The Multidisciplinary Undergraduate Research Conference celebrates the contributions of undergraduate scholarly inquiry and research at UBC. All members of the UBC community are welcome and encouraged to attend this annual celebration of undergraduate scholarly work.

Schedule of the Day

Opening and Closing Speakers

Oral Presentations Session 1

How to Get into Research Workshop

Poster Presentation Session

Oral Presentations Session 2

Activities

MURC 2013 Journal Call for Submissions

Acknowledgements
## Schedule of the Day

*Saturday, March 23, 2013 – Various*

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30-10:00</td>
<td>Registration &amp; Check In</td>
<td>Old Auditorium</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Opening Session</td>
<td>Old Auditorium</td>
</tr>
<tr>
<td>10:40-11:50</td>
<td>Oral Presentation Session 1</td>
<td>Buchanan D Block</td>
</tr>
<tr>
<td>11:50-12:45</td>
<td>Poster Display</td>
<td>IKBLC Main Foyer</td>
</tr>
<tr>
<td>12:45-2:00</td>
<td>Lunch</td>
<td>IKBLC Main Foyer</td>
</tr>
<tr>
<td>1:15-2:00</td>
<td>Lunchtime Workshop</td>
<td>IKBLC Dodson Room</td>
</tr>
<tr>
<td>2:00-3:10</td>
<td>Oral Presentation Session 2</td>
<td>Buchanan D Block</td>
</tr>
<tr>
<td>3:20-4:00</td>
<td>Closing Session</td>
<td>Old Auditorium</td>
</tr>
</tbody>
</table>

*IKBLC denotes Irving K. Barber Learning Centre*
Opening and Closing Sessions

Opening Keynote: Jennifer Ferris
Jennifer Ferris is a fourth year student in the honours psychology program at the University of British Columbia. She has been involved in research for 3 years and has worked with Dr. Kiran Soma, Dr. Lara Boyd and Dr. Todd Handy. Jenn has also been involved in several initiatives within the psychology department. She is President of the honours society Psi Chi UBC, an editor for the UBC Undergraduate Journal of Psychology, and is currently leading a Student Directed Seminar entitled, "Alzheimer's Disease and Related Dementias" (ASTU 400M). She will graduate (BA Honours) in May and intends to pursue an MSc in the UBC Graduate Program of Neuroscience beginning September 2013.

Closing Speaker: Serbulent Turan (2013 UBC 3-Minute Thesis Winner)
Born in Ankara, Turkey, Serbulent Turan is a PhD Candidate at the University of British Columbia in Vancouver. He has a BA in Political Science and Public Administration from Galatasaray University (Istanbul), and two MAs in European Politics, one from the College of Europe (Bruges) and another from a joint Bilgi University (Istanbul) & Leiden University (Leiden) program. His current research is in Political Theory and focusses on the constitution of political authorities and political obligation, and the generation of obedience and disobedience. His interests also include political sociology, political psychology and history.
Closing Speaker: Magdalene Payne (2013 UBC 3-Minute Thesis Runner Up)
Magdalene Payne is a second year Master's student in Dr. Rajavel Elango's lab at the Child and Family Research Institute. The Elango Lab is primarily focused on protein and amino acid nutrition in various life stages using modern stable-isotope tracer techniques. Magdalene began her graduate degree in September 2011 after graduating from Queen’s University that June. Her research aims to determine lysine requirements during healthy pregnancy, and she hopes these novel data will improve prenatal care on a global scale. Outside of the lab, Magdalene is active in multiple community outreach programs to encourage scientific inquiry and understanding.

Closing Speaker: Sun Nee Tam (2013 UBC 3-Minute Thesis People’s Choice Award Winner)
Sun Nee is an international student from Malaysia. Under the prestigious sponsorship from her government, she obtained her BSc. (Hon) undergraduate degree as well as an associateship (AKC) from King’s College, London. Following a few years of work experience, she decided to come back to graduate school to major in Neuroscience. She completed her master’s degree at UBC under the supervision of Dr. Brian Cairns (Faculty of Pharmaceutical Sciences), investigating hormonal influences on chronic pain mechanisms and sex-related differences in pain. She is a PhD candidate in Neuroscience, working under the mentorship of Dr. Martin McKeown. Sun Nee's current research work is heavily focused on understanding the compensatory mechanisms of Parkinson’s disease. In addition, she is interested in investigating how therapies such as musical walking programs and specially-designed computer games can be employed to augment these compensatory mechanisms in the brains of patients in order to improve their symptoms and overall quality of life.
Oral Presentation Session 1

**Therapeutics Across Time and Disciplines** *(BUCH D307)*

**Ali Majdzadeh**: Correlation Study of Multiphoton Microscopy with Histology of Ex Vivo Human Skin

**Sally R. Ke**: Emergency Department Usage by Smokers and Non-Smokers at Vancouver General Hospital

**Kate Dumbrell, Linda Pan**: Infant Soothing Study

**Zach Liang**: Fight Bacteria with Bacteria: Designing a *Listeria*-based Vaccine Against *Burkholderia Pseudomallei*

**Food’s Food: Improving & Modifying Our Intricate Dietary Sources** *(BUCH D312)*

**Ali Sulemanji**: The Potential for Alternative Feedstuff in East African Poultry Production

**Belle Tiao**: Benefits of Using Electronic Feeding System to Assess Social Behaviour of Dairy Cattle

**Elaine Wu**: Analysis of Probiotic Supplementation in Broiler Chickens

**Connie Leung**: A Novel Approach to Increasing Nutritional Content of Tomatoes Using AMF
<table>
<thead>
<tr>
<th>Title</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Atoms to Stars: Encompassing Our Universe</td>
<td><em>Evan Flater</em>: The Role of Cycling in the Vancouver Transit System</td>
</tr>
<tr>
<td></td>
<td><em>Manveen Kaur</em>: Comparison of Resting Time in Dogs at Home and in Boarding Kennels</td>
</tr>
<tr>
<td></td>
<td><em>Justine Vallieres</em>: The Value of Analyzing Large Predator Mortality in North America</td>
</tr>
<tr>
<td></td>
<td><em>Mathias Hudoba de Badyn</em>: The Late Periods of Protoplanetary Disk Lifetimes</td>
</tr>
<tr>
<td>The Globe's Changing Conditions: Effects, Solutions &amp; Beyond</td>
<td><em>Andrea Cheng</em>: The Effect of Ocean Acidification on Native Marine Fouling Calcifers</td>
</tr>
<tr>
<td></td>
<td><em>Andrew Barton</em>: Assessing the Value of Place Along the Northern Gateway Pipeline Route</td>
</tr>
<tr>
<td></td>
<td><em>Grace Yi</em>: Teamwork Within Engineered Microbial Communities</td>
</tr>
<tr>
<td></td>
<td><em>Robyn Giffen</em>: First Language Literacy: Using Orthography to Empower the Nabit Speakers of Ghana</td>
</tr>
</tbody>
</table>
Earth, Living Cultures & the World

**Cora Skaien:** Effects of Oophaga Pumilio Tadpoles on Aquatic Communities and Nitrogen Isotopes of Bromeliads at La Selva Biological Station, Costa Rica

**Gurkirt Grewal, Aman Arora:** Light- and Phytohormone-induced Cell Expansion and Senescence of Excised Cucumber Cotyledons

**Jamie Russell:** Sounding Southern: Preferential Spontaneous Phonetic Imitation in Children

**Julia Jeong Hyun Park:** The Locked Door: Revelations and Recollections of Segregation and Subordination in the Immigrant Shared-Church Experience

Doctorates: The Future Is Here

**Eric Y. Zhao:** Correlations Between Corpus Callosal Myelin Water Fraction and Measures of Transcallosal Inhibition in Multiple Sclerosis Patients on Glatiramer Acetate Treatment

**Zhenxinyu Zhang:** Children’s Mental Representation of Brand Concepts

**Jeffrey O'Keefe:** The Synthesis of New Pyrazole Compounds for Anti-Inflammatory, Neuroprotective, and Anti-Cancer Drugs

**Jenelle Lamothe:** Novel Pyrazole Compound Reduces Astrocyte Toxicity
Therapeutics Across Time and Discipline  BUCH D307

Correlation Study of Multiphoton Microscopy with Histology of Ex Vivo Human Skin: Ali Majdzadeh (Faculty Sponsor: Dr. Haishan Zeng)

The ability to probe biological activity within living organisms by means of optics is desirable due to its non-invasive nature, particularly in the domain of early cancer detection. Multiphoton Microscopy (MPM) is commonly used to image biological samples. In scientific publications, images obtained through MPM are often presented with histology for verification. However, the images often do not closely correspond to histology as they are from a similar, but not the same, region as histology.

We have established a method to accurately correlate MPM images of prominent structures in ex vivo human skin with subsequent histology. We employed this technique, along with multispectral imaging, to identify melanin granules, which are known to fluoresce at 760nm, in MPM and to attempt to locate them in histology. It was found that our method is only capable of locating prominent structures, not single cells. Nevertheless, this approach will enable us to identify prominent microstructures presented on MPM skin images, which will form the basis for future in vivo skin MPM image interpretation in clinical diagnosis.

Emergency Department Usage by Smokers and Non-Smokers at Vancouver General Hospital: Sally R. Ke (Faculty Sponsor: Dr. Ka Wai Cheung)

Tobacco smoke is the leading cause of preventable deaths in British Columbia (BC) and claims approximately 6000 lives annually in BC, primarily in the form of lung cancer, coronary heart disease, and strokes. In addition, smoking also causes significant morbidity resulting in climbing healthcare costs and chronic health conditions requiring frequent emergency department (ED) visits and hospitalizations. Although 16% of British Columbians smoke, the prevalence of smoking may be as high as 48% in the ED patient population. Furthermore, smoking-related illnesses account for about 26% of ED visits among smokers.

Our aim is to investigate ED usage by smokers and non-smokers, while taking into account potential confounding factors, including age, gender, illness severity, chief complaint, marital status, and having a family physician. The two primary outcomes of interest will be whether smokers and non-smokers have a difference in the re-utilization, within 72 hours, of the ED and the number of visits 6 months post initial index visit. Our study population will include all patients who visited the Vancouver General Hospital ED between
June 1st and July 31st, 2012, inclusive. We will use a logistic regression model to assess whether smokers and non-smokers have a difference in ED usage. The characteristics of the ED smoking population and visit frequency will be discussed. Better understanding of ED smoker demographics will allow improved patient care and aid in efforts to reduce smoking and ED visit frequency.

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Infant Soothing Study: Kate Dumbrell, Linda Pan (Faculty Sponsor: Dr. Ronald Barr)

Previous research has demonstrated that infant crying during the first few months of life can provoke a wide range of emotional responses in caregivers, but prolonged crying bouts and failed soothing are rarely acknowledged. Caregivers may get extremely frustrated due to infants’ crying; this is dangerous because it is the main reason they shake or hurt babies. If a crying infant is shaken with sufficient force, induction of mild concussion occurs, also known as Shaken Baby Syndrome, which causes death or devastating impairments later in life.

We are interested in parents’ emotional and behavioural response of successful and failed soothing attempts to infant crying. Our primary purpose is to see whether post-soothing frustration and choice of soothing behaviour are affected by success of soothing. We are also investigating possible mother-father differences, and whether the gender of the crying doll affects frustration. First-time parents are invited to participate in this study. They are asked to care for and soothe a model infant using one of three soothing techniques during two prolonged, five minute crying bouts. After each bout, their frustration level and soothing choice are recorded. The success of their soothing (unsuccessful defined as failing to stop the baby’s crying), and the gender of model infant assigned is randomized.

We expect to find lower frustration and less switching of soothing technique following a successful soothing bout. Understanding how successful soothing and failed soothing affects both caregiver frustration and choice of soothing response will hopefully lead to preventing injury to infants.

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Fight Bacteria with Bacteria: Designing a Listeria-based Vaccine Against Burkholderia Pseudomallei: Zach Liang (Faculty Sponsor: Dr. Tobias Kollmann)

Every couple of minutes, two infants in the world will have died from an infection for which there is an effective vaccine. Worldwide, 5 million infants could be saved every year if only they are immunized on time. There appear to be many reasons, none of them insurmountable, as to why the world fails to save the lives of these children. By focusing on part of the science
to help solve this problem, is it highly possible that a vaccine system is developed where, with only one immunization given at birth, it will protect from a wide range of specific infectious diseases, as well as from allergies, autoimmune diseases and malignancies, for the entire life.

The bacterium Listeria monocytogenes (Lm) has, in recent years, been very promising as a vaccine vehicle, for its ability to specifically target immune cells that are so vital in helping to generate protective immunity from disease(s) (i.e. Antigen-presenting cells); and especially for its potential as a neonatal (i.e. infant) vaccine, due to its ability to confer lifelong protection. By utilizing basic molecular cloning techniques, it is possible to have attenuated strains of Lm express danger signals that other pathogens typically carry. This work strives to systematically tackle diseases for which vaccines are non-existent or ineffective, using Lm as a vaccine platform for respective disease-causing agents and their danger signals. As this is a work that has only just begun, at the time of writing this proposal there are no main findings to declare.

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Food’s Food: Improving & Modifying Our Intricate Dietary Sources (BUCH D312)

The Potential for Alternative Feedstuff in East African Poultry Production: Ali Sulemanji (Faculty Sponsor: Dr. Darin Bennett)

With increasing global economic constraints, high quality sources of protein are increasingly absent in the diets of people in parts of the developing world, such as East Africa. Poultry production presents a food source that is rich in protein, free from religious taboos and relatively easy to implement, yet the rising price of common commercial feed ingredients for poultry (such as maize and soybeans) creates significant challenges. However, the use of alternative feed ingredients as viable substitutes to commercial feedstuff has shown promise.

A literature review was conducted to argue the case for substituting commercial feedstuffs with cheap, readily available alternatives. Research on nutritional content of poultry feed ingredients and literature on agricultural and poultry producing practises of East Africa shows that several alternative feed ingredients are inexpensive, readily available and can be cultivated locally. These alternatives include fruits, legumes, green leafy plants, roots and tubers, and non commercial cereals and oilseeds. Such alternatives were found to be of comparable quality to commercial feeds. Viable, cost effective, alternatives for supplemental protein sources from animal parts besides fish meal and meat meal were also found.

In conclusion, these alternative feedstuffs have the commercial potential, both from production and economic perspectives, to
replace commonly used feedstuffs as the standard feed ingredients used in poultry production systems in East Africa.

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Benefits of Using Electronic Feeding System to Assess Social Behaviour of Dairy Cattle: Belle Tiau (Faculty Sponsor: Dr. Julie Huzzey)

Social behaviour is an important aspect of animal welfare. Traditional methods of measuring social behaviour in animals are time-consuming and labour-intensive. The aim of this study was to assess whether an electronic feed recording system (Insentec) could be used to identify competitive displacements from the feed bunk in group-housed dairy cattle. A displacement may be associated with a short interval between the successive feeding events of two cows at one bin (i.e. the interval between the time the displaced cow left the bin to the time the cow that caused the displacement enters the bin).

Observations of displacement events of five focal cows at the feed bunk were made over 3-d for 24-h/d using time-lapse video recording. Data collected from video observations were matched with the corresponding feeding intervals derived from the Insentec system. There were 191 out of 325 observed displacement events that could be paired with one feeding intervals, and the majority of these 191 events were paired with feeding intervals that were 11-20 sec in duration. Using a feeding interval threshold of \(\geq 20\) s, displacement events could be predicted by the Insentec system with a sensitivity of 94% and specificity of 80%.

These results suggest that data derived from the Insentec system may be useful for measuring displacements in group-housed dairy cattle, although other electronically derived measures of feeding may be needed to more thoroughly describe social behaviour.

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Analysis of Probiotic Supplementation in Broiler Chickens: Elaine Wu (Faculty Sponsor: Dr. Darin Bennett)

Increases in the number of broiler chickens raised for human consumption - subject to high stocking densities and unsanitary conditions - have led to concerns over animal welfare. Additionally, the use of antibiotic growth promoters (AGPs) on production animals is facing changing attitudes from consumers who oppose this practice due to worldwide increases in antibiotic resistance. By modulating the gut microbiota with live microorganism feed additives, also known as probiotics, a potential substitute for AGPs arises which has also been shown to enhance broiler performance.

A literature review was conducted to examine data collected from 43 sources, including experiments published in 21 different peer-reviewed journals, the majority of which are relevant to probiotic
research on broilers. Based on this literature, combinations of suitable probiotics may prove to reduce intestinal disease risks and displace pathogenic microorganisms, implying improved broiler management and subsequently increasing broiler welfare.

Main findings suggest probiotics to be as effective as AGPs in increasing broiler food conversion ratios; moreover, probiotics have consistently been found to aid the stimulation of stronger immune responses and prevent the shedding of broiler-human diseases such as Campylobacteriosis. Thus, exchanging AGP applications for probiotic ones satisfies social demands from consumers, economic pressures on producers, and welfare needs of the broilers.

However, current knowledge of probiotic applications on broilers is limited. Much still needs unravelling regarding the diversity of the gut microbiome and the bacterial mechanisms of action. Further research into intestinal flora diversity and the probiotic field may strengthen approval for universal probiotic applications.

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A Novel Approach to Increasing Nutritional Content of Tomatoes Using AMF: Connie Leung (Faculty Sponsor: Dr. Miranda Hart)

With the nutritional value of food declining in the past decade, there is growing pressure to find novel ways to increase the nutritional content in our food. Rhizophagus irregularis, a commercially available arbuscular mychorrhizal fungi (AMF), are widely used as a fertilizer to increase nitrogen and phosphorus conditions in soil which subsequently improves plant yield.

Previously, studies have been done on the toxicology, mineral and phenolic content of foods of the fungi on the plants. However, we are still unsure if the increase in mineral content translates into impacting tomato plant nutrition or whether or not vitamin content and lycopene in tomatoes are affected by AMF.

The aim of this project is to see whether or not Rhizophagus irregularis, a commercially available inoculum increases or decreases antioxidant potential, mineral and vitamin content in tomatoes. There are two treatments, one batch of 10 tomato plants are inoculated with AMF and the other 10 plants are not. The plants are fertilized and grown until fruit are produced and harvested when ripened. These fruits are then analyzed for total carotenoids, vitamins, lycopene and mineral content.

Preliminary data shows that Rhizophagus irregularis does increase the total carotenoid content and lycopene content in tomatoes as compared to plants that were not inoculated with AMF. This research tries to understand the impact of AMF on nutritional value in tomatoes in hopes to find a new and creative way to increase the nutritional density in foods.
From Atoms to Stars: 
Encompassing Our Universe 
(BUCH D313)

The Role of Cycling in the Vancouver Transit System: 
Evan Flater (Faculty Sponsor: Dr. Jim Brander)

Introduction: Cycling as a mode of transportation has importance for improving individual and environmental health.

The primary research question in this study concerns explaining and predicting bike lane volume. In particular the focus will be on the relationship between bike lanes and the rest of the transportation network.

Literature Review: Miranda-Moreno and Nosal (2011) found that precipitation, temperature and humidity all have significant effects on bicycling volume.

Hypothesis Development: The structure of Vancouver’s transit system is conducive to a study to observe the relationship bike lanes have with the overall transportation network. Each of the five facilities - Burrard Bridge bike lane, the Canada Line and the Dunsmiari Viaduct, Dunsmuir and Hornby bike lanes - were introduced consecutively and therefore provide an opportunity to observe the effects of the introduction of subsequent facilities.

H1: The introduction of the Canada Line increased the volume of bike traffic on the Burrard Bridge bike lane.

Data and Data Development: Data will be gathered from Environment Canada for weather data; City of Vancouver for the dependent variable bike lane volume data; news archives for data on events; and gasoline prices from StatsCanada. The event data, seasonal and other indicator variables will be coded using Stata12.

Methodology: Variables will be used in multiple regression analysis to attempt to measure and predict daily bike lane volume.

Preliminary Results: Based on preliminary results it appears that there are strong seasonal, weather and weekday effects. Most importantly the effect of the Canada Line introduction was positive and meaningful.

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Comparison of Resting Time in Dogs at Home and in Boarding Kennels: 
Manveen Kaur (PhD Student Sponsor: Nancy Clarke)

The unfamiliar surroundings of a shelter can be potentially stressful for dogs, which can affect their resting behaviour. Lack of rest and sleep may cause various behavior problems in dogs, therefore, reducing their adoptability. No study has been done to date to see the effect of admission into shelter on the resting behaviour of dogs. Since the ownership of shelter dogs is often...
unknown, boarding kennels can be used to simulate a similar context and environment to shelters.

This study quantifies and compares the resting behaviour of dogs at home and in boarding kennels. Collars fitted with HOBO Pendant G datalogging accelerometers were placed on dogs to measure changes in the angle of the neck (tilt) to identify their resting behaviour at 10 second intervals. Data were collected for 5 days before, during and after each dog’s boarding kennel stay (N=34). A paired t-test was conducted to analyse data and a significant difference between the resting time before boarding (mean=65.92%) and during boarding (mean=47.16%) was seen (P<0.001). The average resting time of dogs decreased by 18.76% while in boarding. A significant difference of 1.41% (P<0.05) was also found between the resting behaviour before and after boarding (mean=67.34%).

These results indicate that dogs spend less time resting in the unfamiliar surroundings of a boarding kennel when compared to their familiar home environment. These results suggest that the welfare of shelter dogs may be improved by providing them more opportunities to rest.

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The Value of Analyzing Large Predator Mortality in North America: Justine Vallieres (Graduate Student Sponsor: Sara Dubois)

Hundreds of thousands of large mammal predators in North America have been, and continue to be, killed for livestock protection, hunting, conservation purposes, and for pest control. The large number of predators killed impacts species and populations, which can in turn affect whole ecosystems. This research aims to determine human-caused mortality of predators over a span of ten years, including the number of predators, and how and why they are being killed (i.e. shooting vs. trapping; individual hunters vs. government culls), in addition to assessing the quality and accessibility of this data. This data will help provinces and states to better regulate hunting and lethal control so that predator numbers do not deteriorate unsustainably. Data collection included researching statistics for individual states and provinces between 2000-2010.

Data was obtained through individual state Fish and Wildlife Departments, USDA data, emails with government officials and other harvesting sources. For example, New Brunswick is roughly 1/13th the size of British Columbia, and yet NB annually kills approximately 13 black bears for every 100 black bears on average each year, while BC annually kills roughly 3 black bears for every 100. New York is roughly 3/5 the size of Utah, and yet NY kills about 17 black bears for every 100 black bears on average each year, whereas Utah annually kills roughly 5 black bears for every 100.

These results suggest a need for standard recording methods of predators killed by
state and province in order to better preserve and protect these species.

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The Late Periods of Protoplanetary Disk Lifetimes: Mathias Hudoba de Badyn (Faculty Sponsor: Dr. James Owen)

Protoplanetary disks are the progenitors of planets, forming from the gas-heavy nebular remnants of star formation. Understanding their evolution and expected lifetime is important in constraining parameters in other areas of astrophysics, in particular planet formation timescales.

A recently discovered phenomenon called thermal sweeping occurs due to X-ray heating of the inner disk edge. This process creates instability in the disk due to vertical thermal pressure gradients from the X-ray heating, which are not cancelled out by the pressure associated with the disk scale height. The disk will thus spontaneously photoevaporate on the order of hundreds of years, effectively cutting off the lifetime of the disk once it reaches a certain state in its evolution.

In order to find the parameter space in which thermal sweeping will occur, we will utilize the ZEUS-MP Hydrodynamics code to numerically model a protoplanetary disk undergoing X-ray heating using three parameters: disk density, disk radius and X-ray luminosity. Once this parameter space is known, further research may be employed to model disk evolution in order to accurately calculate disk lifetimes. The model may potentially also be used to accurately date the age of observed disks, which can then be used to verify models of the evolution of the Milky Way.

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The Globe's Changing Conditions: Effects, Solutions & Beyond (BUCH D314)

The Effect of Ocean Acidification on Native Marine Fouling Calcifers: Andrea Cheng (Graduate Student Sponsor: Norah Brown)

Ocean acidification has been shown to cause numerous negative effects in many phyla of marine organisms such as Cnidaria, Mollusca, Arthropoda, and Echinodermata. Over the next century, these effects are predicted to negatively impact the survival of many calcifying organisms, and consequently threaten or collapse the ecosystems in which they live. Although the effects of ocean acidification on specific species and phyla have been widely documented, less is known about how such environmental changes affect interspecific species interactions and overall community structure.

To assess how ocean acidification impacts marine fouling communities, field
mesocosms were treated with air (~400 ppm CO2) (n=12) or treated with CO2 gas (~1000 ppm) (n=12) to increase pH levels. Each mesocosm contained two suspended tiles that were removed after 10 weeks and the percent coverage of native calcifers bay mussels (Mytilus trossulus) and kelp lace bryozoans (Membranipora membranacea) was determined. Both species showed no differences in mean percent coverage values between treatment levels. Overall, the bay mussels followed the expected trend yielding a higher mean percent coverage of 11.47 under normal air conditions and 7.41 under elevated CO2 conditions (p=0.057). The kelp lace bryozoans, however, showed an opposite response yielding a lower mean percent coverage of 60.87 under normal air conditions and 71.30 under elevated CO2 conditions (p=0.035).

Further experiments exploring the impacts of CO2-induced acidification on similar communities over longer periods of time are needed to verify whether these types of ecosystems are robust enough to survive ocean acidification.

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Assessing the Value of Place Along the Northern Gateway Pipeline Route: Andrew Barton (Faculty Sponsor: Dr. Donna M. Senese)

The Northern Gateway Pipeline proposal has focused significant attention on the places and people who may be impacted by this project. The Joint Review Panel hearings that are part of the environmental assessment process enables participants to articulate how they feel about the locations they inhabit—their expression of place. These hearings also provide a unique and timely opportunity to investigate the role of place-based narrative in the Canadian Environmental Assessment process.

Using the proposed pipeline route as a transect, this research followed a case study approach to analyse testimonies while employing coding techniques based in grounded theory to identify major themes in the narrative. Photographic data was also collected by visiting communities along the proposed route. These images were then triangulated with the coded narratives to produce a rich representation of the lived experiences of local residents.

Through this process, an expression of sense of place emerged that changed with landscape attributes. East of the Rockies, the mainly indigenous testimony is influenced by the cumulative effects of previous industrial projects and their associated environmental assessment hearings. West of the Rockies, testimony from both first nations and non-indigenous peoples provides an expression of place that is represented by ecological concerns, subsistence practices, and efforts towards aboriginal cultural renewal.

These themes combine to illustrate how the Northern Gateway proposal stimulates a strong sense of risk in many local residents which results in their willingness to stand up for the places they call home.
Teamwork Within Engineered Microbial Communities: Grace Yi (Faculty Sponsor: Dr. Joanne Fox)

The field of synthetic biology has long focused on creating “super-microbes” that can perform a myriad of novel functions. Contrasting this current paradigm, microbes in nature have evolved to survive as members of dynamic communities with distributed metabolism. This “divide and conquer” strategy of metabolism, which splits up the work among individuals, allows the community to perform more complicated processes than would be possible in single microorganisms. Furthermore, through cooperation, they become more resilient to environmental changes.

Despite recent proofs-of-concept in developing model microbial consortia, or synthetic ecology, questions remain as to whether complex metabolic pathways can be engineered in the context of microbial populations. The 2012 UBC iGEM team set a precedent by engineering a tunable three-membered consortium of auxotrophs. Each of these auxotrophs lack a gene needed to make one type of amino acid, a biochemical compound crucial to survival. They are thus not self-sufficient and must rely on the other members within the microbial community for these essential nutrients.

Major advantages of employing this concept include easing the individual burden associated with expressing large, complex pathways and facilitating spatial organization of these reactions. In practice, utilizing consortia could increase the yield of desired biosynthetic products, a current issue in biotechnology. To explore a real-life application of this concept, we distributed a desulfurization pathway among members of a microbial consortium. Increased efficiency in this process will optimize the removal of organosulfurs in heavy oils and bitumen resources, which contribute heavily to acid rain when burnt as fuel.

First Language Literacy: Using Orthography to Empower the Nabit Speakers of Ghana: Robyn Giffen (Faculty Sponsor: Dr. Christine Schreyer)

Working with fluent Nabit speaker and Nabdam community member, Vida Yakong, I created a preliminary alphabet for the language of Nabit, an oral language spoken in the Upper East Region of Ghana. Nabit is a minority dialect of the language of Frafra, and is spoken only in the Nabdam district by approximately 10,000 speakers. With the relatively low speaker population, the small geographic region, and the increasing use of other indigenous languages and the national language of English, Nabit is a language at high risk of falling out of use, especially as a first language for children.

My research addresses the issues Nabit speakers face in using and maintaining their language in a multi-lingual society. The
creation of a writing system will help Nabit speakers use their language in a new way to protect it from becoming even more endangered. To conduct this research, I recorded the sounds of Nabit and suggested symbols that could represent each sound to Vida, who made the final decisions about the writing system on behalf of the Nabdam community. I also created an alphabet book that included all 52 letters, which will be sent back to the community in Ghana for feedback, so that the writing system can be finalized.

My research, and in particular the alphabet book, are important first steps towards literacy and mother-tongue education for Nabit speakers. This is important for the community because Nabit speakers can be educated in a language they understand which will provide opportunities for personal and economic growth.

Earth, Living Cultures & the World (BUCH D316)

Effects of Oophaga Pumilio Tadpoles on Aquatic Communities and Nitrogen Isotopes of Bromeliads at La Selva Biological Station, Costa Rica: Cora Skaien (Faculty Sponsor: Dr. Diane Srivastava)

To encourage conservation efforts for organisms or ecosystems, studies must determine the roles of species within their respective communities. The tree-frog Vriesea bituminosa, for example, influences nitrogen composition of Brazilian bromeliads by altering the ratio of nitrogen isotopes within the plant’s tissues (Romero et al. 2010). Isotopes are different forms of an element, with one form often being naturally more abundant (e.g. nitrogen-14). Higher proportions of the nitrogen-15 isotope in an organism’s tissues are indicative of nutrients obtained from sources that are higher in the food chain (Peterson and Fry 1987). Epiphytic bromeliads are plants that grow on trees but only obtain nutrients from material that falls into their leaf axils. These axils provide habitat for numerous invertebrate larvae and tadpoles of the Strawberry Poison Frog, Oophaga pumilio. Tadpole mothers provision their offspring with unfertilized eggs every 1-8 days for six weeks (Limerick 1980; Weygoldt 1980).

The effect of these tadpoles on the aquatic communities and the nutrients available to bromeliads is currently unknown. I conducted a survey of natural bromeliads in Costa Rica by collecting leaf samples and the invertebrate communities within axils to determine differences in nitrogen isotopes and community structure between bromeliads that contain tadpoles and those that do not.

Preliminary results suggest that the presence of these tadpoles does not influence the aquatic community, but drastically impacts bromeliad nutrition. These results contribute to a better
understanding of how O. pumilio tadpoles influence community structure and nutrients within bromeliad axils of Costa Rica’s declining rainforest.

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Light- and Phytohormone-induced Cell Expansion and Senescence of Excised Cucumber Cotyledons: Gurkirt Grewal & Aman Arora (Faculty Sponsor: Dr. Santokh Singh)

In order for plant cell expansion to occur, a plant's cell wall must increase in cell wall extensibility, increase in growth-effective turgor pressure or decrease in wall yield threshold. Plant hormones have been involved in the regulation of cell growth and leaf senescence in various plant species. However, there is little information about the precise requirement of optimum hormone concentrations and their interaction with other hormones in relation to cell growth and senescence in cotyledons.

The objective of our research was to investigate the concentration-dependent effect of various plant hormones, such as cytokinins, brassinosterioids, auxins, gibberellins, and abscisic acid (either alone or in various combinations) on cell expansion, protein profiles, and chlorophyll content in cucumber cotyledons using microscopy, gel electrophoresis, and spectrophotometric methods respectively.

For our project we have already studied the effects of cytokinins, specifically 6 benzylamino purine (BAP), zeatin, and kinetin in their influence on cell growth and expansion, light harvesting complex B2 protein content, and chlorophyll content, in cucumber cotyledons, and in each of the cases we have found that there was an increase in cell size and chlorophyll content compared to the controls. We are choosing to use cucumber cotyledons because they are the storage organ for the young seedling and become the embryonic first leaves after germination. The implications of the findings from this study can help us to understand the precise roles of specific plant hormones and their interaction with other hormones to regulate cell expansion and photomorphogenesis in cucumber cotyledons.

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Sounding Southern: Preferential Spontaneous Phonetic Imitation in Children: Jamie Russell (Faculty Sponsor: Dr. Molly Babel)

Recent research has shown that adults unconsciously imitate characteristics of a speech stimulus and that social preferences mediate this behaviour. The role of spontaneous imitation in children, however, has gone unstudied. This study aims to investigate the role of social context in phonetic imitation by children aged 3 to 6 years via exposure to a Southern US speaker.
Thirty-two children completed a picture-naming task of 25 items; this elicited baseline productions. Half the children were then exposed to an audio-visual presentation of the Southern US speaker telling a “nice” narrative, while the other half were exposed to the same speaker telling a “mean” narrative. Next, both groups participated in a naming task where the model talker prompted the child to repeat a target word from the list of 25 items; for example “This is a banana; now you say banana!” Upon prompting the child uttered the target word, producing the shadowed token. Using these baseline and shadowed productions, listeners from UBC were asked to judge which token sounded “more Southern;” this judgement allows for a holistic assessment of how experimental condition (nice or mean) mediates imitation.

In addition to perceptual measures, acoustic analysis of the children’s productions will provide us with a clearer picture of how social preference can affect imitation, particularly with respect to gender and age. Beyond addressing the cognitive link between speech perception and production, this research also provides the opportunity to understand the potential role of imitation in creation and maintenance of childhood social relationships.

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The Locked Door: Revelations and Recollections of Segregation and Subordination in the Immigrant Shared-Church Experience: Julia Jeong Hyun Park (Faculty Sponsor: Dr. Jennifer Jihye Chun)

Recent developments in transnational studies have found that second-generation cohorts, or people who have been born to immigrant parents, are prone to perceive more feelings of discrimination and vulnerability (Reitz & Banerjee 2006).

For my research endeavor, I compared this surprising data to theories of second-generation integration, particularly in respect to the experience of children (Boyd & Grieco 1998; Hou, Balakrishnan & Jurdi 2009; Menjivar 2006) to conduct an ethnographic profile on Saehanul Church, an immigrant congregation that borrows the building of Hillside Church for its religious services. Many churches in Canada can be identified as immigrant congregations that are too financially strained to have a building of their own. As a result, they rent space from larger, financially independent, English-language congregations. I decided to analyze the power relations that were present in the church-share arrangement through this profile.

Through a series of qualitative interviews with leaders from both congregations, as well as a focus group with four members of the immigrant church, I found that feelings of inferiority and subjugation were indeed present within some members of the immigrant church, and that the hierarchical restriction of information and
communication regarding the usage of church space exacerbated these perspectives. These intersections of class and race in the ethnographic profile of Saehanul/Hillside parallel those found in the perspectives of the Canadian second-generation population. Such finds suggest the importance of breaking out of the traditional “immigrant success story” myth and highlight the complexities that must be considered in future multicultural policymaking.

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**Doctorates: The Future Is Here**
(BUCH D317)

**Correlations Between Corpus Callosal Myelin Water Fraction and Measures of Transcallosal Inhibition in Multiple Sclerosis Patients on Glatiramer Acetate Treatment: Eric Y. Zhao**
(*Faculty Sponsor: Dr. Alex Mackay*)

Multiple sclerosis (MS) is a disease of the central nervous system characterized by acute clinical and subclinical attacks of inflammation and progressive neurodegeneration. Demyelination of the corpus callosum, a structure which connects the two hemispheres of the brain, is believed to be closely related to brain function deficits.

Using magnetic resonance imaging it possible to measure the relative amount of water trapped between myelin bilayers (myelin water fraction, MWF). MWF is directly related to myelin content and, therefore, allows in vivo monitoring of myelination state. Transcranial magnetic stimulation (TMS) can assess cortical excitability and neurophysiologic function between homologous regions of the motor cortex mediated by transcallosal connections. Transcallosal inhibition (TCI) is observed as a transient weakening of voluntary muscle contraction ipsilateral to TMS stimulation due to inhibition through the transcallosal pathway.

In this study, we aim to characterize the relationship between MWF in the corpus callosum and the conduction of the inhibitory signal across the corpus callosum observed in TCI. This may guide the use of myelin water imaging (MWI) for evaluating treatments that have potentially neuroprotective effects. Preliminary analysis of MWI and TCI in 12 subjects showed a significant negative correlation between onset of inhibition and MWF in regions carrying motor and sensory transcallosal fibers (motor $p = 0.043$ and sensory $p = 0.013$). Positive correlations were observed between motor region MWF and both the duration ($p = 0.084$) and magnitude of inhibition ($p = 0.037$). These findings suggest that demyelination plays a role in functional decline in MS, and can be effectively assessed by myelin water imaging.

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Children’s Mental Representation of Brand Concepts: Zhenxinyu Zhang (Faculty Sponsor: Dr. D. Geoffrey Hall)

Nowadays, people’s daily lives are filled with brands. From beverages to consumer electronics, brand names have become increasingly powerful in shaping the way in which people refer to commercial products. This modern phenomenon has inspired much brand-related research in various fields. Sadly, much of the existing literature only emphasizes on how children use brand names and extremely little has been done to understand what brands actually mean to children. This lack of attention is surprising, because the entities in the extension of brand concepts are a strikingly non-obvious set.

To address this issue, a series of three research projects involving five year olds are currently in progress at the Language Development Centre at UBC. In the first two studies, children are presented with different sets of objects and informed of the function and maker of the objects. Each object has a sticker logo on it indicating its brand, to which a name is given. By observing how children use given brand names to refer to the objects, study 1 has revealed a distinction of kind-labelling and brand-labelling of the objects; study 2 has found children’s lack of understanding of brand concepts (i.e., children cannot associate the maker of a particular object with its brand). The third starting study aims to replicate study 2 but with its focus shifted from objects to substances. All three studies have adult participants as control groups. Findings of the first two studies along with the third study's preliminary results will be presented at the conference.

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The Synthesis of New Pyrazole Compounds for Anti-Inflammatory, Neuroprotective, and Anti-Cancer Drugs: Jeffrey O’Keefe (Faculty Sponsor: Dr. Ed Neeland)

Pyrazoles are a class of chemical compounds with a molecular structure that can be modified to create a wide range of derivatives, which are useful in treating a variety of medical conditions. In this way, a series of neuroprotective and anti-inflammatory pyrazole-based drugs have been produced and patented by researchers at UBC Okanagan in 2010. These drugs were found to be more potent and faster acting than anti-inflammatory drugs currently on the market.

The objective of this research project was to further modify the structures of this novel series of drugs to improve their safety and therapeutic applicability. This process began by determining an appropriate synthetic approach to produce new target molecules and their precursors. Careful control of temperature, reaction time and
reaction scale produced two new pyrazole compounds.

One of the new compounds was a homolog of the original parent compound that is more readily modified than the original. The second new compound was a chlorinated version of the original that potentially performs a different function in a living organism. The structure of each new compound was confirmed using chromatography and instrumental spectroscopies. Once pure, the biological activity of the new compounds was tested using in vitro bio-analysis, in which cell lines were treated with varying concentrations of the new compounds, and then subjected to pro-inflammatory agents. Based on the results of this analysis, the chlorinated compound possessed neuroprotective properties while the homolog was biologically inactive.

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**Novel Pyrazole Compound Reduces Astrocyte Toxicity: Jenelle Lamothe (Faculty Sponsor: Dr. Andis Klegeris)**

Chronic inflammation in the brain is a common characteristic of neurodegenerative disorders, such as Alzheimer’s and Parkinson’s disease. Under inflammatory conditions, certain non-neuronal cells become activated and secrete neurotoxic, inflammatory mediators that cause neuronal cell death. The cyclooxygenase (COX)-2 pathway is known to be responsible for production of such pro-inflammatory compounds. Therefore, inhibition of COX-2 is a potential target for treatment of neurodegenerative diseases. However, inhibition of COX-2 by currently available highly selective inhibitors such as Celecoxib leads to numerous side effects including adverse cardiovascular events. Consequently, inhibitors with better pharmacological properties are needed.

This project explored the effects of novel pyrazole compounds on the inflammatory response of one type of non-neuronal cells, astrocytes. This was accomplished by assessing the ability of pyrazole compounds to decrease the toxicity of astrocytes towards neuronal cells.

To study the anti-inflammatory properties of these compounds, U373 and U118 astrocytic cells were activated using pro-inflammatory stimuli in the presence and absence of the pyrazole compounds. After 48 hour incubation, astrocyte supernatants were transferred onto SH-SY5Y neuronal cells. Neuronal cell viability was assessed 72 h later using two different biochemical assays; one detecting live cells, by measuring production of a purple dye by actively metabolizing cells, and the other measuring cell death by evaluating amounts of an enzyme released from dead cells.

One of the compounds studied decreased the secretion of toxic products by astrocytes. Future research with this compound may involve testing it using primary human astrocytes and in animal models of neurodegenerative disease.
Workshop

**Undergraduate Research: An Enriched Educational Experience**

Irving K. Barber Learning Centre (302: Dodson Room), 12:45pm – 1:45pm

This interactive workshop will explore the various opportunities, pathways and avenues for undergraduate students to get into research. The importance of undergraduate research in teaching and learning in the 21st century will be discussed. Active participation by the audience will be encouraged.

**Speaker:** Dr. Santokh Singh, Senior Instructor, Department of Botany, UBC

Dr. Santokh Singh is Senior Instructor in the department of Botany at the University of British Columbia. He obtained a M.Sc. degree in Botany from Punjab Agriculture University in 1981 and a Ph.D. in Plant Cell Biology from Australian National University in 1988. From 1989 to 1992 he was a Postdoctoral Fellow in the Biology department at the University of Saskatchewan. Dr. Singh moved to the University of British Columbia in 1992, where he has been involved in teaching and research in the field of plant biology. He is the chair of the Teaching section of the Canadian Botanical Association (CBA/ABC). Dr. Singh received the Killam Teaching Award in recognition of outstanding teaching in May 2011.
Poster Presentation Session

An Acoustic Description of Glottalized Obstruents in Gitksan – **Michael David Schwan**

Antidotes for Oral Anticoagulants – **Shanli Parnia, Boden Anderson, Dixon Leroux**

Attention, Personality Style, and Event-Related Potentials – **Samantha Feldman**

Attentional Resource Distribution in a Real Reaching Task – **Javier Granados-Samayoa**

Auxin, Gibberellin, and Cytokinin in Relation to Apical Dominance in Bean Plants – **Molly Cheng**

Avoiding the Unavoidable: The Effects of Distractor Location on Eye Movement Trajectories in an Antisaccade Task – **Mona Zhu**

Can Aquatic Viruses be Used as Biocontrol on the Aquatic Weed Myriophyllum Aquaticum? – **Jane Bai, Tun-Min Lisa Cheng**

Can Repetitive Transcranial Magnetic Stimulation Increase the Cortical Excitability of Lower Facial Muscles in Stroke Patients Thus Recover the Patients’ Ability to Smile? – **Rachel Zhao, Anica Villamayor**

Changing Health Determinants in a University Campus Community: Action Research and Student/Non-Student Partnerships – **Alexa Geddes**

Chemical Responses of Sitka Spruce (Picea sitchensis) to Insect Damage by the Western Hemlock Looper (Lambdina fiscellaria lugubrosa) and the Sitka Spruce Weevil (Pissodes strobi) – **Ching-Yi (Jenny) Chen**

Chimeric Antigen Receptor (CAR): a Novel Approach to Immunotherapy for Crohn’s Disease – **Jacqueline Siu**

Comparing the Difference in Glucosinolate Concentrations Across Garlic Mustard Populations – **Jerold Chu, Victoria Lei**

Comparison of HR-pQCT and DXA on Fracture Risk Prediction – **Joe Liu, Taylor Scott**

Effect of Rectal Cancer Treatment on Quality of Life – **Ada Lo**

Effect of Size on the Perception of Identity in Blurry Faces – **Kimia Shahangian**
Effects of Protonated Nanostructured Aluminosilicate on Vitamin D3 and K1 Intestinal Absorption in Rats – Carly Wong

Effectiveness of Dabigatran in Treating AD Pathology – Harani Ramasamy

Emotion Expression: An Analysis of the Development of Gender Stereotypes through the Expression of Emotion – Megan MacPherson

Gender Effects on the Interpretation of Memory Failures – Sophia Solomon

Helping hands to helping minds: How Volunteering Affects Perception of Academic Performance – Heather Herriot, Shirley Bi

Here, There, and Everywhere: Spatial Location Modulates the Effect of Self-Relevance on Memory Accuracy – Simon Ho

Human Potential, Human Progress, and Human Objectivity: The Philosophical Constitution of Classical Music Criticism in d’Alembert’s Discours préliminaire (1751) – Grace Ma

Immunotherapeutic Approaches for Gliomas – Ramy Alesi Slama, Jay Paul Gill

Inter-sex Differences in Susceptibility against an Amyloid-beta Infusion – Christina van den Brink

Keeping Up with Change: Neural Mechanisms of Probabilistic Reversal Learning – Nena Wang

Last Names: A Measure of Social Dissimilarity – Leo Fankhanel

Mindfulness-Based Cognitive Therapy for Provoked Vestibulodynia: Women’s Feedback and Treatment Experiences – Pretty Verma

Novel probes for the identification of EGFR-T790M mutation – Daniel Bronder, Jeffrey Hao-Chan Huang, Herman Wu

Parental Care Motivation and Mate Preferences – Jiwan Choi

Phonetic Imitation - David Haist

Protecting Transplanted Human Islets from Allogeneic Responses Using Naturally Immune Privileged Human Hair Follicle Cells – Nicole Kwong

Problem Solving Strategies of Video Gamers: Are They Different? – Stephanie Stoltenberg
<table>
<thead>
<tr>
<th>Title</th>
<th>Author/Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Influence of Gender Roles on Food Security in Small-scale Fisheries in the Central Philippines</td>
<td>Paramdeep Nahal, Emily Bolton, Marysia Grzybowski</td>
</tr>
<tr>
<td>The Effect of Eye Gaze on Memory</td>
<td>Soo Jeong (Crystal) Byun</td>
</tr>
<tr>
<td>The Effect of &quot;Free&quot; on the Decision-Making Process</td>
<td>Nathan Wispinski</td>
</tr>
<tr>
<td>The Effects of GABA Antagonist in Medial Prefrontal Cortex on Effort Based Decision Making</td>
<td>Agnes Cywinska</td>
</tr>
<tr>
<td>The Effects of In-Ovo Cortisol Exposure on Stress-Axis Function and Anti-Predator Behaviours in the Threespine Stickleback</td>
<td>Callum Kingwell</td>
</tr>
<tr>
<td>The Evolution of Lotus (Leguminosae) of the Cape Verde Archipelago</td>
<td>Yee Sing Ong</td>
</tr>
<tr>
<td>The Relationship of ADHD Symptom Expressions in Fathers and Children: Differences Between Families with Biological Fathers and Children, and Families with Non-Biological Fathers and Children</td>
<td>Vernon Lee</td>
</tr>
<tr>
<td>The Role of Microglia Activation After Mild Repetitive TBI in the Development of Alzheimer’s Disease</td>
<td>Melody Lu</td>
</tr>
<tr>
<td>The Significance of PTPRG as a Cancer Suppressor in Cervical Cancer Cells</td>
<td>Frank (Zhexian) Liu</td>
</tr>
<tr>
<td>Unpacking the Feedback-Withholding Bias: How Anonymity, Remoteness and Personal Ideologies Influence Evaluation of Minority Students’ Work</td>
<td>Alice Fleerackers</td>
</tr>
<tr>
<td>Using Novel Software to Design and Develop More Effective Vaccines for Whooping Cough</td>
<td>Neil Xu, Lianna Wang</td>
</tr>
<tr>
<td>Western Red Cedar: Eagle Tree History Through Tree Rings</td>
<td>Ashley Dobko</td>
</tr>
<tr>
<td>Who Sticks Around: Drop-out Rates in Clinical Health Research</td>
<td>Mingyang Wang</td>
</tr>
<tr>
<td>What is a ‘Family’?</td>
<td>Christine Kim</td>
</tr>
</tbody>
</table>
An Acoustic Description of Glottalized Obstruents in Gitskan: Michael David Schwan (Faculty Sponsor: Dr. Molly Babel)

Gitskan is an endangered language of the Tsimshianic family spoken in northern British Columbia by approximately 400 first-language speakers. Like most languages of this linguistic area, it has a set of sounds (glottalized obstruents) that are produced by the timed closure of the glottis (the vocal cords and the opening between them) relative to the oral closure. These sounds are typically identified by a characteristic burst that is heard as a result of the timing in closures. Compared to other languages of this region, the glottalized obstruents of Gitskan have proven themselves to be more difficult for linguists to categorize. The sounds are perceived as being weakened to the point that they are transcribed as plain obstruents (/p t k/). This presents a challenge to the researchers doing documentation of the language since accurate transcription is essential to the task.

This study is a quantitative description of the acoustic phonetic features that define what a glottalized obstruent is in Gitskan. Speech tokens from a native speaker of Gitskan have been analyzed according to several acoustic measurements. These measurements include voice onset time, stop burst amplitude, voice quality of neighbouring vowels, and closure duration. Measurements are made in Praat (Boersma & Weenink 2013), a computer program used to perform speech analysis. The results of this study will contribute to the cross-linguistic understanding of what acoustically constitutes a glottalized obstruent and will shed light on which acoustic cues are most salient, thereby assisting in accurate categorization during transcription.

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Antidotes for Oral Anticoagulants: Shanli Parnia, Boden Anderson, Dixon Leroux (Faculty Sponsor: Dr. Ross Macgillivray)

Blood clotting is the result of a series of reactions involving the activation of a group of blood proteins called the clotting factors. The end result is the thrombin-catalyzed conversion of soluble fibrinogen to an insoluble fibrin polymer that forms the basis of the blood clot.

Recently, a new group of anticoagulant agents have been developed. These are small molecule inhibitors of factor Xa (rivaroxaban) and thrombin (dabigatran) that bind tightly to the protease active site. The new anticoagulants have the advantages of being taken orally and not requiring the continuing assessment of clotting potential. However, there is no current antidote to the anticoagulant effect of rivaroxaban or dabigatran. This can result in life threatening situations when the blood clotting is vital in order to prevent blood loss due to an injury. In order to test
the hypothesis that the marine extracts contain an antidote for dabigatran and/or rivaroxaban, a microtiter plate-based assay for the inhibitory effect of compounds is developed. The assay utilizes factor Xa and the chromogenic substrate S2765. Factor Xa cleaves the S2765, releasing p-nitroanilide which can be detected by its yellow color that absorbs at 405nm. When added to the reaction mixture, rivaroxaban binds to factor Xa and inhibits the formation of p-nitroanilide giving a colorless reaction. This colorimetric reaction will be the basis of a high-throughput screen for compounds that are able to bind to rivaroxaban and inhibit its binding to factor Xa. In the case that an active compound is found, that particular marine extract will be used as to purify a large amount of the compound for structural analysis.

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Attention, Personality Style, and Event-Related Potentials: Samantha Feldman (Faculty and Graduate Student Sponsors: Dr. Todd Handy, Julia Kam)

Event-related potentials are electroencephalographic responses to external stimuli that can provide an objective measurement of how information is processed in the brain. They have been of interest in both schizophrenia and schizotypal personality type. Gassab et al. have found abnormalities in attentional processing during a decision making paradigm including a described reduced amplitude of the late P300 wave in response to a behavioural target. There is increasing speculation that there is a prodromal phase of schizophrenia for which early disease markers such as abnormal ERPs would be particularly important.

This study investigated the relationships between attentional states (‘on-task’ vs. ‘mind wandering’) and auditory processing in individuals with varying levels of schizotypal personality traits. We predicted that the interaction between auditory processing and attentional states will depend on one’s level of schizotypal personality traits. We recruited 80 subjects from the human subject/participant pool (HSP) to participate in this correlative study.

All subjects were administered the Schizotypal Personality Questionnaire (SPQ) a scale with 74 items and 9 subscales. Participants were also administered an evoked auditory stimulus of while having a electroencephalographic cap which allowed measurement of the N100 response while subjects were concurrently taking part in the State Attention to Response task. Experience sampling at various points during the electrophysiological testing was undertaken to allow a classification of whether subjects were in a ‘mind wandering’ or a ‘on task’ state in relationship to their performance of the state attention to response task and to their evoked responses.

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Attentional Resource Distribution in a Real Reaching Task: Javier Granados-Samayoa (Faculty Sponsor: Dr. Todd Handy)

In the past, attention was conceptualized as a single spotlight-like mechanism that selects stimuli in the visual field. However, natural environments are filled with objects that are potential targets for action. Such environments necessitate that several motor plans be encoded in parallel before one is selected for action.

The aim of the investigation was to use EEG to shed light on the distribution of attention to multiple real objects in a simple reaching task. Participants performed lateral reaches to one of two objects, located to the left and right of center, while seated.

To answer our question, we measured the VEP in response to a flash of light presented on top of the left object before participants knew the goal of their reach (i.e., left or right object). We compared the VEP for trials where the left object was presented in isolation to trials where both the left and right objects were present. The conditions did not differ significantly in terms of the P1 and N1 components. However, the results revealed a greater amplitude of the P2 component when the object was presented by itself compared to when the objects were presented together.

Previous research has shown that the amplitude of the P2 component is larger at attended locations. Thus, the greater amplitude of the P2 component when an object is presented alone indicates that there is a cost splitting of attention between multiple potential targets, likely produced by competition between the parallel motor plans.

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Auxin, Gibberellin, and Cytokinin in Relation to Apical Dominance in Bean Plants: Molly Cheng (Faculty Sponsor: Dr. Santokh Singh)

The objective of my project is to study how the plant hormones, including cytokinin, auxin, and gibberellin affect the apical dominance of bean plants. I also propose to investigate how the hormone concentration and combination with other hormones can play a role in developmental plasticity.

For instance, in my initial trial, I applied a cytokinin, 6-benzylaminopurine (BAP) to three-week-old bean plants with either intact or excised apical buds. After a week of BAP treatments, I observed that plants with either intact or excised apical buds showed greater petiole growth for the first pair of lateral leaves when compared to the plants with excised apical buds. Internode elongation was found to be negatively correlated with exogenous BAP concentrations; the greatest growth was observed in control.
In contrast, in the condition of high BAP concentration, internode elongation is restricted due to the inhibitive effect of BAP on hypocotyl length and root length. Although lateral bud development is observed in all treatments for both intact and excised plants, it’s more often observed in excised plants treated with high BAP concentration. The first pair of leaves in these excised plants was much greener than that in intact plants or excised plants treated with lower BAP concentrations. In the next set of experiments, I am going to study how other hormones influence apical dominance and how they interact with BAP to change the developmental scheme of the bean plants.

Avoiding the Unavoidable: The Effects of Distractor Location on Eye Movement Trajectories in an Antisaccade Task: Mona Zhu (Faculty Sponsor: Dr. Alan Kingstone)

Despite our ability to plan actions based on our goals, the human attentional system is often captured by objects, people, or situations even when there is no intention to stray from the task at hand. Studies have demonstrated that distractors at different spatial locations can influence the path that the eye takes when looking to a target, such that distractors closer to a target object will cause greater deviation than those further away. However, past research has mainly assessed eye movement curvature based on paradigms where the goal of the task is to look to a physical item; it is unclear whether it is important that the distractor be near a physical object, or simply near a goal location.

Therefore, the current experiment aims to examine the effect of distractor location on eye movements in which the goal of the eye movement is not a physical object. In this study, participants’ eye movements were recorded while they were asked to move their eyes in the opposite direction from a target, while simultaneously ignoring a task-irrelevant distractor object placed close to the target or goal location. We predict that eye movement deviation should be greatest when the distractor is presented close to the goal location, rather than close to the target object. Findings from this study would enable us to examine how the visual system plans eye movements based on both the physical location of objects in the environment as well as the higher-order goals held by the participant.

Can Aquatic Viruses be Used as Biocontrol on the Aquatic Weed Myriophyllum Aquaticum?: Jane Bai, Tun-Min Lisa Cheng (Sponsor: Julia Gustavsen)

Myriophyllum aquaticum, commonly known as Parrot feathers, are invasive aquatic weeds found in the Lower Mainland freshwaters, outcompeting many native aquatic plants, decreasing the sources of nutrient for many organisms. Aquatic
weeds project a global problem, which have been attempted to be eliminated by various forms of biocontrol. Viruses are good biocontrols due to its self-replicating, self-sustaining, and target specific aspects, which would decrease the costs spent each year cleaning infested lakes.

This experiment will investigate if aquatic viruses can be used as biocontrol on M. aquaticum. During this experiment aquatic viruses that are known to infect related species of M. aquaticum will be introduced. Plant decay and other signs of infection will be indicative of a successful virus. This virus would be further isolated from the plant tissue to confirm its role in plant death. Not many species of aquatic viruses have been discovered yet to have significant affects on aquatic plants. During this experiment, different aquatic virus species may be introduced to M. aquaticum to observe possible signs of infection.

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Can Repetitive Transcranial Magnetic Stimulation Increase the Cortical Excitability of Lower Facial Muscles in Stroke Patients Thus Recover the Patients’ Ability to Smile? Rachel Zhao, Anica Villamayor (Sponsor: Sonia Brodie)

Facial muscle impairment is commonly observed in chronic stroke patients and may significantly impact their lives, physically and socially. Repetitive Transcranial Magnetic Stimulation (rTMS) is a painless and non-invasive technique that stimulates the brain through the skull, which may be used to alter excitability in specific areas of the brain. Previous studies have shown that rTMS paired with traditional therapy may help improve the cortex excitability associated with the movement of upper limbs in stroke patients; however, the effects of rTMS on lower facial muscles, which are vital to the formation of facial expressions, have not been investigated.

A recent study conducted by Pilurzi et al. (2013) found that plastic changes can occur after exciting the facial motor cortex and given this information we want to investigate the use of rTMS to change the cortex excitability of chronic stroke patients, thus, improve their smile symmetry.

In this study, we will be coupling rTMS with facial exercises to determine if this stimulation will improve the patient’s ability to use the lower facial muscles critical to bilateral smile. Findings from this study could possibly provide insight to developing rehabilitation treatments for other types of facial paralysis as well.

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Changing Health Determinants in a University Campus Community: Action Research and Student/Non-Student Partnerships: Alexa Geddes (Faculty Sponsor: Dr. Claire Budgen)

Healthy community development in educational settings has been a research focus for several decades. While the theory is appealing, application has been challenging because campus life and human behaviour are influenced by many factors. Changing health determinants (e.g. physical, social, environmental, organizational) is one approach to improving the health of a community.

This presentation reports on a study at UBC’s Okanagan campus which aims to increase knowledge about changing health determinants when students and non-students work together, taking into account diverse perspectives. The study is part of a long-term research program (VOICE) which uses participatory community action methods, setting-based health promotion strategies and youth/adult partnership theory. The participatory process has effectively engaged a diverse cross section of students, faculty, staff, administrators and campus business people, to act to improve their campus.

In fall 2012, one hundred and fifteen undergraduate student researchers conducted a campus health assessment using photographic and survey methods. About 30% of the campus population participated in the Community Dialogue survey (n=3257). Current study activities include partnership development and mobilizing existing resources to create health-promoting campus change. Also, experiences of student population sub-groups are being explored through focus groups and talking circles, e.g. Aboriginal, Varsity Athletes, International and LGBTQ. Study methods are designed to strengthen credibility, generate a sense of equality among students and non-students, and stimulate problem-solving ideas.

Results to date will be described including priority interests of the campus community (e.g. food, physical activity, transportation, drinking water etc.), along with collaborative actions underway to create change.

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Chemical Responses of Sitka Spruce (Picea sitchensis) to Insect Damage by the Western Hemlock Looper (Lambdina fiscellaria lugubrosa) and the Sitka Spruce Weevil (Pissodes strobi): Ching-Yi (Jenny) Chen (Sponsor: Dr. Katrin Geisler)

Spruces are of great commercial and ecological interest; however, spruces, as other conifers, are threatened by various insect attacks throughout their lives. Research has shown that trees evolved chemical defense mechanisms against
insect attacks. By comparing chemical responses of Sitka spruce towards two different species of insects, it is possible to further understand the variation in response and regulation caused by these insect attacks.

For the proposed experiment, Western hemlock looper and Sitka spruce weevil are chosen as they are particularly harmful to Sitka spruce (Natural Resources Canada 2011). Generalists (loopers) can damage a variety of trees species whereas specialists (weevils) are specialized on spruce and are better adapted to counteract its defenses resulting in possible differences in tree response. The focus is on the larvae stage of the insects. Weevils lay eggs in the bark and emerging larvae (from May to July) substantially damage trees while travelling inward; looper larvae consume leaves and have a similar larvae duration compared to the weevils (from May to August) (Natural Resources Canada 2011; Lippert et al. 2007).

To control for physical damage, holes mimicking insect attacks need to be drilled and the response measured. The emphasis is on earlier response so each trial lasts for a week. To control for biological diversity, two Sitka spruce genotypes will be used. Similarly, genotypes of insects need to be controlled. Bark and needle samples will be analyzed to determine the chemical profile after insect treatment and to gain a further understanding on Sitka spruce response.

Chimeric Antigen Receptor (CAR): A Novel Approach to Immunotherapy for Crohn’s Disease: Jacqueline Siu (Sponsor: Rosa Garcia)

Crohn’s Disease (CD) is an inflammatory bowel disease that causes inflammation in the gastrointestinal tract. Evidence suggests that common components such as flagellin, a protein in typical gut bacteria, may trigger intestinal inflammation and initiate CD. Inflammation is caused by white blood cells known as T-cells that can recognize and overreact to flagellin. To prevent an overreaction to harmless substances such as flagellin, a special class of T-cells known as regulatory T-cells (Tregs) are present to regulate T-cell mediated reactions.

We believe by making Tregs specific to flagellin and activating Tregs’s ability to downregulate T-cells, we can help reverse inflammation in CD patients. In this study, we aim to generate Tregs that recognize flagellin by adding a genetically engineered protein known as Chimeric Antigen Receptor (CAR). This protein will help redirect a population of normal Tregs into Tregs that activate specifically to flagellin and only suppress intestinal inflammation. Our CARs consists of an extracellular part from the “lock and key” region of an antibody that recognizes flagellin, a transmembrane “spacer”, and an intracellular part that signals the cell. The recognition of an antigen via the extracellular part of the CAR triggers the
intracellular part that then activates the Treg.

We will confirm the specificity of the CARs and then express the CARs in Tregs and test if this will re-direct the cells to flagellin-specific cells. These findings will help pave the way to develop the first antigen-specific cell based therapy for patients with Crohn’s Disease.

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Comparing the Difference in Glucosinolate Concentrations Across Garlic Mustard Populations: Jerold Chu, Victoria Lei (Sponsor: Robert Colautti)

Garlic mustard (Alliaria petiolata) is an invasive plant species native to Eurasia that was spread to North America in the 1860’s. Garlic mustard has the ability to produce allelochemicals, specifically glucosinolates, that can disturb the growth and survival of many competing plants by supressing the mycorrhizal fungi found in the competitor’s roots. Even though the concentration of glucosinolates from plants across North America have been measured, their concentrations have not been compared to native populations in Eurasia.

Our attempt at comparing the difference in glucosinolate concentrations first requires the extraction of allelochemicals from leaf tissue. Afterwards, a spectrophotometer will be used to measure the absorbance of the solution, and then the concentrations can be determined by comparing it to a standard curve. This study’s findings could give more insight as to how invasive plants adapt to their environment using allelochemicals. Due to the absence of natural predators, one prediction is that the invading plants in North America produces less glucosinolates than the native population, which would allow them to spend more resources on growth instead.

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Comparison of HR-pQCT and DXA on Fracture Risk Prediction: Joe Liu, Taylor Scott (Sponsor: Leigh Gabel)

Osteoporosis is a disease characterized by increased risk of bone fracture due to the thinning and weakening of bones. Osteoporotic individuals face not only the increased risk of fracture, but accompanied consequences including disrupted mobility, loss of independence, fear of falling and death. Currently dual-energy x-ray absorptiometry (DXA) is the primary diagnostic tool used to assess fracture risk through the 2-dimensional (2D) measurement of bone. However bones are structurally complex; thus, a simple 2D measure cannot fully assess the overall competence of bone or accurately predict fracture risk.

The relatively new imaging tool, high-resolution peripheral quantitative computed tomography (HR-pQCT), can
measure the 3D density, structure and strength of bone. Thus, our objective is to determine if HR-pQCT better at discriminating fracture risk compared to the current standard. We will recruit 200 women (≥ 60 years old) who have sustained low-impact fractures and 200 healthy female controls from the community, matched for age and ethnicity. We will perform assessments on participants using DXA and HR-pQCT and determine the accuracy of HR-pQCT for the classification of fractures and compare it to the current standard, DXA.

By better identifying those at greatest risk of fracture, we can decrease the large economic cost and public health burden imposed by osteoporosis.

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Effect of Rectal Cancer Treatment on Quality of Life: Ada Lo (Faculty Sponsor: Dr. Terry Phang)

A main goal of therapy is to return patients to their normal quality of life. At present, the standard of care for stage 3 or above rectal cancer patients undergo long course radiation for 6-8 weeks before surgery. After radiation, patients have a surgery performed using a technique called total mesorectal excision to remove the tumor and surrounding fat to ensure no residual malignant cells are in the body after surgery. Both long course radiation and surgery are associated with decreased quality of life for patients.

This study aims to determine the longitudinal effects of these treatments on quality of life. 15 rectal cancer patients were each followed and their quality of life measured at 3 time points: before radiation and surgery, after radiation before surgery, and one year after surgery called stoma closure. Two peer-reviewed validated questionnaires were used to capture patients’ quality of life scores: EORTC QLQ-C30, and EORTC QLQ C38. These questionnaires captured multiple aspects of a patients’ life that contribute to their quality of life and reported these outcomes in physical and emotional functioning subscales. The mean age of the patients was 62. Male to female ratio was 4:1. Subscales of emotional functioning, sexual enjoyment, and future perspective increased at one-year after treatment (p<0.04, 0.03, 0.01). Emotional functioning also improved from post radiation pre-surgery to 1 year after stoma closure (p<0.02). All other subscales of QOL did not change significantly after radiation or surgery.

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Effect of Size on the Perception of Identity in Blurry Faces: Kimia Shahangian (Sponsor: Ipek Oruc)

It was commonly accepted that face perception relies on middle spatial frequencies around 8 cycles per face-width. However, it has recently been shown that
the spatial frequencies critical for face recognition is not fixed but rather depends on size (Oruc and Barton 2010). This effect is especially pronounced at small sizes, where recognition is mainly based on low spatial frequencies (i.e. gross forms in the image), compared to larger sizes where middle frequencies (including finer details) are used. This scale-dependent recognition has been shown in the context of just-visible face images, but whether this would hold for supra-threshold perception is not clear.

We address this question by using an adaptation paradigm to examine face identity aftereffects using blurry and intact adaptors of two sizes: small (2 deg) and large (10 deg). The blurry adapting faces included the low spatial frequencies hypothesized to be used at the small size, but not the higher portion of the spectrum. Intact adaptors induced significant aftereffects regardless of size, while the blurry adaptors only produced aftereffects at the small size, and the large blurry adaptor failed to generate any aftereffect.

Since the large and small blurry adaptors were physically identical and contained the same information, the lack of identity aftereffects suggests an inability to access this low-frequency information for the purposes of perceiving identity at that size. These results confirmed size as a determining factor in processes of face perception, and that blurry faces are easier to recognize at smaller sizes.

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Effects of Protonated Nanostructured Aluminosilicate on Vitamin D3 and K1 Intestinal Absorption in Rats: Carly Wong (Sponsor: Fady Ibrahim and Kishor Wasan)

Protonated nanostructured aluminosilicate (NSAS) is a non-absorbable clay that was shown to be effective as an inhibitor of intestinal cholesterol absorption. Previous studies have shown that protonated NSAS effectively reduced total plasma cholesterol levels in rats and reduced atherosclerotic lesions in mice with specific affinity for cholesterol. However, the effect of NSAS on the intestinal absorption of nutrients is unknown. The purpose of this study was to assess whether the intestinal absorption of vitamins D3 and K1 would be affected by the presence of NSAS.

Adult male Sprague-Dawley rats were cannulated via right jugular vein and randomized into the following treatment groups: IV administration of vitamin D3 and K1, and a single-dose oral gavage of vitamin D3 and K1 in peanut oil with either 0 (control), 25, 50 or 75mg/kg slurry NSAS, 550mg/day NSAS in fortified diet, or 50 mg/kg stigmastanol. Blood samples were collected at pre-dose and over a 48 hour period post-dose. Concentrations of vitamin D3 and K1 in plasma were determined using high-pressure liquid chromatography. Pharmacokinetic parameters were derived using non-compartmental analysis.
The results indicated that high doses of protonated NSAS in slurry significantly affect the intestinal absorption of both vitamins D3. Incorporation of NSAS in diet does not significantly affect the absorption of the vitamins compared to the control. Therefore, NSAS could be incorporated in diet to treat hypercholesterolemia and could require vitamin D3 and K1 supplementation.

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Effectiveness of Dabigatran in Treating AD Pathology: Harani Ramasamy (Sponsor: Tom Cheng)

Alzheimer’s Disease (AD) is a progressive degeneration of the brain, causing memory loss and cognitive impairment. It currently affects over 35.6 million people worldwide and no cure is available. Its socio-economical impact is expected to further increase in future due to population ageing. One of the pathological hallmarks of AD is amyloid plaques, deposition of amyloid-beta peptide in the brain parenchyma. Yet, over 90% of AD patients also develop amyloid plaques around brain vessels, suggesting that neurovascular dysfunction may contribute to AD. However, its exact role in AD mechanism is unknown. Amyloid plaque deposition around blood vessels may induce the release of pro-inflammatory factors and blood clotting factors, such as thrombin.

As thrombin is neurotoxic and can trigger inflammatory response, we hypothesize that it may contribute to the development of AD. Dabigatran, a thrombin inhibitor, is an FDA-approved drug used for preventing blood clot formation. This study investigates its potential in treating AD. Genetically manipulated mouse model of AD will be treated with dabigatran at different doses daily for two weeks. Saline treated mice will serve as control. At day 7 post-treatment, spatial memory of mice will be assessed using Morris water maze test. The mice will then be sacrificed, and levels of thrombin and inflammatory markers in brain vessels will be measured by biochemical methods. Amyloid plaque deposition will be assessed by histology. Results from the two dosage groups will be compared to control. This study may provide support on using thrombin inhibitors in treating AD.

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Emotion Expression: An Analysis of the Development of Gender Stereotypes through the Expression of Emotion: Megan MacPherson (Faculty Sponsor: Dr. Kiley Hamlin)

An understanding of how and when different emotions are typically expressed, and by whom they are expressed- referred to as “display rules,” - are critical for accurately assessing the social world (Ekman & Friesen, 1975). One common emotional display rule regarding gender
indicates that women typically exhibit more emotion than men, particularly when expressing sadness, whereas men tend to be somewhat more emotionally reserved and show anger more than any other emotion (Bing, 2004; Williams and Best, 1990, 1999).

In the current studies, we utilized the LookingTime-ImplicitAssociationTest (e.g., Mahajan et al., 2011) to examine whether 5 and 15-month-olds demonstrate sensitivity to these gendered display rules. The basis of the study draws from my hypothesis that infants should take longer to habituate to gender/expression stimulus pairings that are inconsistent with the known display rule (men expressing sadness; women anger) opposed to gender/expression pairings that are consistent with the display rule (women expressing sadness; men anger).

Results indicated that there was no discrepancy with how long 5-month-olds looked at the consistent versus inconsistent stimulus; however, 15-month-olds who witnessed the inconsistent condition took longer to habituate than those in the consistent condition. The findings point to the idea that, by the age of 15 months, infants have at least some knowledge of display rules in emotion expression. This knowledge suggests that even from a very young age, deviations from known gender stereotypes are apparent to infants and may contribute to a child’s own gender development through adolescence.

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Gender Effects on the Interpretation of Memory Failures: Sophia Solomon (Faculty Sponsor: Dr. Peter Graf)

Previous research has shown that people judge prospective memory failures (e.g. forgetting to attend a planned meeting) as more serious than retrospective memory failures (e.g. forgetting where the car keys were left) (Graf, 2012). The former is seen as the mark of an unreliable person while the latter is seen as resulting from simply a bad memory. Research has investigated why we make this distinction and pilot studies have shown that it is possibly the inherent sociality of most prospective memory failures (i.e. the consequences of the failure affect other people) that renders it be judged as more serious (Crease & Graf, 2012).

This study investigated if the gender of the person who has committed the memory failure has an effect on the interpretation. Participants (undergraduate psychology students) were asked to read several vignettes in which either a male or female protagonist commits a prospective or retrospective memory failure, and this failure is either social or asocial in nature (i.e., it affects other people or only affects the protagonist respectively). After each vignette, participants rated how much they agreed or disagreed with several statements about the protagonist. It was hypothesized that female protagonists would receive more blame than males for social prospective memory failures.
Helping Hands to Helping Minds: How Volunteering Affects Perception of Academic Performance: *Heather Herriot, Shirley Bi* (Faculty Sponsor: Dr. Elizabeth Dunn)

Can spending time helping others improve one’s own academic success? While it is easy to think that devoting study time to community service may hinder academic performance, research suggests that volunteering can have positive benefits for undergraduates' academic achievement (e.g., Astin & Sax, 1998). To date, research in this area has relied primarily on correlational designs, preventing researchers from understanding the causal relationship between volunteering and academic performance.

To test whether volunteering leads to increased perceptions of academic success, we will study students from a community service program at Boston College; where interested students are randomly assigned to either a volunteer placement or to a waitlist. Toward the end of the year, we will ask students in both groups about their perceptions of academic success, feelings of connectivity, and enjoyment of school.

We predict that students who participated in the community service program will feel more positive about their academic achievement compared to the waitlist. Furthermore, we predict that these effects will occur through increased enjoyment of their college experience and increased feelings of belonging (e.g., Bryan et al., 2012). As it is difficult to assign participants to volunteer, working with this program provides us with the unique opportunity to evaluate group differences resulting from community service. Although assessing group differences at the end of the year limits our ability to draw definitive conclusions, we believe that this study has important implications; potentially providing causal evidence about the academic benefits of community service.


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Here, There, and Everywhere: Spatial Location Modulates the Effect of Self-Relevance on Memory Accuracy: *Simon Ho* (Faculty Sponsor: Dr. Tom Handy)

A common activity in our daily lives is interacting with and moving objects - especially objects that belong to us. We deal with these items every day, but what are the cognitive processes that govern these items? Research shows that the brain
allocates additional attentional resources to self-relevant items, and that self-owned objects confer greater cognitive advantages such as increased processing speed and improved memory recall. However, not much is currently known about factors that mediate the advantages these types of objects afford.

Within this study we suggest that spatial location is a key determinant of subsequent memory accuracy. The level of self-relevance of an object will interact with its spatial location to produce varying degrees of memory recall accuracy. To study this question, we used a novel 3D motion tracking paradigm to record hand movements as subjects sorted self-owned and other-owned objects into boxes placed at different locations. A memory test was then administered to determine the recall accuracy of the various types of objects. Our findings suggest that, in concordance with existing literature, self-owned items offer high memory recall rates. However, these self-owned items are remembered significantly more accurately if they are also pulled towards your own body. Spatial location acts as a mediating factor for how well you remember your own objects. Given the prevalence of multiple types of objects in our daily lives, understanding the cognitive processes that govern them could change the way we interact with our environment and how we manage our own belongings.

Human Potential, Human Progress, and Human Objectivity: The Philosophical Constitution of Classical Music Criticism in d’Alembert’s Discours préliminaire (1751): Grace Ma (Faculty Sponsor: Dr. Hedy Law)

The Philosophes of the Enlightenment were actively engaged in music criticism, which Bojan Bujian defines as “the intellectual activity of formulating judgments on the value and degree of excellence” of music in general. However, connections between the language of Classical music criticism and Enlightenment philosophies remain inadequately explained. To what extent are Enlightenment ideals manifested in the music criticism of the Philosophes?

To explore this question, I examine excerpts from Part I of Jean le Rond d’Alembert’s Discours préliminaire (1751), in which he outlines his views on the nature of music and methods for judging the quality of music. My analysis will show the extent to which d’Alembert’s musical aesthetics align with his philosophical perspectives. D’Alembert is an ideal choice for this case study because he was an affluent figure in both philosophy and music criticism, and his Discours was a highly influential text of the time. While the purpose of Discours was to clarify his philosophical standpoint, d’Alembert carefully utilizes his philosophies of human potential, human progress, and human objectivity for constructing his musical aesthetics.
Understanding the influence of Enlightenment philosophy on eighteenth-century music criticism provides insights into the aesthetics governing Classical music, in addition to how music in general was viewed by the intellectual elite.

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Immunotherapeutic Approaches for Gliomas: Ramy Alesi Slama, JayPaul Gill (Faculty Sponsor: Dr. Sin)

Antibody engineering is an important tool in immunotherapy as immunoglobulins can be specifically designed to recognize certain foreign peptide sequences (known as antigens, or epitopes). In particular, this technique has been contemplated in dealing with several types of cancers, including gliomas (a category of aggressive brain tumours arising from glial cells). It is known that tumours are associated with increased cell divisions and invasions, which in turn can be mediated by upregulated protein expression. In many research areas, the focus has been given on finding out which proteins are indeed over-expressed, which allows researchers to gather information about cellular processes that are altered in cancer cells.

Our study proposes to identify overexpressed proteins on the surface of invasive glioma cells by laser microdissection followed by comprehensive global gene expression profiling to identify suitable epitopes for which antibodies can be specifically engineered to bind upon. In this aspect, we have already identified Cx43, a channel protein that is upregulated in a selected population of glioma cells. The ultimate aim of this proposal is to induce an adaptive immune response to cancerous cells using antibody engineering, as has been shown in some previous experiment.

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Inter-sex Differences in Susceptibility against an Amyloid-beta Infusion: Christina van den Brink (Faculty Sponsor: Dr. Liisa Galea)

*Abstract unavailable*

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Keeping Up with Change: Neural Mechanisms of Probabilistic Reversal Learning: Nena Wang (Faculty Sponsor: Dr. Stan Floresco)

Behavioral flexibility is an adaptive ability which allows us to change our behavioral strategies or patterns accordingly with changes in our environment. Those with neuropsychological disorders such as schizophrenia, depression, and Parkinson’s disease are impaired in this important function. A common way of testing this in both humans and non-human animals is reversal learning (e.g. switching back and forth between options according to constant changes in their contingencies).
This study examines how three different areas of the prefrontal cortex—the prelimbic cortex, the infralimbic cortex, and the medial orbitofrontal cortex—contribute to reversal learning that is also probabilistic, meaning that an aspect of uncertainty is incorporated in the choices available. While the role of these brain regions under deterministic conditions (e.g. certain reward or certain loss) has been established, there is little understanding about the specific neural mechanisms which underlie situations in which there is considerable ambiguity about reward.

The findings of this study implicate the prelimbic and medial orbitofrontal, but not infralimbic, cortices in differentially biasing behavior under probabilistic conditions. These brain regions play selective roles in facilitating learning under situations of reward uncertainty, with inactivations of the prelimbic cortex leading to enhanced cognitive flexibility whereas inactivations of the medial orbitofrontal cortex leading to impaired cognitive flexibility. These findings further our understanding of possible dysfunctions within the prefrontal cortex which are underlying behavioral inflexibility in patients with certain neuropsychological diseases.

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Last Names: A Measure of Social Dissimilarity: Leo Fankhanel (Faculty Sponsor: Dr. Keith Head)

A wide array of research shows that last names can be used as an indicator for genetic distance. In 1875, George Darwin successfully evaluated inbreeding based on marriages of individuals with the same last names. Since then, Genealogists such as Zei (1993) and Jobling (2001) among others have thoroughly investigated the relationship between family names and genetics. Cavalli-Sforza (2000) points out that surnames can also be used in migration modelling. However, little research evaluates social dissimilarity based on last names. My study aims to show that last names can be used as a reliable measure for dissimilarity between populations. The results also depict European social integration.

Using telephone directory data from Germany, I calculate the Manhattan distance of name shares, as a metric for name dissimilarity between regions. I calculate the population-weighted geodesic distance between regions and show that name dissimilarity increases with distance. Using the German dialectic index established by Falck, et al (2012), I find a strong correlation between dialectic distance and name dissimilarity. Interestingly, I also find statistical significance when evaluating name shares across confessional boundaries. These preliminary results provide a foundation for further exploration. I plan to expand my research to include other European countries, which allows for the evaluation of border and language effects. I will also use European regional public opinion data from
Eurobarometer to show the correlation between surname distance and social opinion. The results of my study will be of interest to researchers in many fields including linguists, economists and political scientists.

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Mindfulness-Based Cognitive Therapy for Provoked Vestibulodynia: Women’s Feedback and Treatment Experiences: Pretty Verma (Faculty Sponsor: Dr. Lori Brotto)

Provoked Vestibulodynia (PVD) involves severe pain in the vulvar vestibule and is most commonly experienced with sexual intercourse; it is highly distressing and detrimental to women’s sexual functioning, self-image, and psychological health. In order to manage PVD pain and distress, initial evidence suggests that psychological approaches are promising. One such approach, mindfulness-based cognitive therapy (MBCT), has been increasingly applied to manage various chronic pain conditions, yet has only recently been tested for PVD (Brotto et al., in press). The purpose of this presentation is to share women’s feedback and treatment experiences after participation in a group MBCT for PVD.

Methods: 87 women with PVD participated in four, bi-weekly group sessions of MBCT. They completed feedback forms after the fourth session. The form, returned by 32 women, consisted of rating scales (completed by a subset of women) from 0 (not at all) to 5 (very) to assess how beneficial the group sessions were and the degree to which participants completed their homework assignments; it also included a mixture of closed and open-ended questions. The open-ended responses were independently coded by two authors.

Results: Various aspects of the MBCT sessions were deemed beneficial, including the sense of community women felt being part of the group and the education provided (M benefit rating = 3.6). While the majority of women (84%) felt that offering sessions more or less frequently would not have enhanced the effectiveness of the
group, most (75%) wanted more than 4 sessions (M number of sessions requested = 6.6). While women reported a moderate degree of homework completion (M rating = 3.2), they also noted several factors that would have made compliance easier (e.g., more time in their schedules). Finally, women reported a number of topics for consideration in future groups.

Conclusions: Women with PVD perceived benefit from various components of a 4-session MBCT. As well, women identified some aspects that, if altered, could enhance the effectiveness of the program. These results can be used by clinicians and researchers who aim to develop MBCT groups in the future to target pain and sexual difficulties.

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Novel Probes for the Identification of EGFR-T790M Mutation: Daniel Bronder, Jeffrey Hao-Chan Huang, Herman Wu (Sponsor: Joseph Lau)

Epidermal growth factor receptor (EGFR) is a cell-surface protein that produces growth signals leading to proliferation of cancer cells, which is over-expressed in non-small cell lung carcinomas (NSCLC). NSCLC constitutes approximately 75-80% of all lung cancers, which is the leading cause of cancer death for both men and women in Canada. Erlotinib and Gefitinib are two inhibitors used extensively in the clinic to treat NSCLC patients whose tumours are EGFR-positive. These two drugs bind to the signal-producing region of EGFR, thereby blocking the growth signal and inhibiting cancer cell growth. Although these inhibitors are effective, most patients develop acquired resistance to these drugs through the T790M mutation, which prevents the binding mechanism of the drug.

Currently, there is no efficient non-invasive means of diagnosing this mutation. Our goal is to develop novel probes that will allow for the identification of T790M-EGFR using positron emission tomography (PET). PET imaging is a non-invasive method that uses radioisotopes to track the path of our probes at a cellular level. Antigen recognition molecules such as antibodies, small molecule inhibitors and peptide sequences can be labelled with radioisotopes for imaging purposes. Their binding properties will be tested on three distinct cell lines expressing different levels of EGFR and T790M-EGFR. The ability to identify this specific mutation would give physicians a powerful diagnostic tool to make well-informed therapeutic decisions leading to improved treatment outcomes and higher quality of life of lung cancer patients.

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Parental Care Motivation and Mate Preferences: Jiwan Choi (Faculty Sponsor: Dr. Mark Schaller)

Parental care is a fundamental human motivation. This motivational state may be triggered even among non-parents (e.g., simply as a result of seeing or interacting with infants). We examined the effects of parental care motives on women’s mate preferences. Specifically, we tested the hypothesis that when a parental care motivational state is aroused, women are more likely to prioritize caretaking qualities in a potential mate, and less likely to prioritize qualities irrelevant to caretaking.

In an ongoing experiment, young adult women are randomly assigned to one of two experimental conditions in which they were asked to hold a girl’s toy -- either a ball (control condition) or a baby doll. While holding the toy (Ball or Doll), they completed several measures assessing the relative importance of various traits that a potential mate might have, including nurturance, responsibility, status, intelligence, and physical attractiveness. Participants also completed a questionnaire assessing chronic individual differences in the tendency to experience parental emotions toward infants (“tenderness”).

Preliminary results (based on responses from 49 participants) indicate that the manipulation may influence the prioritization of a potential mate’s qualities (e.g., intelligence is rated as less important in the Doll condition), but some of these effects are moderated by individual differences in tenderness. Data collection is ongoing and we anticipate to have data from 80 participants by the end of March. Results based on a statistical analysis of the complete dataset will be presented.

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Phonetic Imitation: David Haist (Faculty Sponsor: Dr. Molly Babel)

Vocal imitation is the phenomenon of speakers phonetically “matching” their speech to that of speakers in their immediate environment. Imitation can be seen in a number of aspects of speech, but in our study we focused on measures of word length, vocalic length and voice-onset time. Native speakers of English were recorded producing a word list both before and after hearing a model talker produce a list of words. In this study, we investigate the role working memory has on the extent of phonetic imitation.

Subjects in our control condition initially produced a baseline word list of monosyllabic words. They then listened to model talker’s speech, and after a short break the participants read the same list of words a second time. To manipulate the effects of working memory on imitation, other groups of participants completed tasks during the exposure period. These tasks were designed to either tax participants’ working memory or not, as
well as involving additional linguistic resources. The following conditions were run: completing a word recall task (WM, linguistic) solving math equations (WM, non-linguistic) describing the model talker (non WM, linguistic) and drawing a picture (non WM, non-linguistic). In this talk, I summarize the effect that the various conditions have on vocal imitation, as well as broader implications that this study has on speech production and phonetic variability. Finally, I will discuss further research that we are interested in which would build on this study.

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Protecting Transplanted Human Islets from Allogeneic Responses Using Naturally Immune Privileged Human Hair Follicle Cells: Nicole Kwong (Faculty Sponsor: Dr. Garth Warn)

Type 1 diabetes is one of the most common autoimmune diseases that is characterized by the destruction of insulin-synthesizing pancreatic beta islet cells by host immune system. Consequently, patients with Type 1 diabetes must depend on daily insulin injections for managing blood glucose levels. Researchers have made advances in islet allotransplantation to serve as a potential treatment, but its widespread use is challenged by the increased tumor risk and opportunistic infections from long-term usage of immunosuppressive drugs. A reduced-risk, immuno-modulatory therapy is urgently needed. We hypothesize that non-histocompatible islets, in close association with hair follicle cells, will escape immuno-surveillance and rejection.

We demonstrated that cultured hair follicle derived dermal sheath cup (DSC) cells exhibit natural immune privilege due to the secretion of immuno-regulatory factors and a lack of major histocompatibility complex (MHC) expression. In comparison to fibroblasts, a significant upregulation of immune privilege associated genes and a downregulation of MHC molecules were observed by real-time polymerase chain reaction. Enzyme-linked immunosorbent assay was used to study allogeneic responses of co-cultured human peripheral blood mononuclear cells (PBMCs, as responders) and purified human islets (as stimulators). The secretion of interferon-gamma, a critical cytokine involved in alloimmunity, from PBMCs was significantly reduced in the presence of DSC cells or DSC-conditioned medium.

This study demonstrates that human islet/hair follicle DSC cell constructs exhibit localized immunosuppressive properties, suggesting that transplanted islets may be benefited from the immune privilege status. Using naturally immune privileged cells may reduce the need for chronic systemic immunosuppression in clinical islet transplantation.

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Problem Solving Strategies of Video Gamers: Are They Different?  
*Stephanie Stoltenberg (Faculty Sponsor: Dr. Alan Kingstone)*

Previous research in video games has shown that gamers have certain general cognitive abilities, such as visual and auditory attention and perception (Donohue et al., 2010) and strategy use (Clark et al., 2011), which surpass non-gamers’ abilities. However, there has been little research with regard to how gamers’ cognitive abilities why they may differ from non-gamers. The main purpose of this study is to investigate differences in people’s problem-solving strategies, such as divergent thinking (ability to come up with multiple possible solutions) and convergent thinking (ability to logically decide on one solution), based on their previous video gaming experience, specifically with role-playing (RPG) and strategy genre games. These genres in particular may be teaching players how to think and approach problems differently since they force players to adapt to various and strange situations and to plan out their goals accordingly to progress further in the game.

Our hypothesis is that there will be a significant difference in problem solving strategy performances between gamers, who play more RPG and strategy games, and non-gamers. To test the hypothesis, we would have participants engage in various tasks testing their general problem solving abilities, convergent thinking skills, and divergent thinking skills. Like in previous research, for participants to qualify as a gamer, the participant has to have played a RPG or a strategy genre game for at least 5 hours a week during the past year. If there is a positive relationship between playing these genres and better problem solving performance, further research should be conducted in this matter.

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The Influence of Gender Roles on Food Security in Small-scale Fisheries in the Central Philippines: *Paramdeep Nahal, Emily Bolton, Marysia Grzybowski (Faculty Sponsor: Dr. Danika Kleiber)*

Demonstrating the significant correlation between small-scale, non-industrial fishing and food security millions of the world’s rural and urban poor are known to depend on fish harvested by small-scale fisheries as a source of protein and macronutrients (Bacnac et al. 2007). Women are known to participate in these fisheries, and have been found to allocate a greater percentage of their catch towards household consumption as opposed to selling it for income (Chapman, 1987). Presently, fishing done by women, including onshore harvesting of marine resources, is often not included in official statistics.

We will address this deficit by examining gender roles in small-scale fisheries and in food security within the Central Philippines.
The Philippines has one of the highest per capita fish consumption in the world and high human dependence on its marine resources has depleted the local fish stock. This case study involves hundreds of interviews with randomly selected female and male respondents from twelve coastal communities across the Central Philippines. Questions focus on assessing the proportion of catch that female and male fishers keep for consumption as opposed to selling, as well as investigating the frequency of and methods of dealing with household food shortages. We expect that women's catch substantially contributes towards household protein intake and thus highlights the important role of gender in small-scale fisheries and food security. Understanding the contribution of women provides a clear depiction of how small-scale fishing is essential in ensuring household food security and in promoting more informed management of small-scale fisheries.

References:


The Effect of Eye Gaze on Memory:
Soo Jeong (Crystal) Byun (Faculty Sponsor: Dr. Alan Kingstone)

The present study will investigate a potential mechanism through which mutual gaze might influence memory. Research has shown that the experience of mutual gaze provokes emotional and physiological arousal. For example, participants report greater levels of tension (Argyle, 1969; Argyle & Dean, 1965) and show higher levels of physiological arousal (Nicholas & Champness, 1971) when making eye contact. Also, studies have demonstrated a relationship between arousal and memory: Heightened arousal facilitates memory by affecting perception and attention during encoding (Christianson & Loftus, 1991; Reisberg & Heuer, 1992). Presumably, emotional and physiological arousal produced by mutual gaze will have an impact on our memory.

In the present study, we test this notion by having participants remember a list of words read aloud by a partner who is either gazing towards them or not. It is hypothesized that participants will experience heightened arousal when they gaze towards the experimenter and will show a better performance of recalling words.
The Effect of "Free" on the Decision-Making Process: Nathan Wispinski (Sponsor: Grace Truong)

An item’s price is generally an influential factor in consumer decision-making, and tends to follow the relationship described by normal goods in economics; demand increases as price decreases. However, past research has shown support for a zero-price effect, in which “free” items elicit a disproportionately pronounced increase in demand relative to other prices (Shampanier et al., 2007). Although this effect has been observed through explicit choice behaviour, little is known about the underlying decision-making processes.

To better understand the cognitive processing involved in the zero-price effect, we studied the reaching movements of adult individuals while they were making rapid purchasing decisions. Previous research has indicated that arm trajectories, travelling to manually select a choice between two options on a screen, are spatially sensitive to an individual’s preference between those options (Freeman et al., 2010). These studies suggest that this movement is characterized by the competition for selection between choices, and that trajectories gravitate more directly toward an option to the degree they are preferred over the alternative. By using motion-capturing cameras to continuously index movement in real-time, we were able to test the idea that, when chosen, “free” items evoke a more direct reaching movement compared with economically equivalent decisions.

The results from this experiment were consistent with previous research, and showed that arm trajectories were significantly more direct when purchasing a “free” item compared with other analogous decisions, suggesting a rapid and exceptional preference for “free” goods outside of a normal economic relationship.

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The Effects of GABA Antagonist in Medial Prefrontal Cortex on Effort Based Decision Making: Agnes Cywinska (Faculty Sponsor: Dr. Stan Floresco)

According to World Health Organization schizophrenia affects about 24 million people worldwide and even though it is a treatable disorder about 50% of people do not receive appropriate care (WHO, 2013). Schizophrenia has a variety of cognitive symptoms, including cognitive flexibility and decision making (Floresco et al. 2008). It has been also shown that GABA hypofunction may contribute to some of those cognitive symptoms (Enomoto et al. 2011).

The current study aims at furthering the knowledge of symptoms of schizophrenia, specifically the effort-discounting decisions.

The study involved bilateral bicuculline (GABA antagonist) and saline (control) injections into the medial
prefrontal cortex (mPFC) of Long Evans rats. The effort based decision making was examined using low effort/low reward lever and high effort/high reward lever paradigm. The low effort/low reward lever required one lever press for two pellets. For the high effort/high reward lever the effort required for reward increased incrementally over 4 blocks (2, 5, 10, and 20 presses), however, it delivered 4 pellets each block. Not surprisingly the control group showed effort-discounting over the 4 blocks. Over the 4 blocks the high effort/high reward lever decreased. The bicuculline group did not show lever preference over the first 3 blocks, on the 4th block they showed preference for the low effort/low reward lever. However, the groups significantly differ only on the first two blocks. Interestingly, the bicuculline group showed significantly longer choice latencies over all 4 blocks, when compared to control group.

The Effects of In-Ovo Cortisol Exposure on Stress-Axis Function and Anti-Predator Behaviours in the Threespine Stickleback: Callum Kingwell (Faculty Sponsor: Dr. Dolph Scluter)

The transfer of maternal stress hormones to developing embryos is well documented in a variety of vertebrate species, as are many lasting behavioural changes in offspring linked with this early-life hormone exposure. In fish, these changes include decreases in aggression, boldness, social rank, and problem solving ability. Recent studies in the threespine stickleback (Gasterosteus aculeatus) and other fish species that link boldness and aggression to expression levels of genes involved in hypothalamic-pituitary-interrenal axis (HPI) function raise the possibility that hormone-mediated maternal effects act via organizational changes to the HPI axis early in development, although this possibility has not been thoroughly investigated.

In this study, juvenile G. aculeatus experimentally treated in-ovo with the stress hormone cortisol are compared to controls for levels of expression in three HPI axis genes (GR1, GR2, and POMC) and for levels of boldness and aggression. Due to a widespread distribution and well-documented natural history, the threespine stickleback is an ideal candidate for future studies attempting to address the ecological relevance and adaptive significance of maternal hormone transfer and its associated effects on behavior. This study attempts to improve the utility of the threespine stickleback model by addressing gaps in our understanding of the physiological mechanisms that underlie hormone-mediated maternal effects.

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The Relationship of ADHD Symptom Expression in Fathers and Children: Differences Between Families With Biological Fathers and Children and Families with Non-Biological Fathers
Attention-Deficit Hyperactivity Disorder (ADHD) is a disorder characterized by significant problems with attention, impulsiveness and hyperactivity in children and adults. While the etiology of ADHD remains unclear, heredity is currently one of the best supported causes (Barkley, 2006). Studies comparing biological and nonbiological children can address heredity and environmental factors in the development ADHD. This study examined the relationship between ADHD symptom expression in both biological and nonbiological father and child pairs. Participants were biological and nonbiological fathers and their sons, and most of the sons had been diagnosed with ADHD. Eighty-four fathers (aged 31-65, nine nonbiological) and their sons (aged 6-13) were recruited. ADHD symptom expression was measured by parent self-reports and parent-reports of child ADHD on a DSM-IV ADHD rating scale.

The study compared the relationship of ADHD ratings for fathers and children between biological families and nonbiological families. Preliminary results show a significant positive relationship of ADHD symptom expression between biological fathers and their sons (r=.47, p<.001). No significant relationship was found between non-biological fathers and their sons (r=-.13, p=.745). The findings support a hereditary component in the etiology of ADHD. A limitation of this study was the small sample size of non-biological fathers. This finding indicates a need for future adoption and twin studies including mothers and using larger sample sizes to evaluate the genetic and environmental influences on ADHD.

Results are only preliminary. More data will be collected and analyzed from now to the conference - those findings will be reported then.

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The Role of Microglia Activation After Mild Repetitive TBI in the Development of Alzheimer’s Disease: Melody Lu (Sponsor: Tom Cheng)

Alzheimer Disease (AD) is a progressive degeneration of the brain, resulting in memory loss and cognitive dysfunctions. There is no cure for AD, and it currently affects 45% of population over 85 years-old. Traumatic brain injury (TBI) is an AD environmental risk factor. However, the exact mechanism linking TBI to AD is unknown. After TBI, inflammatory responses are induced in the brain, and microglia, the resident immune cells in the brain, are activated and release pro-inflammatory factors. However, certain factors are neurotoxic and may induce or worsen on-going disease processes.

In this study, we hypothesize that AD progression is accelerated by more frequent exposure to mild repetitive TBI, due to increased level of microglia activation. Mild
traumatic impact will be induced on brains of young genetically manipulated mouse model of AD, at frequency of either once per week or twice per week, for three weeks. Half of each group will receive anti-inflammatory drug treatment. At week 1, 2, 3 and 20 after first injury, inflammatory response will be assessed by biochemical and histological methods. Spatial memory test will be conducted to assess cognitive function. To determine the effects of TBI frequency on AD pathology, results of high frequency group will be compared with the low frequency group. To determine the involvement of inflammation in TBI-accelerated AD pathology, non-drug treated groups will be compared to their respective drug treated groups. This study will provide insights on the involvement of TBI and inflammation on AD progression.

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The Significance of PTPRG as a Cancer Suppressor in Cervical Cancer Cells: Frank (Zhexian) Liu (Sponsor: Suzanne Cheng)

Cervical cancer is one of the most prominent female diseases worldwide. As traditional therapeutic methods against cancer such as chemotherapy or radiation often cause significant side effects, alternate therapies are needed to provide effective treatments with minimal side effects. Previous research has identified a protein named PTPRG, which displays cancer-suppressive effects in chronic myeloid leukemia. However, the role of PTPRG in other cancer models remains unknown.

In this study, I will delineate the oncosuppressive effects of PTPRG and its correlation with cervical cancer malignancy by 1) comparing the amount of PTPRG between different cervical cancer cell lines and normal cervical cells, 2) measuring the rate at which PTPRG modifies its target molecule to determine the activity of PTPRG in these cells, and 3) investigating the ability of these cells to penetrate through a gel-like substance that mimics tumour cell environment to determine their malignancy, or aggressiveness. It is important to establish a correlation between cervical cancer malignancies and the expression or activation of PTPRG to determine the possibility of targeting this protein (i.e. stimulate PTPRG production) as a novel treatment for cervical cancer.

Further studies that focus on the detail mechanisms of PTPRG functions in normal cervical cells and the identification of common genetic mutations found in PTPRG in cervical cancer cells will be required to further understand the exact roles of PTPRG in normal and cancerous cervical cells.

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Unpacking the Feedback-Withholding Bias: How Anonymity, Remoteness and Personal Ideologies Influence Evaluation of Minority Students’
Work: Alice Fleerackers (Faculty Sponsor: Dr. Toni Schmader)

Previous research has demonstrated that White evaluators often systematically withhold negative feedback when evaluating essays supposedly written by Black students (Harber, 1998, Croft & Schmader, 2012). However, little is known about the mechanisms that produce, and potentially moderate this “feedback withholding bias” (Croft & Schmader 2012).

The present research aims to extend the existing body of research by examining how factors of anonymity, remoteness, and personal ideologies influence the kind of feedback evaluators give minority students. To investigate this question, we collected data through online surveys, a much more remote (and hence anonymous) method than used in previous research. Participants read and evaluated two equally substandard essays supposedly written by either a Black or a White high school student, and then complete scales measuring their racial ideologies, prejudicial motivations, and demographic information.

Comparing evaluations of the two essays, we found that participants systematically provided more negative feedback to the Black student, a direct contrast to what has been reported in the laboratory. To investigate the nature of this surprising effect, we added an impression-management manipulation to the original survey, increasing the evaluator’s awareness of his own race and of racial biases.

We predict that when faced with the risk of appearing biased, participants will be less willing to provide negative feedback to Black students, and again show evidence of feedback withholding. Should this be the case, we would gain insight into the nature of biased feedback, deepening our understanding of how racial biases come to exist, and hopefully, how they can be minimized.


The bacterial pathogen Bordetella pertussis infects the human lungs and causes approximately 48.5 million cases of whooping cough per year worldwide. This infection causes about 295,000 deaths per year and is a significant healthcare concern for children. The protective effect of the existing vaccines is temporary and booster shots are required every 5-7 years.

The proposed research aims to design a long lasting B. pertussis vaccine to help decrease the global toll of the pathogen. Previously successful vaccines for other bacterial pathogens contain bacterial surface components, such as proteins, to achieve a protective immune response. The genes which encode these proteins are commonly found in “pathogenicity islands,”
which are identifiable using bioinformatics software.

For example, the Island Viewer program searches databases of bacterial genes to identify those found in pathogenicity islands and likely to be effective vaccine components. As proteins in our body are synthesized from genes, the full set of B. pertussis genes will be searched with Island Viewer to identify genes encoding promising vaccine candidate proteins. Vaccine candidates will be tested individually in mice by administering a candidate vaccine and subsequently infecting vaccinated mice with B. pertussis.

The quality of the resulting immune response, severity of B. pertussis infection, and length of vaccine protection will be compared amongst vaccine candidates, mice that did not receive any vaccine and mice that received the currently available B. pertussis vaccines. This research may lead to the identification of valuable B. pertussis vaccine candidate proteins yielding better protection.

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**Western Red Cedar: Eagle Tree History Through Tree Rings: Ashley Dobko (Faculty Sponsor: Dr. Lori Daniels)**

Western red cedar trees (Thuja plicata) are highly responsive to their surroundings including weather and site level changes. Located on the Musqueam reserve, the Eagle Tree is a large western red cedar, which has high cultural value to many of the community members. This tree was known for its dead “spiked” top where eagles would perch and look out over the community. In the spring of 2012, the tree blew over in a windstorm, providing an opportunity for tree-ring analysis to determine its age, how long the spiked top had been dead and other information about its history.

In collaboration with the Musqueam community, I collected 20 increment core samples from different sections along the tree. They were mounted on wood supports, sanded and scanned for digital analysis of the tree rings. Samples were cross-dated against each other to obtain accurate annual dates for the outer ring of each core, which represents the last year that section of the tree was alive. The Eagle Tree was more than 270 years. It died back in three episodes, starting from the tip of the tree in 1898, followed by the middle section in 1960 and finally a portion of the lower section in 2004. A small portion of the tree was still living at the time of the windstorm.

In summary, the Eagle Tree died back over three episodes starting in 1898 through 2012, which were consistent with stories of extreme weather events told by elders in the community.

**Who Sticks Around: Drop-out Rates in Clinical Health Research: Mingyang Wang (Sponsor: Gail Andrews)**
Children with life-threatening conditions experience fluctuations in symptoms, while family members’ well-being changes as the child’s condition declines. Charting the Territory is a multi-site longitudinal study that tracks the symptoms of children with progressive genetic, metabolic and neurological conditions, and the psychosocial experiences of their families. Generalizing research results is important to show that the data represents families from all walks of life, including income, caregiver support, education, profession and urban or rural locations.

We examined whether families who withdrew (W) or were lost to follow-up (LTF) exhibit similar characteristics as those who continue to participate. Due to the sensitive nature of pediatric palliative care research, research ethics boards insist that families be able to withdraw from research at any time, in order to minimize distress. For studies of pediatric chronic conditions, on average 20% withdraw at initial follow-up and 32% withdraw during extended follow-up. Factors often cited as influencing participant drop-out include age and education.

Our objective was to determine whether or not demographic characteristics reveal underlying factors influencing withdrawal from pediatric palliative care studies. We present preliminary results describing the demographic characteristics of families overall, and compare demographics of participating families with W or LTF families. 258 families were enrolled, with 245 baseline questionnaires entered into the database. At 1 year after baseline, a small number of families are no longer participating (6% W, 4% LTF). Since inception of families, 88% continue to participate. Preliminary results on withdrawal and LTF at 1 and 2 years will be presented.

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What is a "Family"? Christine Kim (Faculty Sponsor: Gail Andrews)

Charting the Territory is a longitudinal study with 258 participating families whose children have progressive, life-threatening metabolic disorders, neurodegenerative disorders and chromosomal disorders. These children experience health issues that challenge the family over time, making it important to assess the families’ health and functioning. The Family Adaptability and Cohesion Scales (FACES) is a standardized questionnaire measuring the adaptability and cohesion of an “ideal family” - a family with parents and children old enough to communicate and actively participate in decisions.

While the FACES is validated and commonly used, the authors did not address atypical families, e.g., where a couple has a non-verbal child with life threatening condition. Does the FACES questionnaire provide valid data regarding families whose composition is atypical? Preliminary results show that
families can be grouped into three categories: the first and second categories are atypical whose only child is the index case and/or siblings who may not be active members of the family. The third category consists of typical families for the FACES, with one sick child and one or more siblings who participate actively in the family.

Overall mean and standard deviation for each subscale – adaptability and cohesion – will be reported and compared to normative samples. ANOVA will be conducted to evaluate statistical differences between means for each family category. Using family categories to analyze the FACES will inform future research focusing on rare childhood population, as to whether the FACES is a valid tool to conduct analysis.
Oral Presentation Session 2

Studies Of The Novel, Time Old Biases & The Unconventional (BUCH D307)

Selena Zong: Does Race Matter in International Beauty Pageants? A Quantitative Analysis of Miss World

Fiona Tsun: What’s in a Face? Assessing Pain in Harbour Seals (Phoca vitulina) Using Pain-Based Facial Expressions

Dongho Lee: Discovering Neural Stem Cells with Novel Phenotypes within the Spinal Cord Central Canal through Gene Expression

Leanne Huang: Ethnicity as a Protective Effect for Adolescent Substance Use: Examining the impact of parental monitoring

From Dreams to Hard Sciences and Back Again (BUCH D312)

Caleigh McEachern: On A Bridge of Dreams: Dreams, Reality and the Unconscious Collective in M.T. Anderson's *Feed*

Marie-Eve O'Toole: The Effect of Changes in Salinity and Temperature on the Growth Performance of Wolf-Eels (Anarrhichthys ocellatus)

Samarpita Das: The Role of Receptor Tyrosine Kinases in Proper Functioning of Gliotactin in Drosophila Imaginal Wing Disc

Erick Carreras: Cardiac Strangulation Following Epicardial Pacemaker Implantation: a Rare Pediatric Complication
Investing In Future Direction  
(BUCH D313)

Terri Sun: Debunking Mental Illness Stigma in High School Students: The Effects of a One-Hour Classroom-Based Anti-Stigma Workshop

Sarah Jane Kerr-Lapsley: ‘Routes and Roots’ : An Introduction to the Post-War Experiences of Vancouver Holocaust Survivors

Jack Leung: Risk and Return Characteristics of Owner-Manager and Owner-Divestor Entities in Infrastructure Investments

Sophia Walters: The Role of Voice Similarity in Accommodation

Beyond A Single Perspective: Integrating A Multidisciplinary Approach  
(BUCH D314)

Nicole Bobadilla: Public Attitudes on the Issue of Housing Pregnant Pigs

Harleen Sekhon: Tissue Culture of Wild-type and Transgenic Tobacco Plants

Paulina Piesik: Viral Hemorrhagic Septicemia Virus: A Potential Pathogen for B.C.’s Farmed Atlantic Salmon

Graham Harber: Linking Changes in Speech Production and Perception
Enter Zen Bliss: Achieving Well-Being
(BUCH D316)

Aaron Lao, Charles Pan: More Than Just Building: an Investigation Into the Impact of Location of Retirement Communities on Well-Being

Dion Kaszas: A Research Journey into the Heart of the Cultural Revival of Nlaka’pamux Tattooing.

Tim Krupa: Correlates of Psychological Well-Being in Zambian Children

Tony Hui: The Role of P55 Efflux Pump in Cholesterol Metabolism
Studieds Of The Novel, Time Old Biases & The Unconventional BUCH D307

Does Race Matter in International Beauty Pageants? A Quantitative Analysis of Miss World: Selena Zong (Faculty Sponsor: Dr. Rima Wilkes)

Most research on race and beauty pageants uses qualitative research methods and focuses on national beauty pageants. For this reason it is unclear whether there are broad patterns of racial inequalities in international beauty pageants. My study addresses this issue by using a quantitative approach to examine whether race affects success rates in international beauty pageants.

This study examines countries that have competed in the Miss World pageant from 1951 to 2011 and examine each country’s probability of winning and reaching the semi-finals. The analysis shows that race matters. White countries have a much higher chance of winning and being in the semi-finals than non-white nations. Furthermore, white nations have been over-represented as winners and semi-finalists while non-white nations have been under-represented in both those categories. The patterns of success for white nations and lack of success for non-white nations demonstrates that beauty is not neutral and that global beauty pageants can be seen as a reflection of racial hierarchies and a reaffirmation of the ideology of white beauty.

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What's in a Face? Assessing Pain in Harbour Seals (Phoca vitulina) Using Pain-Based Facial Expressions: Fiona Tsun (PhD Student Sponsor: Amelia MacRae & Faculty Sponsor: Dr. Joanna Makowska)

Tagging and micro-chipping are routine procedures used to identify animals and are known to be painful, thus compromising animal welfare. Facial Action Coding System (FACS) is a widely-used computerized system that was originally developed to study facial expressions in humans, including pain-based facial expressions. In a more recent study, the concept of FACS was used to create a scale to assess pain in mice. Furthermore, the idea of evaluating pain in non-human animals with FACS was adapted to assess pain in rats and rabbits as well. In these studies, orbital tightening, nose bulge, and cheek bulge were common facial expressions indicative of pain in humans, mice, rats, and rabbits.
The objective of this study is to investigate whether or not harbour seals have facial expressions indicative of pain and if they do, to create a scale that can be used to quantify the intensity of pain felt. Sixty four harbour seals rescued by the Marine Mammal Rescue Centre had their faces video-recorded prior to, during, and after the tagging and micro-chipping. Video frames were then extracted for analysis.

Preliminary analysis indicates that expressions similar to those found in previous studies may be also present in harbour seals, demonstrating that pain-based facial expression is conserved among a variety of animals. The results from this study have clinical application in the accurate assessment of pain in harbour seals, and speak to the value of developing similar scales for other animals as well.

Discovering Neural Stem Cells with Novel Phenotypes within the Spinal Cord Central Canal through Gene Expression: Dongho Lee (Faculty Sponsor: Dr. Jane Roskams)

Stem cells play a key role in modern approaches to therapeutic treatments for spinal cord injury and disease. It is known that the central canal (CC) is the epicentre of spinal cord neural progenitors and that there is a spatial segregation of cells with different functions within the CC. However, the distinctive identity and functional diversity of these neural stem cells is not well studied.

This study assesses the characteristics of the cells via bioinformatics analysis of over 300 CC specific genes obtained in collaboration with the Allen Brain Institute to determine neural stem cells with novel phenotypes that may play a unique role in diseases within the central nervous system. Categorization of the genes into subsets based on region and age of expression created groups of genes that are likely to be interacting within the cells. Gene ontology and protein pathway analyses were employed to determine the functional importance of the genes. Using the Spinal Cord Atlas, a database that reports the expression of over 17000 genes in the neonatal and adult mouse spinal cord, to confirm the existence of other mRNAs necessary for active protein pathways, we have discovered pathways that may be active in spatially and temporally segregated regions of the CC. The various pathways of these stem cells suggest the existence of different stem cell populations within the CC which are used for distinct functions during disease or injury.
Ethnicity as a Protective Effect for Adolescent Substance Use: Examining the Impact of Parental Monitoring: Leanne Huang (Faculty Sponsor: Dr. Chris Richardson)

Recent studies have found that substance use is reduced when paired with positive parental behaviours such as parental monitoring, communication, and emotional support. Many of these studies have been done in westernized communities, but few have explored the potential role of parental behaviours as a mechanism that explains differences in the levels of adolescent substance use among different ethnic and cultural groups in the Canadian population. In Canada, researchers have reported that being an Asian adolescent reduces one's risk of using substances. A proposed explanation for this effect is that Asian adolescents experience higher levels of parental monitoring.

In our study, we aimed to determine if increased levels of parental monitoring account for the expected decreased in risk of having used marijuana, alcohol and tobacco among Asian adolescents. The data analyzed in this study were collected as part of an ongoing prospective cohort study of adolescents called the British Columbia Adolescent Substance Use Survey (BASUS). The sample consisted of 1394 adolescents (60% female, median age of 15 years) who completed the sixth wave of the BASUS survey in the fall of 2012. The increase in the relative risk of having tried each substance and gender, ethnicity and level of parental monitoring was assessed using separate modified Poisson regression models.

The results of this study confirm previous research in Canada indicating that Asian adolescents appear to be at much lower risk of using marijuana, alcohol and tobacco. These protective effects were found after statistically controlling for levels of parental monitoring which indicates that high levels of parental monitoring does not explain protective effect effects related to substance use associated with identifying as Asian. Further research is required to understand the protective mechanisms associated with being an Asian adolescent living in British Columbia.

From Dreams to Hard Sciences and Back Again
BUCH D312

On A Bridge of Dreams: Dreams, Reality and the Unconscious Collective in M.T. Anderson's *Feed*: Caleigh McEachern (Faculty Sponsor: Dr. Rick Gooding)

In M.T Anderson's *Feed*, individuals are connected to a live stream of information, images and advertisements, through a chip implanted in their brains: the feed. *Feed*'s similarities with North American society
provides much ground for critical discussion, however, the current discussions by Clare Bradford, Abbie Ventura, Elizabeth Bullen and Elizabeth Parsons, are limited as they examine the novel primarily as a capitalist dystopia. Ventura explores the dehumanizing effects of *Feed*’s global capitalism, whereas Bullen and Parson explore the novel’s political implications. Bradford, meanwhile, discusses the social implications of *Feed*’s consumer society on agency and the individual.

However, this focus on solely the capitalist-consumer dimensions of *Feed* ignores the significant dimension of dreams. As Titus’ dreams are increasingly infiltrated by feed-media and hackers, one begins to question his ability to dream on his own. Reality is also manufactured in this way, as the feed-technology mediates Titus’ experience with the world, alienating him from the world outside of America and the feed.

I will apply Walter Benjamin’s critique of 19th century Paris and the capitalist dream, the spell cast over society by commodity fetishism, to *Feed* to interpret the distorting effects that feed-technology has on reality and dreams. I propose, then, to interpret Feed as a dream dystopia, and pose the question: “What does it mean to dream in a world where reality is manufactured, and even your sleeping state can be infiltrated by hackers and corporate agendas?” or, more simply, “What does it mean to dream in a world where your dreams are not your own?”

The Effect of Changes in Salinity and Temperature on the Growth Performance of Wolf-Eels (Anarrhichthys ocellatus): Marie-Eve O’Toole (Research Associate Sponsor: Shannon Balfry)

In the rearing of captive fish, salinity and temperature are important factors for optimal housing, of which little is known in wolf-eels. Therefore, studies were conducted in an effort to explore the tolerance of juvenile wolf-eels to different salinities and temperatures. Saltwater at 8-10°C with a salinity of approximately 30 parts per thousand (ppt) is considered to be a comfortable environment for wolf-eels.

To assess tolerance to lower salinities, the specific growth rate (SGR) and food conversion ratio (FCR) of wolf-eels were compared in different treatment groups over a 6 week period. Seventy-two wolf-eels were randomly assigned to one of three treatments (n=12 per group, 2 groups per treatment): Treatment 1 - brackish water (9 ppt) at 8-10°C; Treatment 2 - brackish water (9 ppt) at 13-14°C; Treatment 3 (Control) - full seawater (30 ppt) at 8-10°C. Brackish water provided unsuitable conditions: lower FCR and SGR values were recorded. Heating the water appeared to have no effect on improving growth performance of the wolf-eels. Overall, there was no calculated correlation between an increased temperature and their appetite: they ate poorly in both the 8-10 and 13-14°C temperatures. For the control
condition, significant positive correlation between temperature and appetite was established.

In summary, the wolf-eels did not appear to tolerate the lower salinities of the brackish water treatments, regardless of temperatures. In the control treatment, the wolf-eels proved to have better growth performance even at 8-10°C.

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The Role of Receptor Tyrosine Kinases in Proper Functioning of Gliotactin in Drosophila Imaginal Wing Disc: Samarpita Das (Faculty Sponsor: Dr. Vanessa Auld)

Gliotactin is an essential component of the septate junction (SJ), a ladder-like structure that forms a permeability barrier between neighbouring cells in invertebrate epithelia. It is unique because it localizes to the tricellular junction (TCJ), the convergence of 3 adjacent cells, where it essentially forms a ‘plug’ stopping unwanted transcellular flow. Septate junctions are the functional homologs of vertebrate tight junctions and both junctions are crucial in maintaining ionic balance and protection from invading pathogens. Gliotactin is highly regulated and phosphorylation of its conserved tyrosine residues is required for proper cellular targeting and degradation. We know that when Gliotactin is overexpressed in the imaginal wing disc, severe delamination, apoptosis and mislocalization occurs, alongside improper septate junction formation. We also know that Src 42A, a receptor tyrosine kinase (RTK) can rescue the apoptotic phenotype through phosphorylation as well as relocalize Gliotactin back to the TCJ. Since the exact mechanism of this interaction is unclear, other kinases must be tested and ruled out as possible candidates that may also interact and control Gliotactin’s functioning.

This project aims to identify these kinases and determine their interaction, if any, with Gliotactin. The spatio-temporal pattern of specific proteins was determined via immunohistochemical staining, which uses antibody-antigen binding principles to mark proteins for qualitative measure. Preliminary results suggest that some candidate kinases can rescue the apoptotic phenotype and are interacting with Gliotactin in a way that is similar to Src 42A.

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Cardiac Strangulation Following Epicardial Pacemaker Implantation: a Rare Pediatric Complication: Erick Carreras (Faculty Sponsor: Dr. Andrew I.M. Campbell)

Cardiac strangulation (CS) may occur following epicardial pacemaker (EP) implantation if its lead(s) wraps around the heart and becomes adherent to the epicardium. With progressive somatic growth this lead may constrict the
underlying cardiac structures causing mechanical complications and potentially death. The aim of our study was two-fold: determine the incidence of the pathology, and develop a follow-up protocol that includes regular reassessment and potential imaging.

All patients who underwent implantation of an EP from January 1992 to March 2012 were included. Hospital health records were used to gather retrospective data. Prospectively, the patients that had not received a chest x-ray within the previous 2 years were approached for such imaging to assess the leads’ potential for causing CS. The primary outcome investigated was mortality, or reoperation for replacement of the lead(s), secondary to CS. Secondary outcomes researched included specific symptoms. A multivariate analysis determined interdependency between the variables of primary and secondary outcomes.

This study included 86 patients with a 2.2% incidence, and 1.1% mortality related to this pathology. A characteristic pattern of posterior looping of the ventricular lead was seen in chest radiographs of both patients with CS presenting acutely in both cases.

Our institutional incidence of CS is significantly greater than the approximate literature incidence of 0.046%. Our data, and the 7 cases found in the English literature (May 2012), supports that the 2 cases of cardiac strangulation were not caused by a lack of follow-up but by a lack of effective imaging for diagnosis.

Investing In Future Direction
BUCH D313

Debunking Mental Illness Stigma in High School Students: The Effects of a One-Hour Classroom-Based Anti-Stigma Workshop: Terri Sun (Faculty Sponsor: Dr. Jehannine Austin)

Background: There is a need for more sustainable and cost-effective interventions to reduce mental illness stigma in the current education system. This study aims to evaluate the efficacy of a one-hour classroom-based workshop in reducing public stigma amongst secondary school students (aged 14-17) towards people living with mental illness, specifically depression, anxiety and schizophrenia.

Method: A total of 279 students from three public secondary schools participated in a one-hour interactive workshop led by medical students. A previously developed questionnaire aimed at measuring two aspects of stigma, stereotype and social distance, was employed to measure students’ level of stigma towards people living with mental illnesses. To evaluate changes in stigma level over time, the questionnaire was administered at four time points: 1-month before the workshop, immediately before the workshop,
immediately after the workshop, and 1-month post-workshop.

Results: Our data shows that survey stigma scores were immediately reduced after the Healthy Young Minds (HYM) workshop by 23% (p<0.01). This was sustained 1 month post-workshop with a 21% (p<0.01) stigma reduction compared to pre-intervention. This effect was primarily due to improvements in social distance scores. There were no significant changes in the perception of stereotypes following the workshop.

Conclusion: Adolescent attitudes regarding mental illness can be effectively reduced through a one-hour classroom-based workshop given by medical students, specifically social distance felt towards people living with mental illness.

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‘Routes and Roots’: An Introduction to the Post-War Experiences of Vancouver Holocaust Survivors: Sarah Jane Kerr-Lapsley (Faculty Sponsor: Dr. Patrick Moore)

There is a large body of literature on Holocaust testimony, memory and commemoration, which focuses largely on the loss of survivors to age and illness. While testimonials are invaluable to the education process, they often end at emigration or summarize the post-war experience in a matter of sentences. What is missing is the bridge between eye-witness accounts of the Holocaust and the future of Holocaust education without survivor speakers.

Building on the sparse, yet enthusiastic, existing research on Vancouver Holocaust survivors (Sevy 2010, Gerber 1997, Schober 2009), this project weaves previous research with archival material, memoirs, testimonials and new interviews, approaching it for the first time from an anthropological perspective. In part, this involves both exploring the relationships between Holocaust survivors and existing Jewish communities in the context of contemporary diaspora theory (Clifford 1994, Talalyan 2007), and exploring the politics and dynamics within the survivor community and how they were negotiated for the purpose of commemorating experiences and educating future generations.

In addition to contributing to a growing body of research towards the understanding of survivor’s post-Holocaust experiences in Western Canada, this project also has the potential to contribute to a larger discourse on the integration of war and genocide survivors into new communities and the policies that govern that process of integration.
Risk and Return Characteristics of Owner-Manager and Owner-Divestor Entities in Infrastructure Investments: Jack Leung (Faculty Sponsor: Dr. Ralph Winter)

There are advantages of asset allocation to infrastructure within an investment portfolio. While these advantages have gained investors’ attention in recent years, there remains a lack of research literature on the infrastructure asset class. As such, this paper aims to advance research by analyzing and comparing the risk and return characteristics of owner-manager and owner-divestor entities in infrastructure investments. Owner-managers are business entities that own and directly manage the infrastructure assets, whereas owner-divestors own and divest management responsibilities to a third-party contractor. Historical market prices of owner-managers and owner-divestors are collected from >40 exchange-listed infrastructure investment funds and >1400 exchange-listed infrastructure equity securities. These prices are subsequently regressed against the MSCI World All-Country Index to obtain the beta (proxy for systemic risk) and standard error (proxy for firm-specific risk) over quarterly and annual time intervals. Control variables, including market capitalization, dividend yield, leverage and geographic origin, are employed.

While both entity forms are expected to exhibit similar levels of systematic risk, owner-divestors have displayed higher idiosyncratic risk and, therefore, higher total risk. On the contrary, owner-divestors have displayed less EBIT (earnings before interests and taxes) volatility—a conflict with market results. The research results will serve to: (i) guide risk management and diversification approaches to produce optimal values for investors, including pension funds and sovereign funds; (ii) suggest a performance benchmark for infrastructure investments, and other assets classes; and (iii) support future research on the role of regulation on risk to investment returns.

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The Role of Voice Similarity in Accommodation: Sophia Walters (Faculty Sponsor: Dr. Molly Babel)

Studies of accommodation show that some talkers are perceived as accommodating more than others. One possibility is that the similarity of the shadower’s voice to a model talker’s can account, in part, for the amount of perceived accommodation. To determine this, we conducted an auditory naming task having eight model talker voices previously rated for attractiveness and prototypicality, such that the Most Attractive and Least Attractive and Most Typical and Least Typical voices for each gender were used as models. Twenty participants completed an auditory naming task with these eight voices. A separate group of twenty listeners rated the
similarity of model tokens and shadower’s baseline productions using a visual analogue scale.

The results of this task were compared to the perceived accommodation results from a separate AXB rating task. Overall, female voices that were more different from the models showed more accommodation. This effect was not found for males, who generally showed less accommodation overall. These findings suggest that talkers either accommodate more when their voice is more distinct from the model talker’s voice, or perhaps more likely, that such changes are more perceptible to listeners. Further explorations of the data are underway to tease apart these possibilities.

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Beyond A Single Perspective: Integrating A Multidisciplinary Approach (BUCH D307)

Public Attitudes on the Issue of Housing Pregnant Pigs: Nicole Bobadilla (Associate Dean Sponsor: Dr. Daniel M. Weary)

There is growing public interest in the welfare of intensively reared farm animals. Pregnant sows are typically housed in gestation crates that prevent the animal from turning around, but some farms are using group pens that allow sows to move freely.

The aim of this study was to explore public attitudes towards the use of gestation stalls and group pens. An online survey was created using the University of British Columbia’s “Your Views” website, providing an interactive forum where participants could engage in discussions about how sows should be housed. Comments were analyzed to examine why participants supported either gestation stalls or group housing, were neutral on the issue, or were not supportive of either system.

One major concern expressed by participants was the lack of opportunity for pigs to engage in natural behaviors in either system; participants commented on the importance of allowing sows the opportunity to engage in social behavior, build nests, root, and have freedom of movement. Many participants commented on the importance of providing straw or other manipulable objects; this suggestion is supported by the scientific literature showing improved welfare in pigs provided access to straw.

In conclusion, scientific and public attitudes research can inform recommendation for housing systems for pregnant sows that meet the needs of the animals and resonate with societal values.

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Tissue Culture of Wild-type and Transgenic Tobacco plants: Harleen Sekhon (Faculty Sponsor: Dr. Santokh Singh)
Plant tissue may be used to study differentiation and morphogenesis because roots, shoots, and embryos may be generated in culture from undifferentiated cells. The role of two major classes of growth regulators, cytokinins and auxins, in tissue culture was studied. Tobacco leaf tissue was analyzed for the formation of organs by the auxin to cytokinin ratio. The tumor-inducing plasmid (Ti-plasmid) of the Agrobacterium tumefaciens was used to transfer specific genes into the nuclear genome of tobacco plants.

In this experiment, I have initiated tobacco tissue cultures and examined their developmental responses to the application of growth regulators, and infected leaf pieces with an Agrobacterium strain. In addition, regeneration of transgenic plants, and examination of the developmentally regulated expression of the transgenes in tobacco plants will be investigated.

I found that the tissue samples grown within the auxin (naphthaleneacetic acid or NAA) media had a higher regeneration of roots and the samples grown within the cytokinin (6 benzylamino purine, BAP) media had a higher regeneration of shoots. The tissue samples on the media containing both NAA and BAP formed callus. The control (without hormone) sample had no regeneration and the untransformed control had mainly shoots and some roots formation. The PIN-GUS-transformed tobacco leaf discs started to show shoot formation after four weeks. The developmentally regulated expression of the trangenes in tobacco will be discussed.

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Viral Hemorrhagic Septicemia Virus:
A Potential Pathogen for B.C.’s Farmed Atlantic Salmon: Paulina Piesik (Faculty Sponsor: Dr. Jan Lovy)

Viral hemorrhagic septicemia (VHS) is a hemorrhagic disease of finfishes responsible for massive die-offs in wild and farmed fish populations. The etiological agent is Viral Hemorrhagic Septicemia virus (VHSv), a negative-sense RNA virus found in cold freshwater or marine environments in the Northern hemisphere. Over 70 species can be infected with VHSv, and transmission between wild and farmed populations has been observed both experimentally and in practice. In British Columbia, Pacific herring are highly susceptible to VHSv genotype IVa and are carriers of the virus. With Atlantic salmon being farmed in ocean netpens they share an environment with wild Pacific herring leading to VHSv transmission to Atlantic salmon.

Our research aimed to evaluate the susceptibility and effects of the virus to Atlantic salmon. To study this, a VHS outbreak was simulated by exposing salmon and herring to VHSv via injection or immersion. To monitor disease progression, viral pathogenesis, and host immune defenses, weekly samples were
taken for histological examination, viral assays, and immune gene assays.

Our results demonstrated that Atlantic salmon can become infected by VHSv genotype IVa and disease signs occurred in fish infected by both immersion and injection routes. Interferon signaling genes, including interferon-Î±, Mx, and ISG15, were activated in response to VHSv. Moreover, infected salmon continue to shed virus and virus can persist in a small percentage of salmon for at least 10 weeks. Our research demonstrated that VHSv may potentially emerge as a significant pathogen in the Atlantic salmon farming industry, and that future research is necessary to protect farmed fish stocks from potential disease outbreaks and viral transmission between wild fish populations.

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Linking Changes in Speech Production and Perception: *Graham Harber (Faculty Sponsor: Dr. Molly Babel)*

Previous research has demonstrated the flexibility of talkers’ production and perceptual repertoires. In terms of production, this would include phonetic imitation (Goldinger 1998) e.g., when a talker, exposed to the speech of a model talker with a different dialect, spontaneously shifts their vowel productions to sound more like those of the model talker (Babel 2010). Likewise, listeners’ perceptual repertoires are also highly adaptable as they too shift to accommodate novel stimuli, i.e., perceptual learning (Norris et al. 2003, Clayards et al. 2008).

Though adults’ productions have been linked to abilities in perception (Ghosh et al. 2010, Hay et al. 2006), how exactly flexibility in production relates to flexibility of perception remains a topic of some debate, as the relevant research has produced conflicting results (Baese-Berk 2010, Shiller et al. 2009, Kraljic et al. 2008).

The current study investigates the nature of this relationship. Participants were adult, native speakers of North American English. We tested whether the participants’ perceptual boundaries between the vowels of the words BAD and BED, would shift when exposed to recordings New Zealand English speech, in which BAD is produced more closely to the North American English BED, and BED to the North American English BID. In a production condition where participants repeated words after the New Zealand model talker, participants shifted their perceptual boundaries. This did not occur when participants only listened without repeating. The more participants imitated the model talker’s productions, the more they shifted their perceptual boundaries. This suggests that imitative behaviour i.e., changes in production, occur in chorus with changes in perceptual boundaries and facilitate perceptual learning.

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Enter Zen Bliss: Achieving Well-Being

BUCH D316

More Than Just Building: an Investigation Into the Impact of Location of Retirement Communities on Well-Being: Aaron Lao, Charles Pan (Faculty Sponsor: Dr. Elizabeth Lee)

Much research has been conducted on how the location of one’s residence can impact well-being (Dunn 2009, Lawton 1970, Yeates 1979). However, there have been very few studies addressing how location affects the well-being of senior citizens in particular, despite research demonstrating that they experience space differently than the general population, and have different needs in terms of health care, transportation, etc.

Our study examines how the location of a retirement community affects the well-being of the senior citizens residing there. The study was conducted by comparing two retirement communities: Tapestry at Arbutus Walk and Tapestry at Wesbrook Village, on the UBC campus. By comparing two very similar communities, we were able to isolate the variable of location. Surveys were conducted with twelve residents at each location, as well as focus groups to explore the topic further. To quantify well-being, we will use a rating system based on five factors of well-being outlined originally by Smith (1973): living environment, physical and mental health, education, social belonging, and recreation and leisure.

Our study has not yielded any results yet, as we will be conducting our site visits in late February. This knowledge will help cities better plan the location of retirement communities, particularly as the elderly population in Canada grows.

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A Research Journey into the Heart of the Cultural Revival of Nlaka’pamux Tattooing: Dion Kaszas (Faculty Sponsor: Dr. Margo Tamez)

Many Indigenous peoples have lost connections to their cultural traditions, which is manifested as a struggle to form a sense of who they are as Indigenous peoples. My goal this summer was to make a contribution to the cultural revitalization of the Nlaka’pamux people through the recovery of traditional tattooing practices, one of our artistic and visual cultural forms. I examined historical archives, I visited museums and sacred places to find pictographs that would inspire new tattoo designs. The knowledge gained has spurred a renewal of Nlaka’pamux tattooing, which contributes to the healing of our people.

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Correlates of Psychological Well-Being in Zambian Children: Tim
Krupa (Faculty Sponsor: Dr. Mark Holder)

This study investigated the correlates of psychological well-being in 1365 children and adolescents in urban and rural communities in Zambia. Four different populations were sampled: 1) rural impoverished children from Lusaka (Lusaka Province); 2) rural affluent from Lusaka; 3) semi-rural impoverished from Senanga (Western Province); and 4) semi-urban impoverished from Livingstone (Southern Province). Participants completed a forty-five item survey. The survey included measures of psychological well-being (i.e., happiness, life satisfaction, and sense of hope), nature connectedness, spirituality, religiousness, and physical health. All surveys and instructions were translated into tribal languages, and read by interpreters to ensure participants’ understanding.

The measures of psychological well-being indicated that children and adolescents in Zambia were happy. Urban participants were more hopeful than rural participants, while rural participants were found to be happier than urban participants. Physical health correlated positively with all measures of psychological well-being. Nature connectivity, spirituality, and religiousness items are currently being analysed. This study was important to advance understanding of children’s and adolescents' well-being. It has opened discussions on possible interactions, and variations in the meaning and importance of the sense of hope and happiness due to cultural perspectives. Further study and local interpretation of results may assist in designing culturally appropriate interventions in Zambia and potentially globally, to increase subjective well-being.

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The Role of P55 Efflux Pump in Cholesterol Metabolism: Tony Hui (Faculty Sponsor: Dr. Santiago Ramon-Garcia)

Mycobacterium tuberculosis (MTB) is the causative agent of tuberculosis, which is an infectious bacterial disease that infects and kills more people than any other bacterial disease; its deadliness is second only to HIV. Moreover, current strains of tuberculosis are becoming resistant to multiple antibiotics, which make them significantly more dangerous. For example, MTB can be resistant to antibiotics by using efflux pumps to pump multiple antibiotics out of their system. Recent research suggests that MTB must import and consume cholesterol from our cells in order to cause disease, because cholesterol is its only source of nutrition. Genetic studies also suggest that one specific efflux pump, called P55, is also involved with MTB’s cholesterol metabolism, contradicting previous thoughts that antibiotic efflux pumps were only important for survival against antibiotics.
Our research question was whether or not P55 was involved in the metabolism of cholesterol. To address this question, we used strains of a non-pathogenic model organism, Mycobacterium bovis BCG, one strain with P55 and the other without P55. We then investigated their ability to grow using cholesterol as the sole nutrient source and measured their ability to import radiolabeled cholesterol. Our research revealed that M. bovis BCG without P55 grew slower in cholesterol and could only import half as much cholesterol as the wild-type strain with P55. These results suggest that P55 is directly involved in the import of cholesterol, and therefore the development of therapeutics that inhibit or remove P55 may contribute to eradicating the disease.
Activities for the Day

Social media:
Got a Smart Phone? On Twitter? LiveTweet your MURC experience by using the #MURC13 hashtag and Tweeting us @UBC_MURC. We’ll RT the best ones and answer any questions you may have. Let’s get this hashtag trending in Vancouver!

Delegate involvement:
Peer Review

Have comments that you wish you could share? Check-out the ‘Peer Review’ cards in your nametag holder and feel free to leave a comment for the presenters of your choice. The cards will be given to the presenters after the conference. Please note that these reviews do not have any impact on the adjudication process.

Also, be sure to get your name on the list of Peer Reviewers at the end of the day for a chance to win an iPad Mini! See the MURC team at the Old Auditorium Closing Plenary for details.

Eureka Fantasy Board (IKBLC Main Foyer)

Do you have a research project that you dream about? Well then, put it up on our Eureka Fantasy board and make a commitment to yourself that you’ll pursue it in the future. Also tweet your Eureka Fantasy to us @UBC_MURC and using the #MURC13 hashtag.

Presenter involvement:
AHA! Moment Board (IKBLC Main Foyer)

What’s that one (maybe two) things that inspired you to get into research? This is your time to share your research journey with your fellow presenters. All AHA! cards will be collected at the end of the day and will be randomly placed in presenters’ post-conference packages as a memento of the day.

Tweet your AHA! Moment @UBC_MURC using the #MURC13 hashtag and we just might read it out loud at the closing ceremony!
Selected Proceedings of the 2013 Multidisciplinary Undergraduate Research Conference (MURC)

Call for Submissions

Deadline: April 30, 2013

The UBC Centre for Student Involvement & Careers and Arts Studies in Research and Writing are pleased to offer you the opportunity to publish your research in our online publication: Selected Proceedings of the 2013 Multidisciplinary Undergraduate Research Conference (MURC). Whether you have presented an oral paper or a poster, we encourage you to submit a written version of your work by April 30, 2013. Publishing in this e-journal is a great way to make your research visible to a wider UBC, Canadian, and international audience.

Your submission will be reviewed for potential publication by members of the editorial team. We are particularly interested in papers that are written for a scholarly non-specialist readership. In other words, your paper should provide enough explanation and definition to make it accessible to scholars who work in other disciplines. We will also be looking for papers that explain how your research relates to existing scholarship in the field, interpret the most important findings, and account for the broader implications of the research. Your text will likely be shorter than you prepared for your oral conference presentation. In that case, we encourage you to sharpen your argument and focus on some of the more crucial parts of your project.

Requirements for submissions:

- Format:
  - Maximum length: 1000 words (excluding reference list)
  - Maximum number of tables, charts, graphs, or images: 2
  - Reference list and in-text citations (in discipline’s format)
  - DOC or DOCX file format
  - 12pt Times New Roman; double-spaced; 1-inch margins

- Other:
  - Title, name and email address, name and email address of project’s supervisor
  - 60-word biographical note
  - Completed supervisor sign-off form (available on the MURC website in April)

Submit your paper and attachments electronically on the MURC site: http://murc.ubc.ca
Acknowledgements

Thank-you to all those below for your support in organizing MURC 2013! We appreciate your time and dedication in making the celebration of undergraduate research at UBC a success. Special thanks to the following faculty members from Arts Studies in Research and Writing for their assistance with proposal preparation, submission review and adjudicator training: Dr. Rick Gooding, Dr. Katharine Patterson, Dr. Jaclyn Rea, and Dr. Katja Thieme. Many thanks also to Dr. Santokh Singh (Department of Botany, UBC) for his continued and wide-ranging support of MURC.

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Dr. Rick Gooding

**Lunchtime Workshop**
Dr. Santokh Singh

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Alexander Flock (Guitar)
Winston Minckler (Acoustic Bass)
Cameron Stephens (Drums)

**Volunteers**
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