizontal or vertical stripes), they learn to associate the cue with the rewarding properties of the drug. Rats will associate a specific chamber with either vertical or horizontal striped walls with the drug with or without PT-type neurons activation. Because of their projection patterns, I hypothesize that PT activation will decrease the rewarding effect of cocaine and thus the animals will spend less time in the chamber with PT neuron activation plus drug compared to the other chamber with the drug alone. This finding would be a major step towards disentangling the neural circuits underlying addiction, allowing development of new strategies for prevention and treatment.

POSTER SESSION 3

Commons West, Easel 29

2:30 PM to 4:00 PM

The Causal Link Between Excessive Sensory Stimulation from Media Sources and Deficits in Cognitive Ability

Ojasvi Mittal, Senior, Biology (Physiology)

Kamola F. (Kamola) Kutbitdinova, Junior, Environmental Studies

Shruthie Gnanaswaran, Senior, Biochemistry

Mentor: Susan Ferguson, Psychiatry & Behavioral Sciences

Mentor: Hans Baertsch, Center for Integrative Brain Research, Seattle Children's Research Institute

In today's children, the increased use of electronic devices during early stages of development is providing more audio and visual stimulation than ever before. At the same time, attentional deficits later in life are becoming significantly more common. This has led us to hypothesize that excessive sensory stimulation (ESS), from media sources like TV, Smartphones, video games, etc., during development increases the risk of neurological disorders, most notably attention deficit hyperactive disorder (ADHD). Previous studies in our lab have found that mice subjected to a model of excessive sensory stimulation have damaged cognitive abilities, are less risk-averse, and display hyperactive behavior compared to controls. Our current study aims to build on this data and investigate the impacts of ESS on attention and impulsivity by using the Five Choice Serial Reaction Time Task (5CSRRT), a behavioral test in which mice nose poke a temporarily illuminated target in order to receive a food reward. CD-1 mice were subjected to ESS in the form of flashing lights and sounds for six hours per day for a total of 42 days and subsequently trained and tested on the 5CSRRT. While there was no difference in accuracy between groups, ESS mice displayed significantly increased premature responses in comparison to the controls indicating higher levels of impulsive behavior. These findings suggest a causal link between excessive sensory stimulation and impulsivity, and further illustrate the possible ramifications of the increased use of technology during development.

POSTER SESSION 3

Commons West, Easel 32

2:30 PM to 4:00 PM

Exploring Predictors of Participation in Meaningful Activity Programming in a Housing First Setting

Jingyan (Joel) Gu, Senior, Psychology

Mentor: Susan E. Collins, Psychiatry and Behavioral Sciences, Harborview Medical Center

Housing First, also referred to as harm reduction housing, entails the provision of immediate, permanent, low barrier, non-abstinence based housing to chronically homeless individuals. Beyond the provision of housing, supportive services are essential to the Housing First approach. This includes the provision of opportunities to engage in meaningful activities, such as artistic endeavors, outings, gardening, and talking circles. Participation in meaningful activity programming has been associated with positive outcomes, such as reductions in alcohol-related problems and overall alcohol use. However, no study to date has examined which characteristics are predictors of participation in meaningful activities. The objective of this study is to understand who is engaged by meaningful activities offered in a Housing First setting. To this end, we explored the association between participant characteristics (e.g., sociodemographic, substance use, community-orientation variables) and level of activity engagement. Participants (n = 66) in this secondary study were residents of a Housing First site. An enhanced intervention specialist worked with housing staff to track residents' involvement in programmed Life Enhancing Alcohol-management Program (LEAP) activities. Self-report data were collected to document participants' baseline characteristics. Attendance sheets were used to track participation in meaningful activities. Bivariate correlations indicated that participation in meaningful activities was associated with female gender, greater community orientation, and unemployment. When these variables were tested in a multivariate model, only unemployment remained a statistically significant predictor of greater participation in meaningful activities. This study indicated that few sociodemographic, substance use and community orientation variables predicted differential participation in meaningful activities in a Housing First setting. Taking all potential factors into account, only one variable significantly predicted involvement—unemployment. In designing programming for Housing First, providers should take into account residents' competing priorities (e.g., work) to give programming optimal reach.

POSTER SESSION 3

Commons West, Easel 31

2:30 PM to 4:00 PM

Descriptive Analysis of Meaningful Activities Programming in a Housing First Setting

Victoria Edlyne Orfaly, Senior, Public Health-Global Health
UW Honors Program

Alexander James (Alex) Vess, Senior, Psychology

Gary Alan (Gary) Lee, Senior, Psychology

Mentor: Susan E. Collins, Psychiatry and Behavioral Sciences, Harborview Medical Center

Housing First, also referred to as harm-reduction housing, is one approach to addressing the unique needs of chronically homeless people who are often multiply affected by psychiatric, medical and substance use disorders. Housing First entails the provision of immediate, permanent, low-barrier, housing that does not require sobriety. Beyond the provision of housing, low-barrier, client-centered supportive services are essential to the Housing First approach. The Life Enhancing Alcohol-management Program (LEAP) was a three-phase community based participatory research project designed to facilitate the codevelopment and evaluation of client-driven harm-reduction programming for a Housing First setting. This study describes the content of and attendance at activities that were designed within the LEAP project. Participants (n = 66) were residents in a single-site Housing First program who had lived experience of chronic homelessness and alcohol use disorders. LEAP activities were developed by residents, researchers, and agency management and staff in community advisory board meetings. LEAP activities included a) administrative leadership (e.g., Welcoming Committee, LEAP Advisory Board), b) meaningful activities (e.g., gardening, art hours), and c) pathways to recovery (e.g., talking circles, one-on-one and group harm-reduction treatment). Sociodemographic information on participants was gathered in one-on-one interviews. Attendance records were used to assess participation in LEAP activities during the 6-month follow up. Of LEAP study participants in the Housing First project, 86% reported engaging in at least one activity. On average, residents participated in 16.76 activities (SD= 2.99). Of those who attended activities, 95% of participants attended more than once. Low-barrier activities reached a sizeable proportion of Housing First residents, and residents often remained committed to attending activities over the longer term. Findings may help housing providers design meaningful activity programming for Housing First settings.