

March 9–13

FURCA 2020



The Festival of Undergraduate Research and Creative Activities (FURCA) is the U of A's campus-wide, interdisciplinary celebration of

YOUR QUESTIONS AND IDEAS!

For more information and latest schedules visit www.uab.ca/uri. All events are open to the public.



Undergraduate
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INITIATIVE



WELCOME

In 2011, the Students' Union, with the support of the Undergraduate Research Initiative, held the U of A's first Undergraduate Research Symposium with the goal of fostering cross-disciplinary awareness of undergraduate research and promoting broader student participation in research and creative activities. Since then, the Undergraduate Research Symposium, which later evolved into the Festival of Undergraduate Research & Creative Activities (FURCA), has become an annual celebration of undergraduate research in various forms, showcasing the curiosity and talents of undergraduate students across all disciplines. More than 180 students will present work at FURCA this year—a record number!

We are proud to celebrate a number of “firsts” for FURCA in 2020. We welcome a cohort of visiting international scholars completing research internships at UAlberta, as well as Grade 12 Advanced Placement (AP) and International Baccalaureate (IB) students from high schools across the Edmonton area.

This year, in conjunction with FURCA's first Green Events Gold certification, we are also highlighting undergraduate research in sustainability. Presenters were encouraged to self-identify if their research advances one or more of the 17 UN Sustainable Development Goals (SDGs). You can learn more about the SDGs here: www.un.org/sustainabledevelopment/sustainable-development-goals/

We hope you enjoy FURCA 2020, and come away inspired by the diverse and meaningful contributions our students are making to support a more sustainable future.



WELCOMING REMARKS FROM UNIVERSITY OF ALBERTA INTERNATIONAL

On behalf of University of Alberta International (UAI), I am so pleased for many of our visiting international student researchers to have the opportunity to participate in FURCA 2020. These talented participants are here to gain valuable experience collaborating on innovative research happening at the University of Alberta in as short as 12 weeks or as long as eight months, and are hosted across 20 different departments.

We are fortunate to host visiting international students through a variety of research internship programs. The main programs helping to fund these talented young researchers are the University of Alberta Research Experience (UARE), the China Scholarship Council, the RWTH Aachen Junior Research Fellowships, and the Government of Canada International Scholarships. Between these programs, our campus is lucky to be hosting over 40 research interns from a variety of academic backgrounds this Winter, hailing from eight different countries and almost 20 different home universities. Through these programs, we are actively cultivating the next generation of top researchers and internationalizing our campus by bringing the world to the University of Alberta.

We would like to take this opportunity to thank the visiting international students themselves for choosing to enrich the University of Alberta with their presence, and express our gratitude to all of the host professors, supervisors, departments, faculties, and sponsors involved. Our collective success in the “uplifting of the whole people” relies on your ongoing contributions and invaluable support to advance knowledge and incite change for the public good.”



THANK YOU TO OUR SPONSORS!

FURCA 2020 is made possible through the generous support of:

University of Alberta Faculty of Science
University of Alberta Students' Union
University of Alberta Faculty of Arts
University of Alberta International
University of Alberta Sustainability Council

SPECIAL THANKS TO:

All faculty, staff, graduate students, postdoctoral fellows, and alumni who have generously volunteered their time to judge posters and presentations throughout the week.

University of Alberta Libraries, for their support in coordinating the judging process.

Ashley Castelo, from University of Alberta International, for her support in coordinating the participation of visiting international interns in FURCA this year.

Courtney Hopwood, from the Registrar's Office, for her support in coordinating the AP/IB poster session.

The staff of the Career Centre and URI's Peer Undergraduate Research Liaisons, for their support in planning and logistics. Special thanks to Kelly McDonagh, for assistance with catering and logistics throughout the week.

The Dean of Students' Communications team, for their support in design and promotions for FURCA.

Patrick Phillips, and his team at Supply Management Services, for their support with logistics for the FURCA poster symposium and awards reception.

All of the undergraduate researchers, mentors, advocates and donors who are helping year-round to support a culture of undergraduate research at the University of Alberta.



CONGRATULATIONS TO ALL PARTICIPANTS IN THE

Festival of Undergraduate Research and Creative Activities

UNDERGRADUATE RESEARCHERS ARE THE LEADERS OF TOMORROW.

We are thrilled to be a part of your journey.

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FURCA SCHEDULE-AT-A-GLANCE

This is provided as an overview only. For the most up-to-date detailed schedule, please visit www.uab.ca/uri. All events are free and open to the public; however, we ask you to please register at the URI website, as this helps us estimate food quantities for catered events.

Monday, March 9

- Performances (12:00 – 1:00 p.m., SUB Stage)

Tuesday, March 10

- Oral Presentations (10:00 a.m. – 3:00 p.m., SUB 0-31 & 0-33)
 - Register here: <https://bit.ly/38J1k2s>

Wednesday, March 11

- Poster Symposium (10:00 a.m. – 3:00 p.m., main floor CCIS)
 - Morning session (10:00 a.m. – 12:00 p.m.)
 - Afternoon session (1:00 – 3:00 p.m.)
- AP/IB (High School) Poster Session (4:00 – 6:00 p.m., main floor CCIS)

Thursday, March 12

- Visual Art Exhibit Presentations (12:00 – 3:00 p.m., Rutherford Library Foyer)
 - *Exhibits in Rutherford Foyer will remain on display until March 27

Friday, March 13

- Awards Reception (5:00 – 7:00 p.m., Cascade Room, SUB)
 - RSVP here: <https://bit.ly/2P22G0f>

DETAILED ORAL PRESENTATION SCHEDULE

Time	Room 1 – SUB 0-31	Room 2 – SUB 0-33
10:00 – 10:20 a.m.	O26. Andrey Kutsyh Morphological and Molecular Analysis of Retina in UNC119a1 and UNC119a2 Mutants	O04. Katlyn Kichko The Construction of Masculinity in Public Space: An Analysis of Virginian Coffee Houses During the Eighteenth Century
10:20 – 10:40 a.m.	O25. Isabelle Bernard Cell-associated sialic acid contributes to reovirus attachment to tumorigenic cells	O01. Jonah Dunch Make-believe spelunking: the invitation account of fictions' ethical influence in Outline and Gilead
10:40 – 11:00 a.m.	Break	O07. Arizona Lowe A Review of Alberta's Economy in 2019 and Overview of Ways to Eliminate Fossil Fuels Using Marxism
11:00 – 11:20 a.m.	O11. Hyelin Sung Usability of Infographics for Pediatric UTI and Bronchiolitis	O15. Laura Alejandra Monsalve Bernal Using Information and Communication Technologies for managing frailty: a systematic literature review
11:20 – 11:40 a.m.	O08. Cory McKenzie Listen Before you Drive: The Effect of Voice Familiarity on Memory and Driving Performance	O02. Parul Kanwar Shaping a Country's Sexuality: Bollywood's Item Songs
11:40 a.m. – 12:00 p.m.	O12. Andrew Wu Quantification of Cerebral Degeneration in ALS using Texture Analysis	O18. Lisa Shi Gesture differences between ASL-English bilinguals and French-English bilinguals
12:00 – 12:20 p.m.	O16. Ivan Gonzalez Arc welding high speed video analysis using deep learning	O21. Erinne Ng When in Rome: Interpreting Idioms in English and Mandarin
12:20 – 12:40 p.m.	Lunch	Lunch
12:40 – 1:00 p.m.	O19. Chantelle Klaczek The effect of elevated salinity on diltiazem uptake in rainbow trout (<i>Oncorhynchus mykiss</i>)	O06. Thalia Sanchez The Challenges of Translation Classic Children's Literature
1:00 – 1:20 p.m.	O13. Chunpeng Nie Studying Cartilage Dysfunction Using Proteomics	O23. Alex Fernandez Thematic and taxonomic conceptual systems in children



DETAILED ORAL PRESENTATION SCHEDULE

Time	Room 1 – SUB 0-31	Room 2 – SUB 0-33
1:20 – 1:40 p.m.	O10. Dillon Lee International students and their accessibility to on-campus healthcare services	O20. Denniss Raigoso Brain Computer Interfaces for Games and Environmental Control
1:40 – 2:00 p.m.	O24. Emily Bielech Access to Justice in a Neurotypical World	O09. Jolene Borrelli Understanding Failure: A Way out of Waste
2:00 – 2:20 p.m.	O05. Max Novotny The opioid crisis and street communities in Edmonton: a qualitative study of precarity and harm reduction	O27. Jenna Robinson Females Reducing Incarceration through Education (FRIE)
2:20 – 2:40 p.m.	O28. Kirtan Dhunoo & Shankar Jha Sex Differences in the Pathogenesis of Osteoarthritis in Microgravity	O14. Sarah Kondor Policing unique Internet connections: How Canadian police services have responded to the growth of the online sex industry
2:40 – 3:00 p.m.	O22. Simran Panesar The Effect of pH on the Reduction and Absorption of Iron	O03. Anthony Gallipoli Sherman's March to the Sea



CREATIVE PERFORMANCES

Monday, March 9th | 12:00 -1:00 p.m.
SUB stage

C01. Woman Prophecy

Area(s) of study: Fine arts

Katherine DeCoste | FACULTY OF ARTS

WRITE 494 explored the work of Indigenous scholars on understanding the meanings of treaty-making and land in what is now called Canada. Using poetics as a framework, the course used creative work to connect to the land. My project explores how women's bodies are connected to water, and women's unique role in treaty-making and in protecting the land in a stewardship relationship. The project explores violence against the land by settlers, as well as the importance of familiarity with histories of violence and our responsibilities for reconciliation going forward. Using the text of Treaty 6, the project resists demarcation of the land and moves towards a relational understanding of where we live, work, and study.

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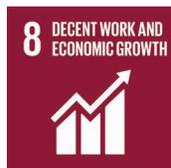
C02. Social Identity: Effects of Masculinity Threat on Language Studies Interest

Area(s) of study: Social sciences & humanities

Yekta Sharafaddin-zadeh*, Kathryn Chaffee, Kimberly Noels, Nigel Manto Lou, Joshua Katz | FACULTY OF SCIENCE

Men are underrepresented in language related fields. In a previous study, men in a foreign language class differed from men not in such classes in both motivational factors and masculine role beliefs. Social identity threats to men's masculinity through false feedback regarding their identity have been shown to lead men to protect their manhood through hyper-masculine behaviour. False feedback has been administered using fake personality tests where men are told they have feminine characteristics. In another study, following a masculinity threat, men with traditional masculinity beliefs reported less interest in foreign language classes and learning. In this current study, 192 men's attitudes, expectancies, abilities, and values were measured following a masculinity threat in order to assess the shift in their interest toward language studies and mathematics. We predicted that men with traditional beliefs about masculinity would place a lower value on language and a higher value on math. Having a more traditional belief about masculinity was associated with more negative attitudes about language learning. We observed a statistically significant interaction between gender beliefs and masculinity threat on math abilities such that men with traditional beliefs rated themselves higher on their mathematical skills following a threat. Based on these results we may be able to identify why men with traditional beliefs toward masculinity are underrepresented in language fields.

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ORAL PRESENTATIONS

Tuesday, March 10th | 10:00 a.m. - 3:00 p.m.
SUB 0-31 and 0-33



001. Make-believe spelunking: the invitation account of fictions' ethical influence in *Outline* and *Gilead*

Area(s) of study: Social sciences & humanities

Jonah Dunch | FACULTY OF ARTS

To what extent, and in what ways, is it possible for fictions to influence their readers' ethical development?

In my research paper, I explore different answers to this question in philosophy and literary studies. My proposal is an "invitation account": fictions can influence their reader's ethical development if the reader make-believely entertains the narrator's point-of-view—including the ethical commitments the fiction "instructs" them to take up with textual clues—and re-examines their existing ethical commitments as a result. The reader thus responds to an "invitation" from the fiction to adopt a novel ethical outlook.

I show how my account has advantages over the extant views of philosophers and literary theorists like Iris Murdoch, Martha Nussbaum, and Joshua Landy. For instance, Murdoch and Nussbaum's "attention account," the view that great fictions automatically hone their readers' ethical sensitivities, wrongly underplays the reader's active engagement with the text. Landy's "clarification account," which holds that the most fictions can do is clarify our existing commitments or hone our existing capacities, wrongly underplays fictions' transformative powers.

My invitation account accommodates fictions' clarificatory, attention-honing, and transformative roles while affirming readers' active role as agents in fictions' processes. To put my account in action, I apply my approach to the contemporary novels "*Outline*," by Rachel Cusk, and "*Gilead*," by Marilynne Robinson.

002. Shaping a Country's Sexuality: Bollywood's Item Songs

Area(s) of study: Social sciences & humanities

Parul Singh Kanwar | FACULTY OF ARTS

The Indian film industry, dubbed as Bollywood, has evolved over time to incorporate certain tropes that can make an average film into a blockbuster. One such trope is an item song which can be defined as a "dance sequence of raunchy movements with risqué lyrics with little attention to the plot line" (Jha 25). An item song features sexual undertones in its choreography, costumes and overall mise-en-scene in an attempt to provide entertainment and enjoyment for the targeted audience of the film. The item song phenomenon has transgressed genres and become a signifier of the entire Bollywood industry. However, while item songs lead to great success for various filmmakers, their impact on the female body and sexuality is overlooked.

Through my research, I argue that the popularity of item songs has led to generalizations and misrepresentations of women's sexuality which promote a heteronormative narrative to gain commercial success and advertize women's self subordination and rape culture within the Indian society. To explore this, I will analyse Bollywood's ability to shape Indian sexuality before identifying the misogynistic origins of item songs and their commercial significance. Furthermore, I will explore the identity of Indian women constructed in films of different genres, namely: thriller and romantic comedy. I will then contrast them with their item songs counterparts to depict the transformation in female sexuality within items songs, and any outliers to their staple construct.

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003. Sherman's March to the Sea

Area(s) of study: Social sciences & humanities

Anthony Gallipoli | FACULTY OF ARTS

My paper on Sherman's March to the Sea in 1864, was a term paper due for Professor Romeo's course. My argument centred around the basis that Sherman's March was a bold and innovative strategy, that completely broke away from the established historical principles. President Lincoln himself felt the plan was incredibly dangerous and Sherman's fellow officers thought he had gone insane. I focused on Sherman's March due to its impact on the American Civil War and its broader historical impact on warfare. Using Sherman's own diary I was able to ascertain some of his own feelings regarding the nature of his new campaign, and how his March affected the Confederate civilians too. Using several primary sources from Union and Confederate perspectives, I was able to prove that Sherman's March was a totally new conception of warfare that brought about a swift end to the war, without huge numbers of casualties either by psychologically terrifying the enemy into submission and destroying the Confederate resources at the same time. The significance of my findings sheds a new light on to the brilliance of William Sherman, and how impressive it was for him to break off from established military principles that men like Napoleon, Julius Caesar, and Hannibal of Carthage followed, thus becoming incredibly successful due to an unbelievable personal and professional risk on his behalf. Sherman's March played a role in establishing "hard-war" tactics, which soon evolved into "total-war" tactics.

005. The opioid crisis and street communities in Edmonton: a qualitative study of precarity and harm reduction

Area(s) of study: Social sciences & humanities

Max Novotny*, Maryam Rana* | FACULTY OF ARTS

Between January 2016 and December 2018, more than 11,500 Canadians have lost their lives due to opioid overdose, the majority of which occurred in the western provinces. This has led to frantic government initiatives to lessen the devastating impacts of the Canadian opioid crisis. Given their extremely marginalized status, homeless communities are far more likely to develop addictions and be exposed to overdose than other factions of the population. How the opioid crisis has affected this demographic must be understood. Our project focuses on how the opioid crisis has come to influence the social realities of those who suffer from homelessness, addiction and marginalization; but also, how it has influenced the programming, policies and practices of service providers who work with these communities. In pursuit of these questions, we conducted 61 semi-formal interviews; 24 with community stakeholders and 37 with service recipients. Interviews were guided by prompts, transcribed verbatim and selectively coded for topics relevant to this presentation. Our findings point to exacerbated relations within the street community and between service providers. The interpersonal behaviour of actors have been altered as they negotiate the increased risk of overdose for themselves and others. They also suggest the importance of informal harm reduction initiatives that focus on educating this community's most vulnerable and hard to reach. Harm reduction policy could benefit from this research by understanding how to direct efforts to those most severely affected by the opioid crisis.

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006. The Challenges of Translation Classic Children's Literature

Area(s) of study: Other/interdisciplinary

Thalia Sanchez Taquechel | FACULTY OF ARTS

This research is part of my undergraduate Honors Thesis in Combined French and Spanish. The work focused briefly on the history of what children's literature consists of and can be considered to be—demonstrating that the term is nebulous and changes in dependence with society's definition of childhood. Also, the research delves into how this genre has been regarded within the field of translation studies (showing that it is an understudied and relatively young sub-discipline within the already recent field of translation studies). In this vein, my research touches on the importance and influence of children's literature as an explanation for why it should be translated. There is also an in-depth discussion on how and why children's literature is particularly challenging to translate, as well as outlines the specific elements that translator should be aware of; this will be accompanied by examples of both successful and unsuccessful real-world examples. The second half of the project is a practical examination of two classic English language works (*One Fish, Two Fish, Red Fish, Blue Fish* by Doctor Seuss, and *Winnie the Pooh* by A.A. Milne) and how they have been translated into French and Spanish since their publication. The work outlines the practical differences between the translations, which will be shown through images and clear comparisons—often with humorous results. The translator's choices reflect their priorities and desired cultural message. The project includes a discussion of how classic works present a particular challenge due to their cultural ubiquity and number of adaptations.

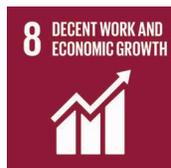
007. A Review of Alberta's Economy in 2019 and Overview of Ways to Eliminate Fossil Fuels Using Marxism

Area(s) of study: Other/interdisciplinary

Arizona Lowe | FACULTY OF AGRICULTURAL, LIFE & ENVIRONMENTAL SCIENCES

This project is an overview of the Albertan economy in 2019 with suggestions to eliminate dirty energy from the equation. With the current state of the climate, shifting towards sustainable energy will be integral in prolonging the success of our species. The Albertan economy is based heavily on unsustainable energy, and without proper economic reshaping, falling future demand for petroleum products could have catastrophic outcomes for Alberta. Though technological innovation is extremely important in sustainable solutions, economic structure and adaptability is fundamental in the implementation of these new technologies. Current political initiatives and the prevailing capitalist ideology of the world economy are counter-intuitive to helping the climate. Therefore, this project uses Marxism to shape the economy and to provide potential solutions that are not solely based on helping the environment but that encompass the entire system. The best solutions are those that do not simply focus on one issue and aspect, but that holistically approach all facets of the economy and provide benefits to all. Using Marxism, this project will review the current state of the Albertan economy and provide suggestions to shift from petrocapitalism to a sustainable, social welfare focused future.

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008. Listen Before you Drive: The Effect of Voice Familiarity on Memory and Driving Performance

Area(s) of study: Natural sciences & engineering

Cory McKenzie*, Jacqueline Cummine, Daniel Aalto, Amberley Ostevik, Bill Hodgetts | FACULTY OF SCIENCE

It is a common experience in daily life that a familiar voice is easier to focus on than an unfamiliar voice. Recent work has provided evidence that listening to a familiar voice requires less mental resources in a complex listening environment, as compared to a non-familiar voice. The extent to which the reduction in listening effort allows for mental resources to be reallocated to other complex tasks (e.g., driving) remains to be seen. We sought to answer whether a familiar audiobook narrator provides benefits to 1) listening comprehension while driving and 2) driving performance while listening? Participants first listened to an audiobook read by either voice 1 (familiar condition) or voice 2 (unfamiliar condition) for 22 minutes. They were then tested on how well they remembered the audiobook (there was no difference between the groups on this pre-measurement). They then completed a virtual reality driving task (22 minutes) while listening to a second audiobook read by voice 1. Both audiobook recall/comprehension and driving performance (number of driving errors made) were recorded. We found that participants who were familiar with the narrator had no improvement of audiobook recall, but had significantly improved driving performance. This implies that 1) a familiar audiobook narrator may reduce driving errors in some situations, 2) some short-term familiarity benefit can be acquired even after just 20 minutes of exposure, and 3) the mental resources gained by decreasing listening effort can be reallocated, likely to whichever task is deemed most important.

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009. Understanding Failure: A Way out of Waste

Area(s) of study: Natural sciences & engineering

Jolene Borrelli | FACULTY OF ENGINEERING

The service life of plastic objects is shortened by various types of failure—the objects lose components, weaken, break or sometimes just aren't aesthetically pleasing after time. Materials engineers are interested in the failure of these plastics, such as the dollar store spatula marked by burns and the shopping bag that rips at the handle. Could the design, creation and use of plastic objects become more sustainable if the modes and mechanisms of failure during service were better understood? This project aims to categorize failure in common plastic objects with a rich, visual taxonomy developed over 8 months as part of an undergraduate engineering co-op term. The taxonomy serves to present the technical details of failure as a record but also narrate the life of the object from fabrication to trash heap as unfolding case studies to be used as a learning tool. The project aspires to challenge students, designers and engineers to think critically about the relationships between plastics, failure and waste through the record and case study methods. This presentation will detail the evolution of the visual taxonomy and the layered approach to failure analysis applied to each investigation. The questions of when and how failure is determined from material and societal viewpoints will also be explored. A sample of a record and of a case study will be shared from the collection of failed plastic objects together with physical and virtual specimens.

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010. International students and their accessibility to on-campus healthcare services

Area(s) of study: Social sciences & humanities, Other/interdisciplinary

Dillon H. Lee*, Ken M. Cor, Lisa M. Guirguis

FACULTY OF PHARMACY & PHARMACEUTICAL SCIENCES

Purpose: The well-being of international students holds significant implications for all students, healthcare professionals on campus, and university policymakers. There is limited information pertaining to specific healthcare needs of international students at the University of Alberta. The aim of this study was to characterize the international student patient experience and factors that influence it, including knowledge, attitudes, and perceived barriers.

Method: This exploratory descriptive study employed a mixed-method approach to produce qualitative and quantitative data. Through snowball sampling starting with targeted contacts from the International Student Centre (ISC), interviews were held using a semi-structured interview guide. Interview data were explored using thematic analysis. A 44 item survey was developed to measure the University of Alberta specific experiences including, help-seeking preferences, perceived cultural barriers, and attitudes towards using on-campus health resources. The survey was distributed using the ISC and Faculty Student Services mailing lists. Descriptive analysis was used to characterize data.

Results: Results draw from nine interviews with international students, on-campus healthcare providers, and ISC advisors and 59 survey responses. The study determined three themes associated with international students: the issue of knowledge translation, insurance imperatives, and the unique challenges with medications. Quantitative findings support the themes.

Conclusions: Explaining the values and the structure of Canada's free healthcare is a crucial step in reconciling the healthcare expectations and realities for international students. The University of Alberta should support student initiatives that better help international students to explore the Canadian healthcare system: this could include the development of a targeted healthcare guide for international students.

Support: Undergraduate Research Initiative (URI) Social Sustainability Research Award

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011. Usability of Infographics for Pediatric UTI and Bronchiolitis

Area(s) of study: Health Services

Hyelin Sung*, Anne Le, Tabatha Plesuk, Hannah Brooks, Byunghoon (Tony) Ahn, Lisa Hartling, Shannon D. Scott

FACULTY OF NURSING

Urinary tract infections (UTIs) and bronchiolitis are common causes of pediatric acute illness. Parents expressed limited knowledge of these conditions and their management, which may lead to further health consequences, demonstrating the need for more effective information resources. Infographics combine text and images to convey complex health information to parents in a simple and aesthetically pleasing way. We surveyed parents to evaluate the usability of a digital UTI infographic and a digital bronchiolitis infographic. A 9-item survey assessed usability on a 5-point Likert scale, using iPads at an urban pediatric emergency department and a general urgent care center in Edmonton, Alberta. Parents were randomly assigned to evaluate the UTI or bronchiolitis tool. SPSS was used for analysis. 64 parents participated in the usability evaluations. Overall, responses were positive (mean scores ranged from 4.10-4.48). Parents agreed that both infographics (UTI/bronchiolitis) were useful (4.10/4.38), relevant (4.27/4.32), and simple to use (4.48/4.26). Both could be used without additional instructions (4.40/4.21), had an appropriate length (4.37/4.09), and were aesthetically pleasing (4.43/4.42). When asked if the infographics would be used in the future, the UTI infographic scored 4.43 and the bronchiolitis infographic scored 4.24. Parents generally agreed the infographics would help them make decisions about their child's health (4.17/4.22) and they would recommend the infographics to others (4.30/4.38). Overall, the positive feedback from parents suggests that infographics are useful mediums of knowledge translation.

012. Quantification of Cerebral Degeneration in ALS using Texture Analysis

Area(s) of study: Health Services

Andrew Wu*, Daniel Ta, Muhammed Khan, Pedram Parnianpour, Avyarthana Dey, Peter Seres, Adam Elamy, Lawrence Korngut, Angela Genge, Nicolas Dupre, Lorne Zinman, Sanjay Kalra

FACULTY OF SCIENCE

Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disease that irreversibly affects the motor and frontal regions of the brain, eventually causing death by respiratory failure. Disease symptoms are heterogeneous, making diagnosis challenging.

Routine structural magnetic resonance imaging (MRI) does not reliably show evidence of cerebral degeneration. Texture analysis is an advanced image processing method that quantifies patterns between voxels in images, with prior studies revealing texture changes in brain T1-weighted MRIs in ALS. The objective of this study is to evaluate cerebral degeneration in ALS using texture analysis with different MRI sequences.

Fifty-one controls and 49 patients were recruited to the Canadian ALS Neuroimaging Consortium. Volumetric 3D T1, T2, and FLAIR scans acquired at 1.0 mm³ resolution were processed using whole-brain texture analysis. Group level comparisons were performed between patient and control groups for each modality. Regional texture values were correlated with patient clinical scores.

Texture changes were detected in FLAIR and T1 scans in the inferior corticospinal tract (CST), as well as in the mid-level of the CST in FLAIR scans. Conversely, T2 scans revealed texture changes in the superior aspect of the CST. Significant correlations were present between upper motor neuron function and texture changes in the CST.

Texture analysis of multimodal MRI data shows promise as a diagnostic biomarker. The differing spatial results between modalities may reflect sensitivity to varying pathology. Future work to explore texture changes in conjunction with imaging modalities of white and gray matter can advance understanding of pathology in ALS.

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013. Studying Cartilage Dysfunction Using Proteomics

Area(s) of study: Health Services

Chunpeng Nie | FACULTY OF MEDICINE & DENTISTRY

The temporomandibular joint (TMJ) connects the jaw with the skull and allows its movement. Joints, including the TMJ, develop disorders such as osteoarthritis if the joint's cartilage cells function inappropriately. Osteoarthritis treatment options are limited partly because cartilage dysfunction is poorly understood. Lack of a signalling protein, BMP7, is known to cause osteoarthritis in the knee and TMJ. Here, we investigated how cartilage cells change before they become osteoarthritic. We hypothesized that loss of BMP7 in the TMJ changes the cells' metabolism before cartilage damage.

To investigate the osteoarthritic TMJ, we genetically modified mice to lack the gene for BMP7 and compared them to control mice. Tissue staining, a traditional way to assess osteoarthritis, showed that cartilage developed normally up to 2 weeks but showed signs of early osteoarthritis in the mutant at 4 weeks. To understand how cellular activity could have caused this change, we used proteomics and looked for differences in protein abundance between control and mutant. Proteins involved in several cellular processes, including energy production and protein breakdown, were decreased greatly. Surprisingly, these metabolic changes to cartilage were already present at 2 weeks, before any cartilage dysfunction was visible through the tissue stains.

This was a new, successful application of proteomics to study cartilage disease. Our findings suggest that osteoarthritis in the TMJ is preceded by changes in cartilage cell activity. Thus, osteoarthritis might be a consequence of metabolic changes within the cartilage. This finding has important implications for developing new treatments and diagnostic procedures for osteoarthritis.

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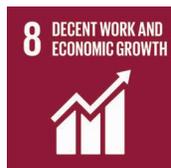
014. Policing unique Internet connections: How Canadian police services have responded to the growth of the online sex industry

Area(s) of study: Social sciences & humanities

Sarah Kondor | FACULTY OF ARTS

In 2014, Canadian Parliament introduced the Protection of Communities and Exploited Persons Act (PCEPA) with the intention of protecting sex workers against violence by, in part, authorizing police to arrest and charge sex buyers instead of sex workers. Simultaneously, the implementation of broadband Internet in Canada provided a medium that fostered the growth of the online sex industry. What remains relatively unexamined, however, is the degree to which Canadian police services have responded to the growth of online sex work under PCEPA. Analyzing the police response to the online sex industry requires evaluating to what extent the growth in online sex work is a result of sex workers moving away from the street-based context into the online context, or rather a function of an expansion of the sex industry overall. An evaluation of Uniform Crime Report statistics, victimization surveys, and existing literature reveals whether or not sex work has generally moved away from the street-based context and into the online context, and how much policing under PCEPA has reflected these patterns in both online and street-based sex work. The results of this investigation provide an avenue to test the degree to which Canadian police services have successfully responded to PCEPA's objective to protect sex workers from gendered violence, regardless of location. Because online media to access information and people continues to develop both within Canada and abroad, it is vital to understand the effects of online contexts on sex workers' working conditions, and the role of police services in fostering more secure environments.

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015. Using Information and Communication Technologies for managing frailty: a systematic literature review

Area(s) of study: Health Services

Laura Alejandra Monsalve*, Luisa Jaime Nieto*, Antonio Miguel Cruz, Adriana Rios Rincòn, Anna-María Ladurner, Daniel Alejandro Quiroga

Frailty is a state of increased vulnerability, with reduced physical reserves and loss of function across multiple body systems. There is a lack of evidence on how the use of information and communication technologies (ICTs) can be used to manage frailty in adults/older adults. Therefore, the purpose of this literature review is to examine the range and extent of ICTs such as wrist wearable sensors, smartphones, automatic speech recognition etc, used to manage frailty, the level of technology readiness, the evidence and associated outcomes. As part of an interdisciplinary research team (Biomedical Engineers, Occupational Therapists and Physical therapists), we are conducting a systematic literature review and at this point the project is on the stage of identifying keywords and subject headings and in a variety of databases and constructing the search strings. Taking into account that the number of frail older adults is increasing, this research will provide useful insights about the existent ICTs used to prevent, delay and monitor frailty and reduce health care system costs by using it at home rather than going to the hospital. Since there is a gap on the use of ICT to prevent frailty field, our findings will provide insights on how ICT can be used in a proactive approach (e.g.to detect and monitor frailty). Our results will be the starting point of the development of a new technology (based on ICT) for managing frailty more proactively on a continuous basis and in adults and older adults living at home.

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016. Arc welding high speed video analysis using deep learning

Area(s) of study: Natural sciences & engineering

Ivan Gonzalez | FACULTY OF ENGINEERING

It is now common the use of algorithms that can process image or video and extract important information from them, such as identifying objects, facial expressions and create captions. These tasks can easily be done by humans, when we see a picture, we can tell whether a person is smiling or not, but how about looking at less intuitive data? It's not that easy to assess which characteristics are underlying in a spectrogram, an acoustic signal of a turbine or a welding high speed video. Although the human perception is not enough in this case, the same techniques of image and video analysis can still be useful. In this work I use machine learning-based processing to high speed videos (HSV) of arc welding.

The reason behind this approach is two-fold. First, machine learning techniques thrive when a high volume of data is available, which is the case of HSV cameras. Secondly, physics behind welding is complex and involves several fields such as solid mechanics, heat transfer and plasma physics. The use of a machine learning-based approach helps in that no prior knowledge is required, data can be processed and give meaningful results, which then can be interpreted using the previous expertise.

With this work I hope to be able to extract important features from the welding process such as droplet size and metal deposition rate over time, which then can be used to improve the efficiency of the task and to gain a deeper understanding of it.

018. Gesture differences between ASL-English bilinguals and French-English bilinguals

Area(s) of study: Social sciences & humanities

Lisa Shi, Elena Nicoladis | FACULTY OF SCIENCE

Previous research shows that bilingual individuals gesture more than monolingual individuals. However, little research has compared gesturing in bilingual individuals of different modalities. Modality refers to the method of communication used in a language, such as an auditory-oral modality in spoken languages and a visual-manual modality in signed language. Bimodal bilinguals, those who are proficient in a sign language and a spoken language, have the unique capability of articulating both their languages at the same time. Therefore, it is hypothesized that bimodal bilinguals gesture more than unimodal bilinguals. The current study compares the gesture rates of monolingual English speakers, ASL-English bilingual speakers, and French-English bilingual speakers. Participants watched two Pink Panther clips and recounted the stories to an interviewer. Their gesture rates were measured afterwards. Results show that ASL-English bilingual individuals produced a significantly higher gesture rate than English monolinguals but not French-English bilingual individuals. These results indicated that bimodal and unimodal individuals gesture similarly to each other, suggesting that bilingual status, more than modality, contributed to the increased gesture rate found in both bimodal and unimodal individuals. Increased gesturing is linked to improved performance on cognitive tasks, such as mental rotation tasks. Therefore, these results have potential implications for how bimodal bilingualism influence cognitive ability. Specifically, this study suggests that learning ASL is not more effective at improving cognitive ability than learning a spoken language. Future studies should directly investigate the link between unimodal bilingualism, bimodal bilingualism, and cognitive ability.

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019. The effect of elevated salinity on diltiazem uptake in rainbow trout (*Oncorhynchus mykiss*)

Area(s) of study: Natural sciences & engineering

Chantelle Klaczek*, Chris Glover, Greg Goss, Gavin Saari

FACULTY OF SCIENCE

Ionizable organic chemicals (IOCs) make up a substantial portion of compounds in commerce, and the environmental risk of these chemicals is of growing concern, owing to their detection in aquatic systems, humans and wildlife. One key factor that will influence the uptake and toxicity of IOC's in aquatic systems is salinity. While salinity can influence the chemical bioavailability of toxicants, it can also alter the physiology of aquatic biota thus altering sensitivity indirectly. Therefore, the objective of the present study was to determine whether salinity influences the uptake of diltiazem (a model IOC), across the gill of rainbow trout acclimated to different salinities. We hypothesized that osmoregulatory and morphological changes of the fish gill in waters of elevated salinity will alter gill handling of diltiazem. To test this hypothesis radiolabeled diltiazem tissue (gill, gut and muscle) concentrations were measured following 6 hour exposures at various salinities (0, 10, 17, 24 ppt) along with osmoregulatory endpoints (e.g. molecular) and morphological changes at the gill (e.g. cell type, interlamellar cell mass). Preliminary studies indicated diltiazem accumulated in fish up to four times the water concentration regardless of the salinity gradient. However, additional analyses aim to indicate the proportion of unionized-ionized diltiazem uptake attributed to the gill morphological changes occurring with increasing salinity conditions. Thus the present study results aim to determine whether environmental conditions, such as salinity, increase IOC exposure and toxicity which is relevant to ecological risk assessment.

020. Brain Computer Interfaces for Games and Environmental Control

Area(s) of study: Health sciences, Natural sciences & engineering

Denniss Raigoso*, Kim Adams, Eli Kinney

According to the World Health Organization (WHO), 15% of the world's population suffers from some type of disability, and therefore, need access to health institutions that provide a rehabilitation service. Rehabilitation is a process aimed at promoting and achieving independence in the individual, thus improving their quality of life. Playing games is a social activity that is motivating to children who have disabilities. Video games can be controlled with brain-computer interfaces (BCI). The BCI system is a device that allows communication with the external world to be established based on brain electrical activity without the need of peripheral nerves or motor activity and promises an improvement in the quality of life of patients. Many times, when these games are developed, we do not have the needs of the patient in mind in terms of the activity and participation component that is, not reaching the objective of functional performance from an individual perspective as well as within their environment. This project will develop video games implemented with BCI for children with cerebral palsy; the BCI will use the P300 events in the brain of children to control a video game. P300 uses the presentation of stimuli which generates a P300 response; the stimuli are icons in matrices that encode the instructions of commands for the game. Thus in this project, some games will be developed to evaluate the brain-computer interaction of the children when playing a video game.

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021. When in Rome: Interpreting Idioms in English and Mandarin

Area(s) of study: Social sciences & humanities

Erinne Ng*, Herbert Colston | FACULTY OF ARTS

Idioms have commonly been studied in language research throughout the years, and many factors have been investigated for their impact on idiom comprehension. Idioms often contain other figures of speech and these also have an impact on how we understand idiom processing. Idiom comprehension and processing have also been investigated in numerous other fields in language sciences and other disciplines.

Although research has been done on the above, little has been done to address how cultural factors influence how idioms are valued and perceived. For example, some cultures utilize idioms casually, throwing them into everyday phrases and conversation. Therefore, nothing is special about an idiom. In other cultures, idioms are more revered, understood as containers of culture knowledge and values. So, a question arises of whether this cultural difference in value and perception of idioms will affect their appreciation when used in conversation.

This study aims to explore this question by comparing idiom appreciation in Canadian versus Chinese contexts. A dozen idioms with as close as possible English and Mandarin forms were presented in stories that contained common situations for a university student. Native Chinese (idioms in Mandarin) and native English (idioms in English) speakers rated the presented idioms for familiarity, insight, and humour. A variety of differences were produced in appreciation in Chinese versus English results, most notably that native Chinese speakers had a larger appreciation for usage of idioms. The findings of this study could help second language learners better produce oral competency and further cross-cultural language research.

022. The Effect of pH on the Reduction and Absorption of Iron

Area(s) of study: Health sciences

Simran Panesar* | FACULTY OF SCIENCE

Background:

Without the mineral iron, life as it is would cease to exist. Iron is a key component of the oxygen carrying pigment hemoglobin, which carries oxygen in red blood cells as they circulate throughout our body. Like most minerals, iron is obtained through diet.

Iron is usually ingested in two dietary forms: the ferric (Fe^{3+}) and ferrous (Fe^{2+}) forms. The latter form is more bioavailable and is obtained through foods such as fish and meat. In contrast, foods such as leafy vegetables and fruits provide the less bioavailable, ferric form. Usually, the ferric form must be converted (reduced) to the ferrous form in stomach acid, prior to absorption in the small intestine. This experiment is inspired by the process of converting ferric iron to ferrous iron, in the acidic environment of the stomach.

Methods:

This experiment consisted of 5 factor levels, varying in pH (pH 2,3,4,5, and 6). For each factor, 10 trials were conducted. Each trial consisted of dissolving 0.05 g of Iron(III)sulfate (source of ferric iron) in HCl. The HCl of varying pH represented the variation in acidity that may occur in human stomach acid throughout life. Zinc was added to supply electrons for the conversion of ferric to ferrous iron. Absorbance readings were taken at 380 nm, to determine the concentration of ferric iron.

Results:

The pH of HCl affects the amount of ferric iron reduced to the ferrous form. It was observed that the yellow color (of Ferric iron ions) got darker as pH increased. As the pH of HCl increased, the absorbance of unreacted ferric iron increased.

Conclusion:

The findings support the hypothesized mechanism that a highly acidic environment is needed to convert ferric to ferrous iron. Without a low pH (high acidity), more iron was found unreacted, in the less bioavailable form. This indicates that disorders or aging factors that can decrease the acidity of stomach acid, may prevent iron obtained from plant based sources from being fully absorbed. For future research, it would be interesting to see what would happen if factors such as temperature were controlled, to mimic the stomach environment more closely.

023. Thematic and taxonomic conceptual systems in children

Area(s) of study: Social sciences & humanities

Alexandria Fernandez | FACULTY OF SCIENCE

The current study explored the notion of children's patterns of thematic and taxonomic responding to examine the underlying developmental shift in children's categorization. Participants received a target picture and three possible choices that were a thematic match, a taxonomic match or an unrelated item. They were instructed to select the one that "goes best with" the target picture. An assessment of each participant's ability to identify taxonomic and thematic relationships as well as their seeming preference for either thematic or taxonomic categorization was conducted. Based on the present literature, it is hypothesized that a developmental shift from a thematic to a taxonomic categorization will be observed. Having the roadmap to the development of children's conceptual system is a stepping stone in the further improvement of the current strategies we have that assist in their learning and lexicon formation.

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024. Access to Justice in a Neurotypical World

Area(s) of study: Other/interdisciplinary

Emily Bielech | FACULTY OF LAW

There is a lack of public services tailored to meet the needs of adults with High-Functioning Autism (HFA) in Canada. This service gap extends to the Canadian justice system, particularly in its provision of aid to self-represented litigants. The difficulty of achieving meaningful participation in the justice system as a self-represented litigant without HFA (a “neurotypical” litigant) is magnified for individuals with this Syndrome. There is a statutory obligation in both domestic and international law to remedy this lack of equitable access to justice. The many, varied challenges individuals with HFA face in attempting to represent themselves originate in the unique cognitive underpinnings of the Syndrome. Combining a cognitive understanding with the perspective of a neurotypical sibling of an individual with HFA, my research attempts to describe how an individual with HFA would experience accessing and navigating online legal resources. Solutions to the difficulties this experience presents include web design alterations, as well as providing access to knowledgeable third parties. An examination of two different online legal resources on the topic of wrongful dismissal, available to individuals living in Edmonton, Alberta, demonstrates that until solutions such as these are implemented, it is not likely that a litigant with HFA would be able to successfully represent themselves without assistance.

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025. Cell-associated sialic acid contributes to reovirus attachment to tumorigenic cells

Area(s) of study: Health sciences

Isabelle Bernard, Heather Eaton, Francisca Cristi Munoz, Maya Shmulevitz | FACULTY OF SCIENCE

Type 3 Dearing reovirus (T3D) is undergoing clinical testing as an oncolytic therapy for breast cancer. Despite its promising development, reovirus therapy fails to completely regress tumors. For successful infection of a cancer cell, T3D binds to cell surface sialic acids (SA) or JAM-A using the N- and C-terminal domains of viral s1 attachment protein, respectively. However, proteases in breast tumor microenvironments cleave the C-terminal domain of s1, leaving only the truncated s1N on the reovirus. s1 consequently becomes entirely dependent SA for attachment. It remained unknown whether SA level differs on breast cancer cells and if proteases in the tumor microenvironment impact reovirus binding towards breast cancer cells.

We first measured SA levels on four breast cancer (MCF7, MTHJ, TUBO, T47D) and one fibroblast (L929) cell lines. Cell surface SAs were detected with SA-binding fluorescein, and fluorescence assessed by flow cytometry. MCF7/MTHJ were SA-low, while L929/TUBO/T47D were SA-high. We then investigated whether SA levels correlate with cell binding of reovirus. We compared binding of T3DWT with a full s1, to T3DUnaG with a truncated s1N to mimic cleaved reovirus in a tumor microenvironment. The same cell panel was exposed to T3DWT or T3DUnaG and the relative levels of cell-bound reovirus particles were assessed by flow cytometry. SA-low cells restricted T3DUnaG binding to a greater extent than T3DWT when compared to SA-high cells. We have therefore demonstrated that SA-low cells decrease binding of T3D with a truncated s1N, which mimics the tumor microenvironment.

Characterizing the relationship between cell-associated SA and T3D attachment provides a greater understanding of restrictions to reovirus oncolysis, presenting opportunity to engineer an increasingly potent virus overcoming these restrictions.

026. Morphological and Molecular Analysis of Retina in UNC119a1 and UNC119a2 Mutants

Area(s) of study: Other/interdisciplinary

Kutsyh A.*, Carrol S., Jean F., Pilgrim D. | FACULTY OF SCIENCE

The retina is a light sensitive tissue critical for vision and responsible for absorbing light, converting it into a signal to the brain. Many forms of retinal disease exist, including genetic conditions such as Cone Rod Dystrophy (CRD), a progressive retinal degenerative disease resulting in blindness. The exact causes and mechanisms are unknown, but many genes have been implicated. One of them is the gene UNC119, a protein which traffics certain proteins across ciliary membranes. Previous work in mice revealed a progressive degradation of retinal structure alongside dysregulation of trafficking. Our goal is to determine a mechanism behind CRD progression alongside creating a zebrafish CRD molecular model, which will lead to understanding and hopefully treatment for CRD. Zebrafish have four similar UNC119 genes alongside a retina with a similar cone-rod ratio as humans. UNC119a1 and UNC119a2 mutants were created and their retinas were observed for structural changes using H&E staining for progressive time points. Immunofluorescence imaging was used on mutant retinas to determine if the predicted dysregulation was occurring. Upon blind analysis it was observed no structural phenotype was occurring in any mutant or over the course of any time point, while the immunofluorescence showed no dysregulation of trafficking. This conflicts with the prior research and the mostly likely cause are the other two versions of UNC119 present in zebrafish which are similar and likely functionally redundant. The redundancy likely observed suggests the expression of UNC119 proteins in a compensatory manner, giving insight into forms of compensation which can occur.

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027. Females Reducing Incarceration through Education (FRIE)

Area(s) of study: Social sciences & humanities

Madison Yaworski, Hannah Porozni | FACULTY OF ARTS

Research shows that for women, victimization and criminalization are intimately connected. We have created a program that will prevent and reduce the victimization of young women and therefore their criminalization and incarceration. Our program, Females Reducing Incarceration Through Education (FRIE), targets young women in Junior High Schools (JHS) and comprises workshops that focus on domestic violence, sexual assault, and knowledge on youth incarceration. FRIE aims to educate young women and provide them with awareness, knowledge, support, healthy coping mechanisms, and access to community resources in hopes of decreasing reliance on drugs and alcohol, victimization, and ultimately criminalization. Grounded in academic research, the workshops were created in consultation with the Edmonton Police Service, JHS teachers, learning consultants, and women with lived experience with incarceration. This spring, FRIE will present workshops to JHS which is evidence that educational professionals believe FRIE is capable of addressing a pressing need in the Edmonton community.

At FURCA, we would like to share our motivation for creating FRIE, describe the details of our workshops and how they will educate young women on topics directly related to their lives that are currently not addressed in the school system, and outline ways we aim to support students after our workshops. Ultimately, our goal is to reduce the stigma surrounding pathways to crime in an effort to decrease the criminalization and incarceration of women. We believe awareness of the links between victimization and criminalization for women is imperative to the prevention and reduction of incarceration for this group.

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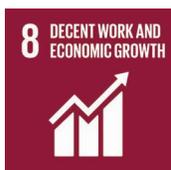
028. Sex Differences in the Pathogenesis of Osteoarthritis in Microgravity

Area(s) of study: Natural sciences & engineering

Kirtan Dhunnoo, Rahul Ravin, Sherry Gao, Amira Aissou, Shankar Jha | FACULTY OF ENGINEERING

Osteoarthritis (OA) is a common form of arthritis that occurs when the protective cartilage that cushions the ends of bones wears down over time. OA disproportionately affects women. Several studies show that prolonged periods of unloading, i.e. joint immobilization, contributes to cartilage degradation with quantifiable molecular changes. However little has been done to show the difference between male and female cells. These studies (Weiss et al) simulated unloading using simulated microgravity (SMG) reactors on earth. While successfully demonstrating gene expression for cartilage unloading, SMG does not subject samples to true microgravity. This experiment aims to quantify the molecular signatures of unloaded bioengineered cartilage tissue samples from both sexes in a true microgravity environment during a parabolic flight. Cartilage samples will be exposed to an increasing number of parabolic cycles and one control group will be left on the surface at earth gravity. All samples will be analyzed genetically with mRNA-sequencing and molecularly with metabolic markers of OA. It is hypothesized that a marked difference in OA markers will be seen between the sexes. This research will allow for a deeper understanding of OA and may identify drug-targetable pathways that can prevent the progression of the disease for people on earth and astronauts returning from long-duration space flight.

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POSTER SYMPOSIUM

Wednesday, March 11th | 10:00 a.m. – 3:00 p.m.
CCIS Main Floor

P01. R.M. for Improvement: Redesigning Saskatchewan's failing Rural Municipalities

Area(s) of study: Social sciences & humanities, Other/interdisciplinary

Alex McPhee*, Jeff Birchall | FACULTY OF SCIENCE

Canada's rural governments are in crisis. In Saskatchewan, 140 of 296 rural municipalities (RMs) no longer hold regular elections—their dwindling populations are simply too low for multiple candidates to run. Surveyed on an identical grid, Alberta suffered a similar problem, until a 1947 Co-Terminous Boundary Commission assembled a sophisticated basket of data sources and completely redrew the province's map. Despite its unique scope, applicability to other jurisdictions, and enduring success, this historical amalgamation has not been much studied.

I change this by replicating the Commission's work using modern, computational methods. Digital GIS technology excels at spatial analysis, and open government data can be used to generate population density models of unprecedented accuracy. Using a basket of census and remote sensing data sources, I suggest a new map for rural Saskatchewan that can keep local democracy viable.

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P02. An Investigation into the Relationship between the Acoustic Patterns of English Liquids produced by Children Learning Mandarin and English in Canada with their Language Exposure Duration

Area(s) of study: Social sciences & humanities, Other/interdisciplinary

Youran Lin, Karen Pollock

Liquids are a class of voiced approximants consisting of laterals(/l/) and rhotics(/r/). It is reported that English liquids produced by native Mandarin speakers are different from Mandarin counterparts (Smith,2010), which is partly due to the instinct disparities of the phonological systems and the phonetic realizations of Mandarin and English. On the other hand, based on Flege's (2018) claim of the influence of language exposure of the learners on their language proficiency, it is hypothesized that Mandarin-speaking children learning English with various language experiences will have different English liquids' acoustic patterns. This study, however, attempts to explore the acoustic patterns of Canadian English liquids produced by Mandarin-English bilingual children enrolled in the bilingual public education program in Edmonton. 15 children from Grade 1, 3 and 5 are selected, producing the liquids categorized into laterals /l/ and rhotics /r/. Their speech will be segmented and analysed with Phon; while their language experience is quantified by the parent reports. More specifically, using specialized software (Praat), the acoustic features will be analysed, that is, the second formants (F2) and F2-F1 of laterals, and F3-F2 of rhotics. The results will be compared with the liquids produced by the monolingual native English speakers documented in literature, with error patterns identified and the role of language experience explored. Besides, a systematic error classification, including the errors produced by the bilingual group and the developmental errors in monolingual children, will be made to further explore the relationship. According to our hypothesis, the language experience could contribute to the native-like pronunciation of English liquids.

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P03. Independentist nationalist rhetoric!: Translation during the early 19th Century in Venezuela and Chile

Area(s) of study: Social sciences & humanities, Other/interdisciplinary

Johann Christian Pitter | FACULTY OF ARTS

During the 19th century, Latin America was beginning the processes of differentiation against their Iberian colonizers; however, their ideas did not have a Latin American origin, but rather French and Roman roots. These foundational ideas of geo-political structures (Republics) were almost exclusively imported by the efforts of revolutionary translators, that sought the ideas of “Liberté, égalité, fraternité” found within the imaginarium of the French Revolution; as well as the Roman based governmental structure, in order to have a framework to facilitate their separation from monarchic Spain. This paper will utilize the theoretical framework on translation given by Lawrence Venuti and Itamar Even-Zohar in order to analyze the translations made by Francisco de Miranda, Andrés Bello, and the anonymous translation of Voltaire’s *Dictionnaire philosophique portatif*. Through the analysis of these pieces, this project will argue that the beginning of the 19th century was one of the most important periods for the development of independentist rhetoric and the Latin American republics that came after independence.

P04. Digital fiction forms as a tool to improve body image in young women

Area(s) of study: Social sciences & humanities

Karuna Nair*, **Astrid Ensslin** | FACULTY OF ARTS

Body related concerns, anxiety and distress are rife in a world immersed in visual, digital culture, in which people strive to reach appearance ideals that are narrow and unattainable for most. Young women and gender-nonconforming individuals are particularly affected by body dissatisfaction, often due to the internalisation of narrow body ideals centred around being white, able-bodied, slim yet voluptuous, cis-gendered and heterosexual.

Bibliotherapy is a therapeutic method involving directed fictional or nonfictional reading to help with mental issues. It has been used to address various psychosocial and emotional issues in different groups, however, typically relies on print media forms. In an increasingly digitalized world, people often look to digital rather than print media for both information and entertainment, so interactive, audio-visual forms of media (digital fictions or DF) may be a more relevant and accessible therapeutic tool than novels or self-help books.

Little research has been done on how bibliotherapy can aid young women in conceptualising their bodies in more positive ways, and none thus far which applies the unique benefits offered by digital media forms. The 'Writing New Bodies' project is using community co-design processes to create a new DF (in app form) that aims to address the body-image concerns of a media-saturated generation of young women (18-25). My research will examine and review the potential therapeutic benefits of this DF tool through literature review, analysis of qualitative data from participant discussion groups, and initial user testing of the pilot DF, contributing to an understanding of how DFs can be tailored to best help the target audience.

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P05. Is the meaning of a constituent activated during the processing of a multimorphemic word

Area(s) of study: Social sciences & humanities

**Taylor Melvie, Alexander Taikh, Christina Gagné,
Thomas Spalding** | FACULTY OF ARTS

How does word structure influence how people read words? Despite extensive research, there remain questions about how people access words. Our study examines how word meaning affects compound words, which have two parts (e.g., bookstore can be broken down into book + store), and pseudo-compounds, where the two constituents are not functioning as parts of the word (e.g., car + pet is not a pet for a car). By examining both types of words we get a more in-depth understanding of how different word structures affect reading. Our experiments will test whether the time required to respond to a word (e.g., library) is influenced by exposure to a compound or pseudo-compound word, where the first constituent is meaningfully related to word (e.g., bookstore or book [second constituent of pseudo-compound]) or not (e.g., lemon). We hypothesize that compound words may help participants respond faster to meaningfully related words, and pseudo-compounds may result in slower response times. We expect this to happen because readers attempt to use the structure of each word to infer its meaning (e.g., car and pet are accessed when processing carpet). We expect pseudo-compounds to result in slower response times because their parts don't contribute to the structure of the word. This research is important in furthering our knowledge of the human conceptual system, which contains all the knowledge someone has about the world. This expanded understanding could apply to several professional areas such as speech pathology, marketing, and artificial intelligence.



P06. What is a Watermelon Orchestra?

Area(s) of study: Social sciences & humanities

Jazlynn Steinbach*, Hamad Al-Azary | FACULTY OF ARTS

Psycholinguistic research can give insight into how people communicate and comprehend concepts. A combined concept refers to two words that form a new, higher order concept (eg. plastic cup). Novel combined concepts (eg. meal laundry) can begin to reveal the mechanisms that people use to interpret new meanings and make sense of the world around them. They are open ended and ambiguous, allowing for a wide variety of interpretations and responses. In our experiment, undergraduate participants rated for comprehensibility and give a written interpretation for each novel combined concept shown. Written responses were coded manually into categories such as literal and metaphorical. Generally, the results showed that responses were unique and varied in length. This indicates participants have varying ideas of the shared knowledge held by them and the reader. Moreover, we found some participants interpreted the concepts strictly in metaphorical terms, and some strictly in literal terms. This suggests people differ remarkably in how they interpret combined concepts. Most psycholinguistic research overlooks the role the individual has in interpreting the stimuli they are provided. Our research implies that interpretations of concepts may be more reliant on the individual than previously thought, and humans may communicate more clearly when assumed shared knowledge is limited.

P07. Leader Rhetoric and Prototypicality on Supporter Trust

Area(s) of study: Social sciences & humanities

Gurjeet Gill*, Angela Ma, David Rast III, Amber Gaffney

FACULTY OF ARTS

Issues of who is a citizen, who is welcome in the country, and who leaders wish to represent is subject to dispute in Canada. Recent debate around Bill 21 shows that there is disagreement between Canadians on who is accepted or not accepted in our country. Could leaders use this discord to their benefit? According to social identity theory, leaders who are high in prototypicality are more representative of their group and are trusted more than leaders who are low in prototypicality. One way that leaders can change how prototypical they seem to their followers is by adjusting their rhetoric. We examine how inclusive and exclusive rhetoric interacts with high and low prototypicality to affect supporter trust. We conducted a two by two between-subjects experimental design in which participants (N = 112) were given fake articles detailing a highly or lowly prototypical leader who uses either inclusive or exclusive rhetoric. We found a main effect of rhetoric on supporter trust. Regardless of prototypicality, if the leader used inclusive rhetoric, they had increased supporter trust compared to leaders who used exclusive rhetoric. These findings suggest that the rhetoric leaders use is vital in establishing trust from their group members. More research is needed to further examine the relationship between rhetoric and trust.

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P08. Effective Leadership while perceiving Threat

Area(s) of study: Social sciences & humanities

McKenna P. Gawalko*, Christine Kershaw, David E. Rast III

FACULTY OF SCIENCE

Traditional leadership theories suggest dissolving boundaries between groups will improve the interactions between two groups when, in fact, intergroup relations are much more complex. Our study draws on intergroup leadership theory which states that promoting an intergroup relational identity, focusing on the interdependent relationship between two or more groups, is integral in maintaining optimal intergroup relationships (Hogg, van Knippenberg & Rast, 2012; Rast, Hogg & van Knippenberg, 2018). This study investigated the relationship between symbolic threat, when group members perceive an outgroups' unique values, beliefs, and culture are markedly different from their own, and leader rhetoric. Participants (N = 92) reported their group's status, read a fake university budget statement about another group's values as either imposing (high symbolic threat) or equal (low symbolic threat) to the participant group's values, and then read a vignette from an ostensible student leader who promoted either an intergroup relational identity or collective identity. That is, the leader either emphasized the unique contributions of each subgroup or promoted the shared group membership of both subgroups. Our results provide support for intergroup leadership theory and ingroup projection model, demonstrating that factors within groups, such as status, influence the effectiveness of leader rhetoric when group members feel their group identity is threatened.

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P09. Piquing female interest in computing science using an intervention

Area(s) of study: Social sciences & humanities

Amanda Chao, Kristyn Gannon, Nimrit Jhinjar, Briana Kroeker, Zoé Saulnier, Sarah Tipples, Elena Nicoladis

FACULTY OF ARTS

Despite the real-world value of having computing experience, women in universities across North America tend to be underrepresented in computing science undergraduate programs (Way, Larremore, & Clauset, 2016). With fewer women choosing computing science as a career, the resulting disparity in interdisciplinary benefits may be leaving women at a disadvantage within their chosen field. Based on previous studies suggesting that education could be effective for changing attitudes, we hypothesized that a short presentation aimed at educating women about computing sciences could increase their positive attitudes towards the subject. Undergraduate students were administered a pretest, a control or an intervention presentation, and a posttest. The control presentation focused on academic support groups on campus, while the intervention focused on the benefits of computing science. The questionnaires for the intervention and control groups contained questions relating to both topics.

In our analysis, we found that both the intervention and control presentations showed no difference between the pretest and posttest scores. After specifically analyzing computing science-related questions in the intervention, males showed a significant increase between pretests and posttest, whereas females did not. In the control group, there was a significant increase for the control-related questions for both males and females.

There is not enough evidence at this point to conclude that a small intervention is not capable of changing attitudes, but rather that an education-directed, non-interactive approach may not be the most effective for attitudes as multi-faceted as those towards computing science.

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P10. Effect of Emotion on the Hand Gestures of three Cultures

Area(s) of study: Social sciences & humanities

Narimane Dahou*, **Elena Nicoladis** | FACULTY OF SCIENCE

Past research has shown that high-arousal emotions, such as joy, are characterized by faster and larger perceived arm movements than low-arousal emotions such as sadness. The purpose of our study is to investigate whether these findings extend to hand gestures and, if they do, whether there are any cultural variations. In a within-subject design, we manipulated Arab, Chinese, and European Canadian participants' emotions by having them write a happy (sad) autobiographical memory while listening to happy (sad) music. They were then asked to watch and retell a visual story seen with the corresponding music in the background. We will examine whether there is a difference in the amount and in the magnitude of hand gestures used while retelling the same story. Current literature posits that Arabs express their feelings in an uninhibited manner while Chinese individuals inhibit them as to not disturb their social environment. Canadians usually fall in the middle of this spectrum. Therefore, while we expect participants to use more hand gestures in the happy condition compared to the sad condition, we also expect this difference to be smaller in Chinese participants and larger in Arabs. Additionally, research shows that Arabs use substantially more hand gestures than Canadian and Chinese individuals. Significant results would indicate that the variation in hand gestures seen across cultures is, in part, due to their differing social norms as the effect of emotion would be minimal in Chinese individuals and larger in Arab individuals.



P11. Can we use images to increase creativity?

Area(s) of study: Social sciences & humanities

Yasmine Abdel Razek | FACULTY OF ARTS

Creativity may not be fixed: One study had evidence that presenting participants with images of related objects (e.g. a pencil, an eraser, and a pen) led to more flexible thinking. In the Dual Pathway to Creativity Model, two pathways to creativity are Flexibility and Persistence. To determine if creativity can be increased by the pathways, the current study will replicate and extend the previous study. Participants will be shown images composed of related or unrelated objects (e.g. a ball, a pencil, and a toaster) and then asked to list out uses for an object (e.g. a shoe). Images of related objects will induce Persistence and original ideas will be attained due to deeper exploration of a category and increased idea generation. Images of unrelated objects will induce Flexibility and original ideas will be attained due to the analysis of categories that are not frequently considered. These results are significant because they would support that creativity can be improved, at least over a short term.

P12. The conflict between environmental impacts and economic growth caused by fracking

Area(s) of study: Social sciences & humanities

Yifei Ma | FACULTY OF ARTS

Fracking has helped ease Alberta's demand for oil and reduce pollution from the use of petroleum products. However, the process carries the risk of earthquakes, gas leaks and groundwater contamination. That is why many people oppose fracking near their homes. Burning water, discovered by rosebud in Calgary, adds to the "fracking theory". Government reports and scientific studies have shown that fracking is safe, contradicting what has happened. At the same time, there is no clear evidence that these earthquakes, gas leaks or water contamination are linked to fracking. People worried about the impact on their normal lives have called off construction. Instead, the huge economic benefits of fracking could prevent fracking from being shut down, despite potential future evidence of its negative environmental impact. First, fracking brings in significant tax revenues for the government and huge profits for investors and producers. At the same time, fracking creates direct and indirect jobs, boosting the economy. This project will analyze and explain the contradiction of fracking.

P13. Teaching Sustainability

Area(s) of study: Social sciences & humanities

Courtney McQueen | FACULTY OF ARTS

I want to present a poster on my project for the sustainability certificate that focuses on educating the public. For my sustainability integrative project I taught high school students about environmental policies, and sustainability. In my class I made the students make their own policies regarding plastic straws. On my poster I would like to show how education can spark innovation to can lead to solutions to solve sustainability issues, such as plastic straws. I would like to put information such as pros and cons of the carbon tax, and other ways we can sustainable, such as composting, recycling, and reduction and refusing extra material.

I also made a radio documentary for my AREC class that was part of the sustainability certificate requirement. The documentary was about how permaculture looks like in Edmonton. On my poster I want to express the importance of educating the public by being able to listen to experts in their own community. I also want to explain what the project was about, what permaculture is, and what it looks like in our city.

The main focus on my poster is the importance of education and unbiased facts about sustainability in order to create solutions that work in our community.

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P14. Understanding Indigenous Food Sovereignty in Urban Canada

Area(s) of study: Social sciences & humanities

Freya Hammond-Thrasher | FACULTY OF ARTS

Settler colonialism displaces Indigenous peoples from traditional hunting and fishing grounds, exposing them to disproportionate harm within a globalized system that makes food increasingly unaffordable, unhealthy and socially unjust. In fact, Indigenous peoples face food insecurity rates three times that of non-Indigenous Canadians (Morrison, 2016, p. 102). Beyond conventional food security approaches, which address issues of food access, an Indigenous food sovereignty approach recognizes the colonial power relationships that create unique barriers for Indigenous peoples by defining how, where, and by whom food is produced and consumed. Indigenous food sovereignty asserts both a claim to the land and “our ability to respond to our own needs for healthy, culturally adapted Indigenous foods” (IFSN, n.d., para. 1). Climate change brings urgency to this research, as Indigenous communities exemplify resilient food systems modelled on sustainability.

Although over half of Indigenous peoples in Canada now live in urban areas, most food studies literature focuses on challenges in rural communities, particularly in the North. I explore this gap by analyzing urban Indigenous food sovereignty projects such as community gardens, feasts, culinary businesses, and youth food re-skilling workshops and provide a deeper conceptualization of food and decolonization. I argue that Indigenous cosmologies, as relational and place-based value systems, challenge and transcend what John McMurtry identifies as the capitalist value regime to launch decolonial and culturally resurgent food worlds into practice.

References:

Indigenous Food Systems Network (n.d.) Indigenous food sovereignty. Retrieved from <https://www.indigenousfoodsystems.org/food-sovereignty/#targetText=Indigenous%20food%20sovereignty%20is%20a,healthy%2C%20culturally%20adapted%20Indigenous%20foods.&targetText=The%20ability%20to%20make%20decisions,%2C%20gather%2C%20grow%20and%20eat>.

Morrison, D. (2016). Indigenous food sovereignty: A model for social learning. In H. Wittman, A. A. Desmarais, & N. Wiebe (Eds.), *Food sovereignty in Canada: Creating just and sustainable food systems* (pp. 91-113). Halifax: Fernwood Publishing.

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P15. Literature review of strategies that schools and teachers can adopt to involve immigrant families in the educational success of their children

Area(s) of study: Social sciences & humanities

Karima Jenni | CAMPUS SAINT-JEAN

From 2015 to 2016, Canada has received the settlement of 320,932 immigrants. Alberta is an attractive settling place for immigrants remaining in the province three years after settlement (92 per cent). To assure the success of these new families and their children, Alberta must prepare for and accommodate long-term transitions of their immigrants (ATA, 2017).

The relationship between school and families, one of the factors influencing student learning, is of extreme importance in the path of immigrant families, whose children face many linguistic, cultural, and academic challenges. According to Rachedi and Vatz-Laarousi (2016), the educational success of the immigrant student is considered by the families as the success of the integration process. How schools and teachers can help immigrant families in supporting their children academic success?

This research is a literature review of some effective strategies suggested in schools on the one hand, to support socio-academic adaptation of immigrant students; and on the other hand, to encourage the involvement of immigrant families in the academic success of their children.

As result of this research, it is important for schools and teachers to take a positive look at ethnocultural diversity to support immigrant student success (Kanouté and Lafortune, 2011), by establishing a two-way pedagogical relationship of proximity, listening, respect and trust, encouraging regular contacts and putting families in contact with community resources (kanouté, 2003). Teachers must be sensitive to the difficult social and economic conditions experienced by immigrants and be open to different models of school-family partnership.

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P16. What Wives Want, the Judge Gives: Divorce in Drumheller (1927-1960)

Area(s) of study: Social sciences & humanities

Katherine Simunkovic | FACULTY OF ARTS

Social, legal and religious elites all agree that marriage plays a fundamental role in Canadian society. Until 1968, when Canada liberalized divorce laws at the federal level, many unhappy couples struggled to put a legal end to their marriage. In Alberta, the Supreme Court granted its first divorce in 1919. The corpus of 90 divorce files from the judicial district of Drumheller, Alberta (1927–1960) allows one to explore divorce patterns in a small rural community. From the initial statement of claim to the Decree Absolute, often including the statement of defence, the affidavits, the marriage certificate, bills of cost and personal letters, the case files open up a window on marital breakdown. Taking into account class, gender, ethnicity and era, I identify trends. Approximately eighty percent of the total cases took place before 1940 and contrary to more urban populations where wives petitioned for divorce, women account for about forty percent of the Drumheller plaintiffs. Both men and women identified adultery as the main ground for the breakdown of their union, followed by cruelty and desertion. Also noteworthy, women were often granted what they sought when they petitioned for divorce or judicial separation. Judges awarded them custody of their children and ordered husbands to pay alimony.

P17. Cross-cultural Attitudes Towards Sexual Education

Area(s) of study: Social sciences & humanities

Nieva Srayko | FACULTY OF ARTS

Comprehensive sexual education provides students with knowledge about a variety of topics ranging from their bodies to safe sex practices, and to consent. When sexual education is not provided to developing adolescents, there can be misconceptions about the human body, about relationships, and sex. In our globalizing world, ideas from one culture can easily be spread to others, and as a result, the standards for better sexual education are rising across the globe. My research explores to what extent students raised in different cultural contexts have different perspectives and attitudes towards sexual education. As an Anthropology student, I wanted to research how individuals from various cultural backgrounds are taught about these matters, and what their experiences with sexual education are. I used existing literature to form a baseline understanding of different approaches towards sexual education. Following this, I conducted narrative interviews to gain new knowledge and personal experiences regarding these topics. Seven women who grew up in different countries outside of Canada were informally interviewed about their cultural background, experiences with sexual education, and attitudes towards sex and body-positivity. The narratives revealed that the presence of religion within a society may have an impact on the quantity and quality of sexual education provided. As well, my findings suggest that religion affects gender equality, which can also contribute to cultural differences in sexual education. This research may provide insight into why there are such drastic differences in terms of sexual education in different countries and regions.

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P18. The Influence of Language in Defining a Cultural Identity among the Third-generation Chinese Immigrants

Area(s) of study: Social sciences & humanities

Karen Chiu | FACULTY OF ARTS

When discussing the issue of cultural identity, especially when it revolves around bicultural-identity, there are many factors to be taken into consideration. These factors consist of the social environment the individual grew up in, to the language they are most comfortable speaking. However, most of these bicultural-identity studies often focus on first- or second-generation immigrants. The purpose of this research is to gain more insight into the role of language in influencing third-generation Chinese immigrants and their sense of bicultural-identity, and the extent of its impact. This study will have participants answer a questionnaire about their usage of participant's heritage languages, their involvement of the languages and cultural participation, as well as their willingness to be involved in another culture. A short interview will also be conducted for individuals to express their personal thoughts and feelings towards their second language and their cultural identity. As for the results, it is hypothesized to be similar to past studies in how language use allows for a stronger connection between attaining and maintaining a bicultural-identity.



P19. Chinese Burial Segregation in the Pacific Northwest: An Archaeological Perspective on Anti-Chinese Sentiments in Pre-1950 Canada

Area(s) of study: Social sciences & humanities

Jessica Mah | FACULTY OF ARTS

In pre-1950 Canada, work prospects encouraged Chinese immigration, (Wegars, 2003; Holland, 2007; Wilmott, 1970) but also triggered anti-Chinese laws such as the Chinese head tax (Li, 2008), alongside social segregation and occasional violence (Yu, 1987) This study examines the relationship between the dead and the living through the history of Chinese discrimination in pre-1950 Canada. Historical evidence of these anti-Chinese sentiments was analyzed and compared to the archaeological record via cemeteries in western Canada. Each cemetery was chosen for its archaeological significance based upon general research gathered on Chinese cemeteries in western Canada by J. Maxwell (2007). Methods of analysis focused on archaeological evidence of Chinese cemeteries thus, burial depth, disinterment depressions, and age/sex of the deceased, were compared to the historical record. The age and sex of the deceased reflected the government policies which specified the limited need for young male workers. The disinterment depressions and the burial depth identified Chinese burials, revealing burial segregation's and cemetery isolation to social isolation especially at Harling Point cemetery in Victoria BC. It is recognized that this could be a result of Chinese persons not wanting to be buried next to Caucasian persons, however this could also be a result of anti-Chinese sentiments pushing Chinese people to avoid burial in municipal cemeteries. These findings suggest that the archaeological record mimics the historical record and highlights the extent of anti-Chinese sentiment present in life and in the burial record, while also showing the importance of the historical record in archaeological analysis.

P20. Toward East-West Understanding Through An Examination Of Intercultural Challenges And Successes

Area(s) of study: Social sciences & humanities

Olenka Bilash, Kaihong Zhu*, Xizhu Zhao* | FACULTY OF EDUCATION

In the process of globalization, English has played a crucial role. It has been regarded as an international language and has been studied by millions of people. Asia is a growing market of English study and maybe the largest one in terms of the population. The research is focused on the co-teaching of EFL classrooms in the Asian public-funded program introducing the Native English Speaking Teachers (NEST). We try to use intercultural theory and pedagogic context knowledge to examine the problems within the interaction between the NEST and Non-NEST. Hopefully, our research could identify the underlying socio-cultural factors that hinder to build the relationships. Possible suggestions and solutions are also given based on our analysis.

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P21. What's in a Bone? Exploring the Use of Faunal Remains in the Identification of Unknown Bone

Area(s) of study: Social sciences & humanities

Julie Nguyen*, Pamela Mayne Correia | FACULTY OF ARTS

True crime and forensics have always been a guilty pleasure for the general public. The idea of stumbling across a possible homicide can not only be exciting but daunting to those who have no formal training in the identification of osteological material. Although this fascination can assist the police and forensic anthropologists in the discovery of possible crime scenes, it can hinder forensic investigations as well by causing mass panic and the unnecessary use of police and forensic resources to evaluate the scene. When osteological material of unknown origins is found, police resources are dispatched to investigate further; however, there are many ways to investigate remains without prior dispatch of police resources within a lab setting.

My research requires the collaboration of the Department of Anthropology and the Office of the Chief Medical Examiner (OCME). A huge drawback for many forensic anthropologists is that research tends to be case dependent or centered around particular geographic areas. This makes the applicability of forensic research quite narrow. By gathering faunal remains that have been positively identified, I will begin curating a histological catalog of wildlife found within Alberta that may be mistaken as human remains. By creating a catalog, this provides the OCME a vital resource that is inexpensive and can be consulted quickly. My poster will examine the preliminary results of curation of a wildlife catalog as an invaluable tool for forensic anthropologists and police investigations.

P22. Walkability and the pedestrian experience

Area(s) of study: Social sciences & humanities

Rob Shields, Edmar Silva*, Thiago Lima e Lima* | FACULTY OF ARTS

Is walking, beyond a mode of transport, understood as a right? Thinking about moving through the city, whether by car, bicycle, or any kind of public transportation, will always include walking, as every trip starts and ends with the action. Further more, walking increases social capital, encourages involvement in local government, fosters community trust and impacts the sustainability of the place.

In other words, the quality of walkability directly influences the individual's experience of equality of life, especially in cities. Quantifying and qualifying the walkability of cities, such as the quality, for example, of the metro or bus transportation, and the experience that pedestrians have in cities could produce practical information to create an impact in how these cities and environments are being designed.

However, what is walkability? In broad terms, it is a measure of the degree to which an area is pedestrian-friendly. There are several methodologies that have been developed to measure and assess walkability, and each of them considers a specific set of factors that influence pedestrian mobility such as accessibility, connectivity, comfort, safety, and security.

Therefore, we are interested in finding ways to quantify and rate the experiences and behaviour that pedestrians have on the sidewalk and crosswalks, especially but not only in the city of Edmonton, on a micro level scale. By doing that we hope to find human scale information that can be used to produce public policy for cities to enhance their walkability.

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P23. Theories of Language in Brian Friel's *Translations*

Area(s) of study: Social sciences & humanities

Shelby Haber | FACULTY OF ARTS

My paper applies Stuart Hall's theory of communication to Brian Friel's play *Translations*. Hall suggests that communication requires a speaker to translate meaning into the "code" of words and a consumer to translate words back into meaning. I explore the ways in which Friel's play can be read as a case study of Hall's theory. *Translations* represents the 1829-1842 Ordnance Survey, in which English colonizers mapped Ireland and Anglicized Irish placenames. My analysis focuses on moments when communication fails between people who speak the same language. I argue that these moments reflect Hall's theory; even intralingual communication requires decoding and is not always correct. Hall also suggests that "certain codes may... be so widely distributed in a specific language community... that they appear not to be constructed." I argue that Friel represents an Irish community using such seemingly-unconstructed words to define their connection to their land and history. People in the community can easily decode the meanings of these words, but colonizers need to expose the origins and constructed nature of these words in order to understand them. I argue that Friel represents English colonizers not only Anglicizing Irish placenames but also breaking down the codes that had defined Irish communal identities. My research sheds light on Friel's play as a representation of a linguistic loss that continues even after the colonial force has left the space. Perhaps Hall's theory could be applied to other postcolonial communities in order to draw attention to similar linguistic trauma.

P24. Does mind-wandering relate to mood and stress? A narrative review

Area(s) of study: Social sciences & humanities

Gladys Sina*, Vickie Plourde | CAMPUS SAINT-JEAN

Objective: Mind wandering (MW) is ubiquitous and has been extensively studied in young adults. Studies have shown that MW, daydreaming, and also sluggish cognitive tempo symptoms (SCT; e.g., staring, mental fogginess, confusion, hypoactivity, sluggishness, lethargy, and drowsiness) are interrelated constructs and all relate to mood and stress-related symptoms. The aims of the current review are to a) document the associations between MW (and related constructs) and mood/stress-related symptoms (e.g., anxiety and depression symptoms) in young adults and b) identify potential mechanisms underlying these relationships. **Method:** We conducted a narrative review of the literature on MW, SCT, and daydreaming, and their associations with anxiety and depression symptoms, emotion, and stress. We searched MEDLINE (Ovid) and PsycINFO® (Ovid) databases, and performed duplicate and independent screening. **Results:** A total of 559 unique records were identified, and 22 records (published between 1978 and 2017) were included. We confirmed existing evidence of the associations between MW, daydreaming, SCT and mood/stress-related symptoms in young adults (aged 18 - 30 years), although understanding of the mechanisms underlying these correlations remains incomplete. **Conclusion:** These findings are important and highlight the need for further research involving possible mechanisms of the relationship between the wandering mind and mood/stress-related symptoms.



P25. Trajectories of Peer Aggression and Victimization: Prediction by Emotion Regulation

Area(s) of study: Social sciences & humanities

Kristyn Gannon*, Brenna Zatto, Wendy Hogle | FACULTY OF ARTS

Childhood experiences of peer aggression and victimization can put children at risk for emotional problems (Hogle & Hau, 2019). Research has shown that during middle childhood, children differ in their experiences of peer aggression and victimization, where some experience higher or lower levels compared to classmates (Hogle & Hau, 2019). Different developmental trajectories of aggression and victimization can be identified based on those experiences. When studying developmental trajectories, it is important to consider predictors of the different patterns. Emotion regulation is shown to be related to experiences of peer aggression and victimization, but it is unclear how it can predict developmental trajectories during early childhood. The aims of the current study are to examine the developmental patterns of peer aggression and victimization across early childhood and to consider how emotion regulation and dysregulation may predict these developmental patterns. The study sample consisted of 443 children (47.9% girls; $M_{age} = 4.08$ years, $SD = 0.34$) assessed in the fall and spring of preschool and kindergarten. Teachers reported on the frequency of children's peer aggression and victimization as well as dimensions of emotion regulation. For both peer aggression and victimization three different developmental trajectories were identified. Peer aggression classes included high-decreasing (2.8%), moderate-stable (32.3%), and low-stable (64.9%). Peer victimization classes included high-decreasing (7.1%), low-increasing (18.9%), and low-decreasing (74%). Emotion regulation predicted some of the developmental trajectories of both aggression and victimization. The results of this study are important for the development of interventions against peer aggression and victimization in early childhood.



P26. Chinese youth smoking behaviors in the past three decades: A systematic literature review

Area(s) of study: Social sciences & humanities

Jialuo Jiang*, Yao Zheng | FACULTY OF ARTS

Background:

Smoking causes numerous diseases, such as lung cancer, heart disease, and strokes. Despite relatively lower prevalence than alcohol use, smoking remains a major concern, especially in China where a large body of youth use tobacco, and the law of prohibiting selling tobacco products to underage populations is not strictly enforced. To better understand the prevalence of various smoking behaviors and their secular trends, this project conducted a systematic literature review of peer-reviewed studies published in both Chinese and English that reported different tobacco-using behaviors among Chinese adolescents.

Methods:

We searched empirical studies using different keywords combinations, including “Chinese/China”, “adolescents/youth”, and “tobacco/smoke”, in one Chinese and five English literature databases. We then gathered information from 413 studies meeting inclusion criteria to calculate the overall prevalence and the most frequently reported smoking behaviors.

Results:

Various measures of smoking behaviors reported in included studies were coded into several distinct categories, representing the seven most frequently reported smoking behaviors (e.g., lifetime smoking, past month smoking, first time smoking before age 13). . Meta-analysis will be performed to assess the overall prevalence, secular trends, and potential gender and age differences, on the seven most frequently reported smoking behaviors in Chinese adolescents.

Implications:

Our project has two main implications: it will 1) provide information to facilitate the acculturation of recent Chinese international students and young immigrants, especially in Alberta where a large group of Chinese immigrants live, and 2) provide education information on Chinese teenagers to reduce underage smoking and promote healthy activities in Canada.

P27. Greater reading experience enhances lexical precision

Area(s) of study: Social sciences & humanities

Chaeyoung Lee | FACULTY OF SCIENCE

The benefit of reading is acquiring a higher-quality representation of words. This can be tested to gain an in-depth understanding about the relationship between reading experience and lexical precision, which is a component of lexical quality that helps to detect spelling errors. No study has extensively observed lexical precision, specifically in compound words (words created as a combination of two words, such as blueberry) and pseudo-compound words (words that appear similar to compounds but are actually not, such as office; contains off and ice). It is important to do so because it would be useful to know how people with different reading ability process compounds. Our lab is studying lexical precision to observe whether greater reading ability aids in detecting spelling errors of compounds and pseudo-compounds. We measured response times of participants' identifying whether a word was misspelled or not. Next, they selected names from a list containing names of authors and non-authors to obtain an ART score. We propose that greater exposure to print material (books, newspapers, etc.) enhances lexical precision. People with more reading experience will easily identify errors in regular compounds than pseudo-compounds. Additionally, people with higher-level reading ability will respond quicker to errors in pseudo-compounds accurately than those with lower-level reading ability.



P28. Conceptualizing Semantic Transparency in English Compounds

Area(s) of study: Other/interdisciplinary

Leah Auch*, Christina Gagné, Thomas Spalding | FACULTY OF SCIENCE

Psycholinguistic studies investigate many theoretical constructs related to language processing, and must operationalize these abstract constructs with concrete measures. Semantic transparency is one such construct, and refers to the extent to which the meaning of a word with multiple parts can be determined from the meaning of these parts, or constituents. For example, the meaning of “snowball” is derived from “snow” and “ball”, but the meaning of “shindig” is unrelated to “shin” and “dig”. This difference illustrates semantic transparency; “snowball” is semantically transparent, whereas “shindig” is semantically opaque. Research has produced conflicting results concerning the effect of semantic transparency on processing, which makes theoretical interpretation difficult. Our goal was to inform the conception of semantic transparency by systematically examining the operational variables used as its representation. We used a statistical method called factor analysis to investigate whether eleven common measures of semantic transparency inform the same underlying construct, and performed additional analyses to understand how these different aspects predicted processing performance. We found four factors represented by the semantic transparency variables, and that these factors interact when predicting performance. Moreover, our results suggested that people are sensitive to aspects of semantic transparency that computational association measures, which calculate the degree of relatedness between words, are not. Different measures of semantic transparency reflect different constructs, and each provides unique insight into how semantic transparency influences language processing. This project provided a novel conception of semantic transparency that can inform the design of future psycholinguistic experiments.

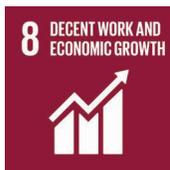
P29. Issues surrounding “climate refugees”: Problems we need to address in the future

Area(s) of study: Other/interdisciplinary

Kathleen Willett | FACULTY OF AGRICULTURAL, LIFE & ENVIRONMENTAL SCIENCES

As climate change results in more extreme weather events, sea-level rise, and worsening environmental conditions, it is expected “climate refugees” will become a reality. It is estimated that anywhere between 25 million and 1 billion people will leave their homes due to climate change by 2050. Due to the unpredictability of climate change and the future, the research surrounding climate change-related migration is limited and speculative. Much more research needs to be done in order to understand the problems these migrants may face. Based on a previous research project that explored how climate migration may affect the city of Edmonton, this research aims to identify the challenges climate refugees around the world may face, missing links in climate refugee research, and problems that still need to be addressed in the future. An extensive literature review revealed three main themes: First, there is a significant lack of international acknowledgement and policy regarding climate refugees. For example, Canada’s immigration system does not recognize climate change-related immigration as a legitimate reason to enter Canada. Second, some authors argue there may be negative connotations related to the term “refugee” and race may play a part in the reception of immigrants in other countries. Third, this research reveals that the consequences of labelling persons affected by climate change as “climate refugees” may be problematic for the people in less-affected countries and for the people affected by climate change themselves. The issues presented by this literature review must be addressed in order to prepare the international community for the social and economic consequences of climate change migration.

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P30. Energy in Alberta the future of renewables

Area(s) of study: Other/interdisciplinary

Cole Vroman | FACULTY OF ARTS

The global climate crisis demands that we progress forwards in a sustainable and economically efficient manner. As renewable energy technology becomes more widely available and cheaper; my research aims to provide information on viable options forward, and how these different choices will affect Albertans. I have collected literature, and information on the topic in order to consolidate and apply the scholarly works to Alberta specifically.

In a globalizing world, it is easy to blame others or ask the question “why must we be the first to change?” though such thinking is detrimental to progress. Alberta has potential to begin this transition and stay ahead of the curve as a leader in environmental preservation and serve as a model of energy efficiency.

My work is meant to analyze which of the sustainable energy sources are most effective in Alberta and what the future of our oil and gas industry could be as the shift begins.

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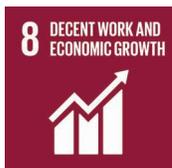
P31. Complete Streets Audit & Recommendations

Area(s) of study: Other/interdisciplinary

Kyle Monda | FACULTY OF ARTS

My project is a complete streets audit to fulfill the integrative project requirement of the Certificate in Sustainability. A complete street is one that facilitates transportation and activities by people using all methods of transportation, including walking, driving, transit, biking, and any other form of active transport. Complete streets are important because they support a variety of transportation choices more sustainable than driving and allow more people of all ages and abilities to be able to use the street comfortably. In turn, this increases economic and social activity along the street, creating broad benefits for the street and the city at large. For this audit, I have assessed four blocks of Broadway Street in Vancouver, BC and provided recommendations for future improvements. Comparing this audit to two blocks of Jasper Avenue in Edmonton, AB I have previously audited, illuminates the differences in the two cities approaches to planning and transportation, and what they can learn from each other.

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P32. It's not a Barbie world; life in plastic is not fantastic

Area(s) of study: Other/interdisciplinary

Tiffany Bruce | FACULTY OF SCIENCE

Single-use plastics continue to be a growing problem and pose significant risk to our oceans and marine wildlife. Therefore, it is imperative to determine ways to prevent the use and production of these plastics and to investigate solutions for removing already-present plastics from the environment. The “war on plastics” has begun and citizens have been responding with backlash and inaction. Why do North Americans continue to choose Ziploc® over reusable Tupperware®? This poster presents a review of literature regarding social behaviours and the reasons that people may be resistant to change. If sustainability means ensuring the prosperity of future generations, then that has to begin at an individual level and later develop to a larger scale to target large industries. Breaking our current habits is conducive to protecting our oceans for years to come. Once this objective is met, focus can be placed on reversing our impact. Ocean cleanup projects are growing in popularity, but the effectiveness of these projects is questionable. Plastics are generally lightweight and can easily travel and break apart in the oceans. Microplastics pose significant danger to marine ecosystems and are very difficult to get rid of; simply collecting visible waste from beaches is not enough to remove all plastics. We need to begin to investigate new and innovative ways to remove plastics from our oceans. Since plastic products are being produced and discarded at extraordinary rates, we need to act fast to protect our future.

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P34. The correlation between reading performance and oral stereognosis.

Area(s) of study: Other/interdisciplinary

Jacqueline Cummine, Bill Hodgetts, Amberley Ostevik and Thi Kim Truc Huynh | FACULTY OF SCIENCE

Oral stereognosis is known as the ability to discriminate shapes using our tongue/mouth, in the absence of seeing the shape beforehand. This task has been shown to be predictive of skilled and unskilled speech production. In turn, speech production performance is highly predictive of skilled and impaired reading performance. This begs the question "To what extent does stereognosis performance predict reading performance?". Methods: Participants (N = 60) completed the Florida Oral Recognition Form task and several reading tasks. Briefly, the FORM required participants to identify carrots that were cut into one of the following letter shapes: L, E, N, O, R, S, T, V. Carrot letters were randomly provided to participants. With respect to the reading tasks, participants were required to press a button if: 1) the letter string spelled a word or 2) if the letter string sounded like a word. Response time (for reading) and accuracy (for both reading and FORM) were measured. Results: There was a significant correlation between reading accuracy for stimuli that relied heavily on sound representations (e.g., warp) and oral stereognosis accuracy. This work provides preliminary evidence that an individual's ability to discriminate letter shapes with their mouth is related to their ability to sound-out unfamiliar letter strings. The extent to which such findings generalize to impaired readers and/or pediatric populations remains to be seen.

P35. The Environmental Impact of Recycling Plastic to Polyester

Area(s) of study: Other/interdisciplinary

Payton Homeak* | FACULTY OF AGRICULTURAL, LIFE & ENVIRONMENTAL SCIENCES

This research project aims to analyze the rise of Polyethylene Terephthalate (PET) plastic and how evolving technological advancements in the recycling industry created a new solution to addressing this particular single-use plastic waste. I will explore the mechanical and chemical processes of converting post-consumer PET waste into recycled polyester. Based on analyzing primary and secondary data, I will evaluate the environmental impacts of these recycling processes and how the degradation of recycled polyester fibers impacts the environment. The key findings from this research support that processing single-use PET plastic into recycled polyester imposes a significant environmental impact due to the rapid degradation of this disposable synthetic material. These findings are essential to consider when consuming textiles and clothing made from recycled polyester. I conclude that the most effective method to recycle PET plastic is to utilize the existing technologies in creating alternative consumable products with a longer life span that can last over generations.

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P36. The Body-peg Strategy for Serial-order Memory

Area(s) of study: Other/interdisciplinary

Yuwei Tan*, Felicitas Kluger, Jeremy Caplan | FACULTY OF SCIENCE

Mnemonic strategies can help people remember arbitrary information in order. Memory champions sometimes describe using one's own body parts as the basis for "attaching" new information, as a mnemonic technique. To our knowledge, this body strategy has not been systematically investigated. In this experiment, we asked whether the effectiveness of the body-peg strategy varies with/without tactile sensation, and compared its effectiveness with a control group that was not instructed with the body strategy. One group of participants experienced tactile sensation by touching their own body parts, a second group performed similar the motor actions but without tactile sensation, and a third group did the task entirely in their mind. Results showed the body-peg strategy to be significantly more effective than the control group; however, contradicting our hypothesis, tactile sensation did not make the strategy more effective. Tests of both vividness of mental imagery and body responsiveness were not significantly correlated with recall accuracy, but a significant correlation was found between recall accuracy and visuospatial ability. In sum, our findings suggest that the body strategy holds promise as an effective mnemonic technique to facilitate serial recall but, like other well-known strategies, may be most effective for people with high visuospatial ability.

P37. Indigenous Engagement Initiative for Chronic Wasting Disease

Area(s) of study: Other/interdisciplinary

Kali Stewart | FACULTY OF NATIVE STUDIES

The Indigenous Engagement Initiative for Chronic Wasting Disease is a research project aimed at the development and distribution of educational materials regarding the impacts and management practices of Chronic Wasting Disease (CWD) in deer, moose, and other cervids. Many Indigenous communities who depend on these animals are currently being underserved by provincial departments, such as Alberta Fish and Wildlife, in terms of public outreach regarding the disease. As of yet, there are no accessible, culturally appropriate, educational materials being provided to Indigenous communities. It is the aim of this project to close the information gap regarding the disease in a culturally relevant manner. Therefore, the research question will be; what is the most effective way to present and share information on CWD so it is useful for Indigenous communities and reflects Indigenous perspectives on wildlife management? The methodological approach to answering the question—will be to include Indigenous values both in the phrasing and in the emphasis being placed on the proactive measures used to prevent disease spread. The key finding is that Indigenous populations are still limited in their knowledge about CWD, but by reflecting the unique relational way that Indigenous peoples interact with animals and the environment, the educational materials about CWD are likely to have higher rates of engagement. Providing information on CWD to Indigenous communities is of great significance, due to the ethical, environmental, economic and social implications cervid populations have on maintaining Indigenous cultural practices as well as on re-establishing food sovereignty and security.

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P40. Significance of Traditional Indigenous Physical Activity on Physical Literacy, Cultural Identity, and Resilience

Area(s) of study: Other/interdisciplinary

Januel Ibasco*, Christian Becker

FACULTY OF KINESIOLOGY, SPORT, AND RECREATION

The following research explores understanding the role traditional indigenous physical activity play in developing indigenous youth's cultural identity and physical resilience.

The research analyzes the question: What are the benefits for Indigenous youth who participate in traditional forms of physical activity?

Traditional physical activity provide opportunities for Indigenous youth to develop a complex and culturally relevant physical literacy that is intertwined with their cultural identity. In turn, with indigenous youth maintaining their traditions of their culture this allows key teachings and practices to be passed down many generations.

Research was made through an in-depth analysis of a literature review through peer reviewed journal articles that included many studies and programs for healthy child development such as the 'High Five Program' founded by Parks and Recreation Ontario.

Key findings from the research included the vital importance of strong connections with family, cultural pride, and being on the land that assisted in alleviating barriers faced by many Indigenous communities. For example, inter-generational trauma experienced by Indigenous youth's parents and grandparents from residential schools, type two diabetes, and racism.

In the westernized world of physical activity, much of recreational programming or physical activity surrounding youth focus more on performance rather than viewing an activity holistically. By implementing more holistic practices from Indigenous communities, recreation programmers, teachers, community leaders, and physicians will recognize and enhance the significance of traditional indigenous practices when creating lesson plans and prescribing Indigenous youth with appropriate resources to improve their physical literacy through emotional, physical, spiritual, and mental realms.

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P41. The Medicine that Walks: Holistic Indigenous Wellness and the Bison Belong Project in Elk Island National Park and Banff National Park

Area(s) of study: Other/interdisciplinary

Regan Wright*, Katja Schreiner*

FACULTY OF KINESIOLOGY, SPORT, AND RECREATION

Incorporating Indigenous values and teachings has been suggested as a holistic method to address the lower health outcomes achieved by Indigenous peoples in Canada. This project presents an interdisciplinary study of Indigenous health and national parks related to the Medicine Wheel teachings and wildlife management. The Bison Belong initiative reintroduced wild bison to Banff National Park in 2017. This case is highlighted as a leading example of a holistic and community-engaged wildlife management approach with potential to improve the health of Indigenous peoples and the land itself, with strong connections between reconciliation and ecosystem management.

A literature review was conducted to investigate how reintroducing bison in Banff National Park contributes to reconciliation and healing, and the health outcomes related to bison. Databases were accessed for keyword searches to locate peer-reviewed works, public policy and non-government organization documents. The Indigenous concept of the Medicine Wheel was engaged to analyze these results related to holistic health.

The relevance of bison relocation and Indigenous engagement is framed within the Truth and Reconciliation Commission Calls to Action and the United Nations Declaration on the Rights of Indigenous Peoples. Based on contemporary scholarship, this project suggests that bison continue to be of great importance to Indigenous Peoples and this extends to holistic health outcomes outlined in Medicine Wheel teachings. This significance has several implications for the Bison Belong project's impact on reconciliation, decolonization, and healing of both land and people. Restoring bison to Banff also restores balance in terms of Indigenous health and cultural resiliency.

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P42. Household Humidifier as a Source of Indoor Air Pollutants

Area(s) of study: Other/interdisciplinary

**Chester Lau*, Max Loebel Roson, Keifer Klimchuk,
Ran Zhao** | FACULTY OF SCIENCE

The average human spends over 90% of their time indoors. As a result, clean indoor air is crucial for a good quality of life. Humidifiers are often used to alleviate symptoms related to dryness. One of the most common types of humidifiers is the ultrasonic cold-mist humidifier, where mist is created by using a high-frequency sound vibration which is then expelled through an opening into the air. Through the evaporation of water molecules, humidifiers may emit particulate matter below 2.5 micrometres in diameter. Particles below this size are referred to as PM_{2.5} and are known to have deleterious effects on human health. Their concentration is therefore widely used as a standard for air quality. Specifically, mist generated by cold-mist humidifiers leaves particulate matter in the form of mineral particles in the air. The production of PM_{2.5} in such instances may well be caused by the evaporation of water molecules, which leave traces of mineral particles airborne. Another common type of humidifier, the evaporative warm-mist humidifier, reduces the buildup of particulate matter in the room by the use of a wick filter. Currently, measurements for humidifiers operated under realistic household settings are sparse in literature. So far, there is also a lack of systematic studies in the laboratory, focusing on the impact of water quality and type of humidifier on the amount of PM_{2.5} generated. In this study, a Scanning Mobility Particle Sizer (SMPS) was used to monitor the concentration and size distribution of particulate matter generated from ultrasonic and evaporative humidifiers, as well as from tap, deionized, and distilled water. The influence of water quality and air circulation on particulate matter concentration was investigated systematically. To provide insights into the chemical composition of PM_{2.5}, particle samples were collected and analyzed by ion chromatography. The results obtained from this study found a strong correlation between water quality and concentration of particulate matter.

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P44. Cyber-Aggression, Cyber-Victimization and Sexual Orientation in Adolescence

Area(s) of study: Other/interdisciplinary

**Muhammad Hassan Yar Nawab, Brenna Zatto,
Wendy L. G. Hoglund** | FACULTY OF SCIENCE

Cyber-aggression is aggression committed via technological devices that is typically enacted by peers and directed toward peers. Cyber-victimization refers to being the target of cyber-aggression. About 20% to 40% of adolescents report having been cyber-victimized at least once in their lives. Cyber-victimization is associated with several negative outcomes, including higher scores on symptoms of depression and anxiety. Cyber-aggression and cyber-victimization are of concern during adolescence as adolescents are among the highest user groups of social media. Adolescents who identify as being part of a sexual minority group have been found to be at particular risk for cyber-victimization.

Sexual minority adolescents may identify as lesbian, gay, bisexual, pansexual, or asexual. It is unclear if rates of both cyber-aggression and cyber-victimization differ by adolescents' sexual orientation and whether the role of social competencies and mental health problems on cyber-aggression and cyber-victimization differ by adolescents' sexual orientation.

The current study examines how rates of cyber-aggression and cyber-victimization change over two school years and relate to social competencies and mental health problems among adolescents who identify as a sexual minority (i.e., lesbian, gay, bisexual, pansexual, and asexual) or sexual majority (i.e., heterosexual).

This two-year study included 1434 adolescents (54.5% girls; Mage = 13.49 years, SD = .89) in grades 7 (32.6%), 8 (31.2%), and 9 (36.1%). Adolescents self-reported on their sexual orientation (8.4% identified as a sexual minority), cyber-aggression, cyber-victimization, social competencies, and mental health problems. This research extends understanding of how experiences of cyber-aggression and cyber-victimization may differ among adolescents based on their sexual orientation.

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P45. Is carpet related to car and pet? An analysis of the effect of entropy on the availability of first constituents and ease of processing in pseudo-compounds

Area(s) of study: Natural sciences & engineering, Other/interdisciplinary

Karen Perez Cruz*, **Holly Kibbins***, **Mohamed Barre***,
Chelsa Patel*, **Dixie Wong***, **Alex Taikh**, **Christina Gagne**,
Thomas Spalding | FACULTY OF SCIENCE

Pseudo-compounds (e.g., carpet) appear to be compounds but they are not. Entropy is a measure of uncertainty in the possible relationship between a pseudo-compound's constituents, where high entropy indicates more conflicting possible relations between constituents. A possible relation is the most likely relationship between a pseudo-compound's constituents. For example, for the constituents of the pseudo-compound bigram, big and ram, have multiple possible relations (e.g., big FOR ram or big MADE FOR ram). High entropy indicates more conflicting possible relations between the two constituents, thus present with higher reaction times. This section of our study focuses on the effect of entropy on the ease of processing of the first constituent of a pseudo-compound. Past research studying the processing of pseudo-compounds examined reaction time to the first constituent (i.e., the availability of the pseudo-compound). However, there is a lack of research investigating the possibility of entropy affecting the availability of the first constituent in pseudo-compounds. We hypothesized that higher entropy for a pseudo-compound would decrease ease of processing of the first constituent, making the first constituent less available; in turn, resulting in longer response times. We found pseudo-compounds with higher entropy have longer reaction times to their first constituent. The first constituent was less available when the pseudo-compound had higher entropy. Our findings suggest that although the constituents of pseudo-compounds act non-productively, their meanings and possible relations still affect their processing.



P46. Is carpet related to car and pet? Investigating the effects of morphological family size and word frequency on the relationship between entropy and ease of processing for pseudo-compounds.

Area(s) of study: Natural sciences & engineering, Other/interdisciplinary

Chelsa Patel*, Karen Perez-Cruz*, Dixie Wong*, Holly Kibbins*, Mohamed Barre*, Alexander Taikh, Thomas Spalding, & Christina Gagne | FACULTY OF SCIENCE

We extended our previous findings by investigating the influence of morphological family size and word frequency, on the relationship between entropy and ease of processing of pseudo-compounds that we previously found. Morphological family size is the number of compounds that share the first constituent. Word frequency is the frequency at which a word is used in everyday situations. Past studies have shown a change in reaction time for compound words (where the constituents do contribute to the overall word meaning) presented with differing morphological family sizes and word frequencies. This section of our study investigates whether morphological family size and word frequency have a modulating effect on the previously found relationship between entropy and the ease of processing in pseudo-compounds. We hypothesized that pseudo-compounds with a first constituent from a large morphological family size would result in increased ease of processing and increased availability of the first constituent, resulting in shorter response times. Additionally, we hypothesized that high frequency pseudo-compounds' first constituents would be easier to process and thus be more available; resulting in shorter reaction times. Our results showed that word frequency and morphological family size did not modulate (i.e., increase or decrease) the relationship between entropy and ease of processing in pseudo-compounds.

P49. Decentralized Traffic Signal Control for Large-Scale Network in a Connected Vehicle Environment via Edge Computing

Area(s) of study: Natural sciences & engineering

Shijie Wu*, **Can Zhang** | FACULTY OF ENGINEERING

Network-level traffic signal control aims to improve network mobility and traffic safety. The optimization of large-scale network traffic signal often involves large amount of decision variables and non-linear constraints. However, the problem of data analysis for centralized systems persists despite recent advancements in data-analyzing algorithms. In addition, communications between vehicles and infrastructures are unable to meet the latency requirement for real-time control. This research proposes a real-time multi-agent traffic signal control system for large-scale urban network traffic in a connected vehicle (CV) environment to improve traffic mobility with limited computation resources. The system decomposes large networks into small subnetworks and simultaneously optimizes the parameters of all intersections in the subnetwork collectively. To reduce data delivery latency, Edge Computing (EC) is utilized to handle data on the device. At the network level, the number and size of subnetworks will be optimized based on simulated demand profiles. For both optimizations at network and subnetwork level, the Dynamic Traffic Assignment (DTA)-based simulation is applied as the major methodology. In DTA, it is assumed that short-term demand will be updated continuously as the input. The control variables for traffic signal timing include cycle length, green time for each phase (phase split), and offset. According to the system built, this research will compare different optimization objectives, such as minimizing total travel time (TTT), minimizing total travel delay (TTD), and minimizing total travel emissions (TTE). This research will also investigate synergies in achieving these differing objectives, and account for externalities of importance to policy makers such as environmental concerns.

P50. Ionic strength affecting wetting morphologies in porous media

Area(s) of study: Natural sciences & engineering

Hannah Gertsen*, Amy Peichun Tsai, Anna Kalde

FACULTY OF ENGINEERING

Fluid-fluid displacement processes can be found in industrial and medical applications and also in natural processes. A displacement process is characterized by a fluid pushing another fluid out of its position. In case of a less viscous fluid pushing a higher viscous fluid instabilities occur in the displacement front. These instabilities have a finger-like shape. Thus, this phenomena is known as viscous and capillary fingering. Instabilities provide a short-cut flow and reduce the overall displacement.

During this project viscous fingering is investigated in microfluidic chips. Due to microfluidic chips, it is possible to tailor a porous structure and control surface area as well as chemical composition which ensures reproducibility of experiments.

Fluid-fluid displacement experiments are conducted using water-oil material systems for different displacement flow rates and microfluidic chip designs. Thus, pressure effects and surface to volume effects can be conducted.

The research experience provides lab experience in membrane manufacturing techniques and wetting characterization. Basic physical chemistry knowledge and scientific working skills are expanded.

By improving the wetting behavior during fluid-fluid displacement process a higher displacement rate can be achieved. A stable displacement is important during industrial processes as enhanced oil recovery and medical applications as chromatography. A understanding of wetting morphologies can help to understand natural process as water seeping into the ground.

All in all, through controlling wetting morphologies in porous media use of resources can be enhanced. A reduced use of resources and more efficient processes are one foundation one the way to a sustainable world.

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P51. Balsa (*Ochroma pyramidale*) influence on invertebrate diversity in Osa Peninsula restoration plots

Area(s) of study: Natural sciences & engineering

Sara Paulgaard, Gabriel Godziuk, Makenzee Kruger*, Carolyn Cook, Jackson Sweder* | AUGUSTANA CAMPUS

Clearing tropical forests for logging and agriculture can have major detrimental effects on ecosystems. Restoration projects exist to try and return areas that have been degraded to their previous undisturbed state, but this can take a very long time. Certain species of trees, such as balsa, are being used in Costa Rica to speed up succession. Osa Conservation near Puerto Jimenez has created a restoration experiment where they try different treatments on plots of degraded land agricultural land; including natural regeneration, 0% balsa (low) tree planting, and 75% balsa (high) tree planting. To assess the effectiveness of these treatment types we studied the invertebrate diversity of these plots and compared diversity measures in the plots to a natural, old-growth forest. This was done by digging pitfall traps in the restoration plots and the old-growth forest to collect invertebrates. After 24 hours our samples were collected and sorted to order level. With this data, we ran a statistical analysis and found that the low balsa plot had significant differences in Pielou's J evenness index. We also constructed an ordination graph which showed that the old-growth forest was most similar to the high balsa treatment and least similar to the low balsa treatment. This data shows that the high balsa treatment may be influencing invertebrate communities to return to pre-disturbance diversity. This pilot study will be used by Osa Conservation to determine if they will expand our methodology to be used across more of their plots and over longer time periods.

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P52. Sustainability implications of cathemeral behaviours as a result of predator absence

Area(s) of study: Natural sciences & engineering

Megan Brownlee*, Audrey Reid, Jocelyn Hall | CAMPUS SAINT-JEAN

When predation pressure in a community is removed, prey species often alter their behaviour by reducing the display of predator-avoidance strategies. As the number of nocturnal predators in an environment decreases, diurnal prey species often become more active at night. More than 75% of the world's large predators are declining; as these populations decline, we can expect prey species to alter the times at which they are active. It is important to understand and consider how animal activity patterns change when developing hunting and harvesting regimes and strategies. We established camera traps at two watering holes in Mbuluzi Game Reserve, in eSwatini to observe the effects of predator absence on the temporal niches of mammalian prey species. We predicted that prey species would exhibit extended activity times in response to the absence of predators and observed that all focal species displayed activity outside of their typical diel pattern. We found that all focal species exhibited cathemeral activity, but some diurnal species displayed more nocturnal behaviours than others. Our findings suggest that species respond differently to changing conditions in their environment. It is important to understand and consider these environmental changes when developing hunting policies as hunting has many social and economic implications in developing countries.

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P53. Regional response of aspen families to simulated herbivory and soil warming: impact on growth and gas exchange in seedlings.

Area(s) of study: Natural sciences & engineering

Stephanie Rudnew* | FACULTY OF SCIENCE

Since the mid-20th century, air temperatures have increased by 3°C in Alberta's boreal regions and are projected to continue rising at a similar rate over the next 30 years. One possible outcome of increased temperatures is soil warming, which may improve plant growth via increased metabolic and chemical processes. Trembling aspen (*Populus tremuloides* Michx.) is a common clonal, dioecious, native tree species in Alberta's boreal forests and is resilient to environmental stressors including soil warming and defoliation by forest tent caterpillar (FTC) (*Malacosoma disstria* Hübner). FTC can directly impair gas exchange (i.e. photosynthesis and stomatal conductance) by damaging and/or removing photosynthetic tissue, or indirectly by causing trees to allocate energy towards defence instead of growth.

The main objectives of this project are to determine how mechanical wounding of leaves and soil warming impact aspen seedling growth (i.e. height, diameter, biomass) and gas exchange. Seeds were collected from a drought-stressed region (5 families) and a healthy operational forestry region in Alberta (5 families). Two hundred seedlings will be grown in a greenhouse mimicking daily spring/early summer photoperiods in Alberta for 63 days in a split-plot design. Propagation heat mats will be used to induce a soil warming treatment, and leaves will be crushed with pliers to mimic FTC herbivory on 50% of the leaf surface area. This study will help determine the potential effects of soil warming, herbivory, and their interaction on aspen seedling productivity from two different regions expected to vary in their resistance to warming in Alberta.



P54. Implicit and Explicit Approaches to Skill Acquisition in Novice Golf Putters

Area(s) of study: Natural sciences & engineering

Abner Monteiro, Jessica Berehulke*, Neil Lemay*

FACULTY OF KINESIOLOGY, SPORT, AND RECREATION

We examined the kinematics and overall performance of golf putting under two conditions for skill acquisition: implicit (errorless) and explicit (errorful) learning. Based on previous literature (Masters, 1992; Poolton et al, 2005), an errorful condition was hypothesized to yield a greater decrement in performance during a transfer test (dual task) than the errorless learning group. Moreover, we hypothesized that velocity at impact should decrease as training progresses in the errorless group. Additionally, we expected that the errorless condition would see a decrease in the planar movement amplitude of the club after the acquisition phase. For this pilot study data were collected for two participants, one in each condition. Each participant completed 5 putts in the pre-test, 30 putts in the acquisition phase, 5 putts in the retention test and 5 putts in the transfer condition. The pre-test, retention and transfer conditions were all performed from a distance of 150cm. The errorless condition started from a distance of 25cm and moved up incrementally by 25 cm to 150cm. The errorful condition started from a distance of 150cm and moved down incrementally to 25cm. Kinematic 3D data were captured with PTI Visualeyex (Burnaby, BC) using 3 infrared light emitting diodes placed on the putter head. Values for peak velocity, contact point, and total stroke duration were calculated. Consistent with Poolton (2005) our data indicate greater technique variation in the errorful condition; however, there were no differences in performance outcome as a function of condition. These findings will be explored in future studies.

P55. Optics of the PICO 500

Area(s) of study: Natural sciences & engineering

Jhoel Montes | FACULTY OF SCIENCE

PICO 500 is a new generation detector of the family of PICO experiments(PICO 2L, PICO 60, PICO 40L). All of them with the same objective: To find the elusive dark matter particle (WIMP).

Those experiments follow the same principle: Placing a chamber full of superheated fluid a couple of kilometers under the surface, then wait for a WIMP to hit a nucleus of the fluid and form a bubble which we can detect.

The PICO 500 bubble chamber is currently in the process of design. This research in particular studies the optics involved in the process of obtaining pictures from the bubble chamber.

So before constructing the 500 liters chamber, we need to be sure that we can easily obtain useful images from the experiment. To do that we run an optic simulation with all the pieces and parameters involved in the experiment.

This is done by the computational method of Ray tracing which consists of generating rays from a camera towards a target and simulate what should be seen by a real camera.

The importance of this research besides the practical application to this experiment relies on the fact that this method could be used not only in the field of physics but in any other field when it's imperative to see what is not still constructed.



P56. A view through the PICO 40L cameras.

Area(s) of study: Natural sciences & engineering

Franz Machado | FACULTY OF SCIENCE

PICO is an experiment which aims to find dark matter using the bubble chamber technique, for this purpose experiments such as PICO 2L, PICO 60 and PICO 40L have been developed. PICO 40L was designed after a successful execution of PICO 60 with the aim of improving sensitivity when data is taken.

PICO 40L was the first detector that was built using the “right-side-up” principle and is in the data acquisition phase.

One of these improvements was the cameras, they are used to record images in the bubble formation process.

In this work we will analyze the behavior of these cameras inside the detector, since there are sources such as LED rings that introduce flickering when the photos are taken.

For this, the standard deviations and the entropy for each image will be analyzed, then we will compare with the entropies found in the absolute differences between successive images, all this will be analyzed through the use of python and open CV, in addition to these results will be contrasted with those obtained for PICO 60.

This in order to find an appropriate trigger value to be able to choose images where the creation of bubbles can be visualized, with this we can identify the position and its size with greater precision, then we can distinguish events associated with noise with better quality. So far, no experiment has been able to conclusively prove that the observed interactions come from dark matter. The search for dark matter continues.

P57. Anthropogenic Diet correlates with Parasite Prevalence in Urban and Peri-Urban Coyotes (*Canis latrans*)

Area(s) of study: Natural sciences & engineering

Arya Horon* | FACULTY OF SCIENCE

Urbanization is increasing at an unprecedented rate throughout North America, applying directional selection on species that can adapt to or exploit urban areas, including coyotes (*Canis latrans*). Urban coyotes are the definitive hosts to several complex and simple life cycle zoonotic parasites. The goal of this paper was to determine how urbanization, diet and parasite prevalence are related within a coyote population in Edmonton, Canada. I used 30 coyotes collected by trappers outside of the city and 30 coyotes from animal control officers or as roadkill within the city. I counted the number of parasites found in the intestines and sorted them morphologically (*Echinococcus multilocularis*, *Alaria* sp., *Taenia* sp., *Uncinaria* sp., and *Ascarids* (*Toxascaris* sp. and *Ascaris* sp.)). I compared parasite prevalence to measures of stomach contents and body condition from the same animals to determine whether infections correlated with diet or health, with emphasis on anthropogenic food and prey items. Relative to peri-urban animals, urban coyotes had a higher diversity of parasites, including *E. multilocularis*, ate a higher proportion of anthropogenic food, and a lower proper of prey. This study suggests that anthropogenic food could contribute to the prevalence of parasites, including the zoonotic source of human alveolar echinococcosis.

P58. Method Development for the Extraction of Petroleum Hydrocarbons from Oil Sands Tailings

Area(s) of study: Natural sciences & engineering

**Keifer Klimchuk*, Kara Rathie, Joe Crumbaugh,
Dani Degenhardt** | FACULTY OF SCIENCE

In the past ten years, reclamation of open pit oil mines has gained relevance due to the extensive anthropogenic damage to the environment. When attempting to return the land to its natural state, the Alberta government reclamation guidelines must be followed. The success of such reclamation projects is determined by measuring the amount of harmful or toxic substances still present at a site after the remediation efforts conclude. Due to the highly precise measurements required, this aspect of reclamation is explored in a laboratory setting. Chromatography techniques, such as liquid chromatography or gas chromatography, are generally used to quantify the presence of substances in oil pit samples. These techniques are exceptionally accurate, this means small method changes, such as extracting the sample differently, can strongly affect the final result of an analysis. At Natural Resources Canada, a research project was developed to analyze the efficiency of three different time varying extraction methods for the isolation of petroleum hydrocarbons (PHC) from oil sands tailings. The Soxhlet extraction method is the current standard but is a time-consuming process used for PHC analysis. The objective of the project was therefore to determine if the shear mixing and wrist action shaking extraction methods are comparable to the standard Soxhlet extraction method. Centrifuge tailings from Syncrude were extracted using the above three extraction techniques. The extracts were then analyzed using gas chromatography with a flame ionization detector. The results were calculated using the reference method for the Canada wide standard for petroleum hydrocarbons in soil (tier one method). The results showed that the wrist action shaking extraction performed poorly compared to the other methods. The shear mixing and Soxhlet extractions produced similar results, but these were proven to be statistically different. The conclusion was that the Soxhlet extraction provided the most precise and accurate results. From a laboratory point of view, standard methods for the PHC extraction of soils should be used to determine the success of reclamation projects.

P59. Cardiovascular consequences of a high-fat meal

Area(s) of study: Natural sciences & engineering

Breanne Collison*, Justin Duong, Majed Karim,
Natasha Boyes, Corey Tomczak, Darren DeLorey

FACULTY OF KINESIOLOGY, SPORT, AND RECREATION

A high-fat (HF) diet has been linked to increased risk of cardiovascular disease. This study investigated the hypothesis that a HF meal alters control of resting heart rate and blood pressure. In a randomized cross-over design, blood pressure and heart rate were measured beat-by-beat in 13 males and 16 females two hours post HF or iso-caloric low-fat (LF) meal. Blood pressure control was assessed as the relationship between changes in blood pressure and heart rate (baroreflex sensitivity, BRS). Heart rate control was assessed by beat-to-beat variations in heart rate (heart rate variability, HRV). BRS was not different ($p>0.05$) between meal conditions in males; however, BRS was augmented ($p<0.05$) in females in the HF compared to LF meal condition. HRV was similar ($p>0.05$) between meals in males and females. These data suggest that a HF meal does not alter HRV in males or females, whereas a HF meal appears to enhance BRS only in females. A single HF meal does not appear to be detrimental to cardiovascular regulation, and may improve blood pressure control in females.

P60. Convolutional Neural Networks In Astrophysics

Area(s) of study: Natural sciences & engineering

Zaid Sanchez*, **Erik Rosolowsky** | FACULTY OF SCIENCE

For the determination of star formation, the gas dynamics are currently analysed, which is done from measurements of gas radiation from galaxies taken by radio telescopes. This research is an exploratory project that aims to use artificial intelligence, specifically convolutional neural networks, for the automatic prediction of star formation from readings of gas intensities in galaxies. These readings can be taken as images that have a representation for each frequency level that the reading was taken. The aim is to have a model which can measure the efficiency of the gases for star formation, using three-dimensional convolutional neural networks, and can be used in further research for the automatic determination of star formation.

P61. Modelling seasonal and sexual habitat selection of mule deer in Ribstone Creek Heritage Rangeland Natural Area, Eastern Alberta, on the basis of resource selection, and verification via camera trapping, with regards to chronic wasting disease spread.

Area(s) of study: Natural sciences & engineering

Robert Xinzhi Lu*, Peter Smolko, Evelyn Merrill

FACULTY OF SCIENCE

Chronic wasting disease (CWD) is a devastating prion disease affecting deer, and is typically spread through contact between infected and healthy individuals. However, infection rates vary disproportionately between species and sex; males and mule deer (*Odocoileus hemionus*) in particular are of greater risk, possibly due to behavioral differences between sexes and species. This study focused on 16 adult mule deer (11 female and 5 males), as mule deer show disproportionately high infection rates. Each deer was captured in January 2018 in Ribstone Creek Heritage Rangeland Natural Area (Eastern Alberta), where CWD is known, and fitted with GPS collars; tracking occurred throughout 2018. The aim was to determine types of habitat were preferred by mule deer throughout different seasons. The year was divided into 2 seasons ("summer" and "winter"), while habitat type was based upon topography. Camera traps were used to determine presence/absence of mule deer in select habitats. GPS positions of deer were plotted against corresponding topographical maps in ArcGIS, and selection rates for habitat type were determined through use-available design of resource selection function. Comparisons between RSF and camera results showed high correlation, further supporting the results. Habitat selection differences between sexes was observed; males were less selective/more diffuse in summer vs. females, vice versa in winter. Unusual avoidance of streams occurred, suggesting possible competition with elk. These results allow determination "high-risk areas" as targets for employment of management techniques by wildlife officials, while understanding differences in behavior between sexes may explain differences in infection rate.



P63. Modeling the performance of checkpointing process that use Heterogenous Storage Systems in Cloud computing Clusters

Area(s) of study: Natural sciences & engineering

Jack Marquez*, Nelson Amaral, Oscar Mondragon

FACULTY OF ENGINEERING

Some High-Performance Scientific applications must execute for a long time. A failure in the machine where such an application is running can lead to loss of significant computed results. A standard solution is to checkpoint intermediate results from time to time to allow the application to restart after a failure from the last checkpointed results rather than starting over from the beginning.

HPC scientific applications can either be executed in dedicated HPC clusters or in Cloud Computing (CC) infrastructure. HPC clusters and CC infrastructure differ in the technologies that they use. For example, most CC infrastructure use virtualization which adds performance overhead. One of the approaches to mitigate this overhead is to use technology present in HPC clusters, such as low-latency networks, more processing units, or heterogeneous storage systems that aim to reduce the data writing/reading time for applications.

One of the latest storage technologies, still under development, is Non-Volatile RAM that has performance close to that of DRAM, but it has data persistency. Adding this technology to HPC clusters can change the strategy used for checkpointing. For instance, more frequent checkpoints with smaller storage footprints may be possible. My research consists of analyzing and modeling the performance of the checkpointing process of different applications using heterogeneous storage systems in CC environments, including NVRAM based storage.

P64. Predicting memory from brain activity

Area(s) of study: Natural sciences & engineering

Matthew H. Danyluik*, **Sucheta Chakravarty,**
Jeremy B. Caplan | FACULTY OF SCIENCE

One goal of memory research is to analyze the brain during the process of remembering to inform memory-training protocols. Two well studied signals which appear in the electroencephalogram upon recognition of a previously studied word are known as the FN400 and Late Parietal Positivity (LPP). However, just because such signals may generally accompany successful memory does not imply that they can classify remembered from forgotten words. Upon testing this, only the LPP successfully classified studied and unstudied words, but both the FN400 and LPP discriminated between those remembered and forgotten. Interestingly, only the FN400 classifier differentiated better versus worse participants. These findings suggest that the FN400 is relevant for memory function, while the LPP can intriguingly “remember” items regardless of whether the participant does. However, it is unlikely that the FN400 is the only aspect of cortical activity involved in item recognition. Indeed, our machine-learning classifiers were more successful than the simpler voltage measures, indicating that, while the FN400 is predictive of memory success, more work must be done to fully map the patterns of remembering. Our work therefore brings us one step closer to understanding the process of remembering, and helps lay the groundwork for future studies with the ultimate goal of improving memory function.

P65. Effect of passive integrated transponders (PITs) on Black-capped Chickadees (*Poecile atricapillus*)

Area(s) of study: Natural sciences & engineering

Jonathan Farr*, Elène Haave-Audet, Kimberley Mathot

FACULTY OF SCIENCE

Individual tagging is used to identify wildlife in order to address a range of questions related to the biology and ecology of the focal organisms. Prior to implementing individual tagging methods, it is important to study the impact of tagging on individual health and survival. Passive integrated transponders (PIT) and radio frequency identification are a relatively new tagging method used on a variety of species, including songbirds. However, the effects of PIT tags on Black-capped chickadees (*Poecile atricapillus*) have not yet been evaluated. Between 2017 and 2018, we individually marked chickadees in the University of Alberta Botanic Gardens with PIT tags that were either attached to leg bands or subcutaneously implanted. Both of these PIT tagging methods have been conducted in other study systems, and although subcutaneous implantation is more labour intensive in the field than installing leg-bands, leg-bands have been known to cause leg deformities in some songbirds. We compared the recapture rates one and two years following individual tagging of birds with leg-band and subcutaneous PIT tags to un-tagged, control birds to determine the effect of the two tagging methods on overwinter survival. If PIT tagging method has no effect on individual health and survival, we expect to observe no difference in recapture rate of individuals with PIT tags of either type compared to un-tagged control birds. Assessing the impact of PIT tagging on chickadee survival will inform our future research efforts, as observing behaviour at an individual level is central to our studies.

P66. Automatic Pose Estimation with Deep Neural Networks

Area(s) of study: Natural sciences & engineering

Mahdiar Nekoui, Fidel Tito*

Estimating action quality is a tough and subjective task for humans, however, it is important in sports competitions and related activities. For this reason, pose estimation takes a key role making a machine able to identify the pose of the person in 2D images or video and track its sequence to assign a final score for his performance. Hence, in this research, a deep neural network is trained with a dataset which includes sport images activities (diving, gymnastics, others). First, it allows to obtain fundamental keypoint locations and the joints of the human body. Second, according to the sequencing, and analyzing that it should have a high accuracy of the keypoints locations, a final score of the action is obtained in real time. This work will be a step towards an objective and efficient method to qualify Olympic sports, helping the judged to give their evaluations.

P67. Reinforcement learning from data with noisy labels

Area(s) of study: Natural sciences & engineering

Yifan Jiang, Shihao Zou, Li Cheng | FACULTY OF ENGINEERING

Despite the success of deep learning in image classification tasks, the human-level performance relies on a lot of clean training examples with high-quality manual annotations, which are expensive and time-consuming to collect. In contrast, it is easy to collect a dataset with noisy labels because there exist many inexpensive data sources on the web, but they tend to contain inaccurate labels. Training on noisy labeled datasets causes performance degradation because models can easily overfit to the label noise and accuracies drop dramatically. To overcome this problem, we propose a novel algorithm learning from data with noisy labels using reinforcement learning.

P68. EM Algorithm in Computer Vision: A Statistical Attempt to Produce Vivid Animations

Area(s) of study: Natural sciences & engineering

Annan Deng*, Sen Wang, Xinxin Zuo | FACULTY OF ENGINEERING

One of the applications of Computer Vision (CV) is human modeling, where we build models from images of human beings. To create realistic animated human bodies that can deform naturally with pose and exhibit soft-tissue motions like those of real humans, a study in 2015 firstly raised Skinned Multi-Person Linear model (SMPL). This model is a skinned vertex-based model that accurately represents a variety of body shapes in natural human poses.

Based on SMPL, a study in 2016 further proposed a method combining color images. However, previous work is usually based on Iterative closest point (ICP) algorithm, aiming to minimize the difference between the two clouds of points. However, when our initial points are not close enough to real points, ICP needs a long time to converge and may even be confined locally. Moreover, estimation based on color images often comes with depth ambiguity.

Therefore, this study applies EM algorithm, finding the point with the largest probability in depth image to estimate points on our model surface. We will compare our new method to previous methods and see if it overcomes their drawbacks.



P69. Lie-X : Depth Image Based Articulated Object Pose Estimation, Tracking, and Action Recognition on Lie Groups

Area(s) of study: Natural sciences & engineering

Kevin Delgado*, Zou Shihao, Wu Shuang, Li Cheng

FACULTY OF ENGINEERING

Pose estimation, Tracking and Action recognition of human or nonhuman movements have been heavily investigated in the last decades, but many approaches tackle problems in these areas with different perspectives. What is unlike in our method is that it relies on the mathematical context of Lie groups which enables it to successfully outperform the-state-of-the-art techniques with a unified approach.

So far, reading the already published paper (and others) is all what I have been doing but the goal of the research is to increase the difficulty of the tasks, which could be done by performing action recognition of the whole body or wild animals.

Graphics, styles, fancy enhancements, equipment and artwork can be superimposed on the image of the person if their human pose can be estimated. By tracking the variations of this human pose, the rendered graphics can “naturally fit” the person as they move. Another interesting application could be done by a human instructor who can effectively teach to a robot certain actions by just demonstrating the same. The robot can then, once performed the pose estimation and tracking of the instructor’s body, calculate how to move its articulators to perform the same action, this application might even solve some of the biggest issues in robotics like walking and opening doors.

P70. Automated Extraction Of Road And Roadside Objects From Mobile Laser Scanning Data

Area(s) of study: Natural sciences & engineering

Augusto Ribeiro Castro*, Maged Gouda, Karim El-Basyouny

FACULTY OF ENGINEERING

LiDAR—Light Detection and Ranging—is a sensing method used for measuring distances based on the usage of light. Comparing the reflected light wavelength and return time with the emitted beam allows the user to create a 3-D representation of the environment. Much useful information can be obtained from the 3-D representation built, as highly accurate coordinates of each point, the intensity, the angle and the direction used during the capture, and the time of each sample. If used to their full potential, LiDAR datasets could create a paradigm shift in how geometric assessment and safety audits on highways are conducted. Moreover, this project will attempt to show the significant potential value of LiDAR data by expanding its use into business areas related to asset management, traffic operation, and road maintenance. The interesting design features can be extracted by using highly advanced AI techniques, such as Convolutional Neural Networks to merge the LiDAR with another useful sensor—like a camera—and extract road parameters or identify objects by its shape, position, and color. In the end, it is possible to present an automatic highly accurate tool to substitute manual work from engineers. Even more, avoiding long manual work reduce the number of errors, saving money and increasing the road’s safety.

P71. Measurement of the current distribution along a segmented cell.

Area(s) of study: Natural sciences & engineering

Elizabeth Griel, Marc Secanell, Claudia Gutierrez

FACULTY OF ENGINEERING

The new era of sustainability and actions for climate change has made us think about how we can replace the hydrocarbons for clean energy. In this context, we are looking for more eco-friendly fuels, such as hydrogen. Throughout the years the optimization of fuel cells has been studied and improved but there are still some unanswered questions, one of which is the behavior of a current through a cell (the initial, middle and final). The methodology for this research is to test and measure the currents of four segments of one segmented cell, and plot those values graphically to see how it looks and how these factors are related. This project will help provide insight into how currents flow through cells and how this process can be improved.

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P72. Estimating sitatunga density (Tragelaphus spekii) using time in front of the camera

Area(s) of study: Natural sciences & engineering

Megan Brownlee*, Mark Boyce, Camille Warbington

CAMPUS SAINT-JEAN

Population densities are an important consideration for wildlife management. For hunted species, estimations of population size are essential for establishing quotas. Sitatunga (*Tragelaphus spekii*) is a semi-aquatic African antelope, and trophy hunting is authorized for this species in Uganda. Despite their demand from hunters, sitatunga are underrepresented in scientific literature, and no formal density estimations of sitatunga (from camera trap data have been conducted in Uganda. We estimated sitatunga density in the Mayanja River area of Uganda using a time in front of the camera (TIFC) method with camera trap data from 2015-2018. The TIFC model averaged 10.30 sitatunga/km², which is consistent with results from a spatially explicit capture-recapture study of sitatunga density. These results suggest that TIFC methods accurately and reliably estimate population densities. It is important to understand sitatunga populations in order to develop sensible hunting quotas and ensure sustainable sitatunga harvest.

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P73. Biophysical analysis of an ubiquitin ligase complex associated with breast cancer

Area(s) of study: Natural sciences & engineering

**Oluwakunmi Mercy Akinloye, Dr. Rashmi Panigrahi,
Dr. Mark Glover** | FACULTY OF SCIENCE

The breast cancer associated protein, BRCA1, interacts with the BRCA1 associated protein, BARD1, through their RING domains to form a heterodimer which can act as a E3 ligase. This stable heterodimer influences a number of cellular processes that maintain genomic stability by promoting the homology-directed repair during double strand break. Mutations in the RING domains cause disruption of the ligase activity which have implications in the promotion of tumor progression, as well as can pose a risk for breast cancer in women. A high-resolution three-dimensional structure of the human BRCA1-BARD1 RING domain heterodimer is currently not available.

With an aim to obtain crystal structure of the above heterodimer, we got the genes corresponding to the two partners in a Duet expression system. Further we optimized the purification protocol for the heterodimer. The purified protein complex was assessed using SDS-PAGE. In order to validate the stability of the complex in different buffer systems, we performed thermal shift assay. Buffer system demonstrating highest T_m value was selected as the buffer of choice. Further the integrity of the heterodimer was assessed on a size exclusion column assisted with multi-angle light scattering detector. The crystallization screen trials were performed using Art Robbins robot. Initial crystal hits were assessed for diffraction using in house diffractometer.

Currently, we are moving forwards to obtain a high resolution map of the complex. This structure could contribute to a more comprehensive database of mutations in the complex and potentially allow for better prediction of breast cancer risk.

P74. Advanced Membrane Processes for Harvesting Clean Energy from Wastewaters

Area(s) of study: Natural sciences & engineering

Camila Saenz*, Isabela Guimaraes*, Mohtada Sadrzadeh, Behnam Khorshidi | FACULTY OF ENGINEERING

Global efforts have been encouraged to develop technologies for clean water and energy production from wastewaters. One promising technology to produce clean water and energy simultaneously is called Pressure Retarded Osmosis (PRO). PRO process requires a semi-permeable membrane that allows water molecules to pass but reject the contaminations to transport. The PRO membrane separates the low salinity solution (called feed) from high salinity stream (known as draw solution). The difference in solute concentration of the feed and draw solutions generates a natural osmotic pressure.

Therefore, the water molecules leave the wastewater stream and permeate through the membrane to the draw solution, resulting in recovery of water from wastewater. The water in draw solution is recovered by removing the solute. Furthermore, the additional volume of permeated water in the draw solution increases the pressure in the chamber, which can be depressurized downstream by a hydro turbine to generate electrical energy.

This project is a novel attempt to expand the PRO application to wastewater treatment by developing high performance nanocomposite PRO membranes aiming at generating energy while recovering clean water from the wastewaters. It was developed in two main phases: the phase 1 consists on the Synthesis of high performance nanocomposite support materials by phase inversion process with different support materials such as polyethersulfone (PES), manipulating the demixing rate, using hydrophilic pore former additives and carbon nanotubes. The Phase 2 consists on the Synthesis of selective layer using interfacial polymerization reaction to reduce the thickness by interfacial polymerization with combination of amine/acyl chloride monomers.

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P76. Use of star-shaped block copolymers to improve the antifouling property in membranes for water treatment.

Area(s) of study: Natural sciences & engineering

Isabelle Fernanda de Sousa*, **Muhammad Amirul Islam,**
Mohtada Sadrzadeh | FACULTY OF ENGINEERING

In the face of water consumption and pollution, sustainable water treatment methods from an environmental, energy and capital cost point of view are necessary. Membrane technology is being used as a separation technique to remove pollutants of different sizes and chemical properties from wastewater. However, fouling is a significant problem for the application of membrane technology to treat wastewater since it can reduce the useful life of the membrane by reducing the flow of water due to blocking of the membrane surface and pores. Particularly, steam-assisted gravity drainage (SAGD) produced water contain highly dispersed oil droplets that are considered as a major fouling material. One of the strategies to improve the antifouling property of the membrane is to enhance the hydrophilicity of the membrane surface. Recently, star-shaped block copolymers were used as the antifouling coating on hydrophobic membrane surface that exhibited enhanced antifouling properties. However, there is scope to further improve the antifouling property of the star-shaped block copolymer coating by tuning their core-shell structure and chemical composition. The objective of this project is to evaluate the antifouling property of the newly developed star-shaped block copolymers. The star-shaped block copolymer will be coated on hydrophobic membrane by using layer-by-layer deposition technique and the antifouling property will be examined by measuring the surface wettability, and surface charges as well as conducting the filtration of oily wastewater.

P77. The star-shaped block copolymers membranes for water treatment

Area(s) of study: Natural sciences & engineering

Victor Zamora Castañeda*, **Mohtada Sadrzadeh**,
Muhammad Islam | FACULTY OF ENGINEERING

Membrane technology is considered as an efficient technology for the treatment of wastewater yielding high quality fresh water. However, the long-term operation of membrane technology is impeded by fouling, this process reduces the water permeation through the membrane due to the accumulation of pollutants on the surface and into the pores of the membrane. This undesirable fouling can be mitigated by incorporating hydrophilic materials on the membrane surface or into the polymer blend used to fabricate the membrane via phase inversion method. The star-shaped block copolymer was introduced in the membrane modification processes. The star-shaped block copolymers were coated on commercial polysulfone (PSF) membrane using layer-by-layer (LbL) self-assembly method, and this modification exhibited high antifouling properties against model wastewater pollutants including dyes, oil emulsion, BSA, and humic acid. However, the inherent limitation of any coating materials is their leaching during long-term operation that can leave the membrane prone to fouling. On the other hand, blending the hydrophilic antifouling materials with the polymeric membrane material results in their entrapment into the host polymeric membrane material. This entrapment can reduce the leaching of the antifouling materials and lead to long-term stability of the antifouling property of the fabricated membrane. In this context, the star-shaped block copolymers will be incorporated into the bulk of polysulfone and polyethersulfone polymers and antifouling membrane will be fabricated via phase inversion techniques. The membranes will be evaluated the performance by analyzing their chemical composition, porosity, surface morphology, hydraulic permeability, separation efficiency, and antifouling property against model foulants.

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P78. Automatic Visual Inspection Of Road Pavements Using Deep Learning

Area(s) of study: Natural sciences & engineering

Fernando Fortes Granado* | FACULTY OF ENGINEERING

Structures age and deteriorate. To preserve their quality, it is crucial that assessment and maintenance is performed regularly and properly. Otherwise, the poorly maintained structures may cause problems varying from inefficiency to life threat. In the context of road pavements, a commonly used way of assessing them is by analyzing the existence and the location of the surface cracks. For the maintenance of the pavements, crack sealing, that is filling the crack with sealant material, is usually applied to prevent water infiltration and further development of the cracks. Currently, most of the quality assessments are performed manually, which is time-consuming, costly and inaccurate. To address these problems, previous studies have aimed to build tools that automatically detect cracks via images. However, the tools built so far have a setback: they incorrectly identify sealed cracks as cracks i.e., false positives. In this project, we focus on building an algorithm that, given road pavement images, can identify and distinguish real cracks from sealed cracks. The algorithm is developed based on deep learning techniques, which is the area of artificial intelligence that has had the most success in computer vision.

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P79. Closing the loop: Designing a process to recycle airplane de-icer from the tarmac

Area(s) of study: Natural sciences & engineering

Lindsay Korol* | FACULTY OF ENGINEERING

Every season, airports in cities with severe winters can use anywhere from thousands to millions of litres of de-icing fluid (ethylene glycol) to keep the planes and tarmac free from snow and ice. The contaminated run-off from the de-icing operations must be treated before entering the environment. Without this step, ethylene glycol depletes dissolved oxygen levels in bodies of water and is toxic to animals and the environment. While multiple jurisdictions are exploring different glycol-processing technologies across North America, an opportunity exists to design a glycol recycling facility to 'close the loop' on the growing consumption of glycol and increase the sustainability of airport de-icing operations.

This project builds upon previous research to redesign a more efficient glycol recycling process at an international airport in Alberta. In conjunction, a comprehensive sustainability study is conducted to better analyze the impacts of ethylene glycol on natural environments, the economic benefits of building a glycol treatment facility at this airport, and the social acceptability of such a project. The proposed design is capable of separating solids and ethylene glycol from collected tarmac run-off, and storing the ethylene glycol for continued use by the airport for seasons to come. By recycling glycol airports can improve operational sustainability while decreasing glycol expenses and positively impacting the environment.

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P80. Volatile emission of fungi associated with different species of bark beetles that kill trees

Area(s) of study: Natural sciences & engineering

Gean Rodrigues*, Yanzhuo Liu*

FACULTY OF AGRICULTURAL, LIFE & ENVIRONMENTAL SCIENCES

Canada is a country with predominant Boreal Forest vegetation, corresponding to a high percentage in the region. However, annually, hectares of forest are lost due to the performance of bark beetles, which interfere in the development of these trees. Recent research has shown that these beetles have established an ecological relationship with fungi mediated by the influence of Fungus Organic Volate Compounds (VOC) and pheromones. The fungi correspond mainly to species belonging to the family Ophiostomaceae. This relationship is beneficial for both organisms, so that as the beetles are distributed in the trees, next to them are carried the fungi, which offer favorable conditions for the development of the larvae of the beetles. In this way, the reproductive success of the beetles as well as the proliferation of fungi, some of which are pathogenic and affect the flow of nutrients necessary for the survival of the trees. The work in question aims at understanding the study of two species of fungi (*Grosmannia clavigera* and *Ophiostoma ips*), which are related to a beetle (*Dendroctonus poderosae*). The hypothesis to be analyzed aims at a study during the initial infection, in which the fungus depends on the beetle pheromone as carbon source. The methodology used aims at the cultivation of both species of fungi and the analysis of their volatile compounds emitted by gas chromatography.

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P81. Volatile emission from fungi associated with different species of tree-killing bark beetles

Area(s) of study: Natural sciences & engineering

Yanzhuo Liu*, Nadir Erbilgin

FACULTY OF AGRICULTURAL, LIFE & ENVIRONMENTAL SCIENCES

Mountain pine beetle (Coleoptera: Curculionidae) has killed millions of pine trees for the last decade in western North America. There are two important reasons why these beetles are fast and efficient tree killers. First, bark beetles rely on their mass aggregation on the host, triggered by aggregation pheromones which can bring hundreds of individuals within a relatively short time. Secondly, these beetles rely on their fungal symbionts, which are inoculated trees during host colonization by bark beetles. Short after the introduction, these fungi start colonizing host tissues and use their nutrients (particularly carbon) to as an energy sources to grow. These fungi not only help beetles to kill trees but also provide nutrients such as nitrogen and sterols for developing bark beetle larvae under bark. In addition, these fungal symbionts can also emit insect pheromones and other beetle semiochemicals (chemicals carrying cryptic messages), which could contribute to the chemical ecology of bark beetles. Traditionally majority of studies have focus on the bark beetle-tree interactions, little is known about the interactions between bark beetles and bark beetle fungal symbionts despite of their importance in bark beetle biology. In particular, how fungal symbionts obtain their nutrients short after introduction to the host trees. In this project, one hypothesis will be tested that fungal symbionts utilize bark beetle pheromones as carbon source under bark in addition to volatile organic compounds emitted by host plant tissues. Pheromones will be selected because they are rich in carbon. One of the fungal associates of mountain pine beetle namely *Grosmannia clavigera* will be used. The fungus in four types of media will be grown: (1) media without any carbon source (only nitrogen is provided), (2) media host volatiles as carbon source, (3) bark beetle pheromones as carbon source, and (4) both host volatiles and bark beetle pheromones as carbon source. In the last three treatments, headspace of chemicals will be released in a closed environment (glass jar) and fungal growth response will be tested. The differences in fungal growth among different treatments will be analyzed to determine whether bark beetle pheromones can promote the growth of bark beetle fungal symbionts. The fungal growth will be assessed by measuring the fungal biomass. Also, chemicals from the dried fungal biomass will be extracted to determine how different carbon sources affected their chemical profiles. Research of the growth and emission characteristics of initial fungal infection will explain an important factor in the process of beetle attack success.

P82. Physics of thermal plasmas at atmospheric pressure

Area(s) of study: Natural sciences & engineering

Stefano Sacco* | FACULTY OF ENGINEERING

In welding, there are a lot of different heat transfer mechanisms that interact when you weld. At the moment, the industry doesn't have any simple equations to approximate the heat transfers and the welding form. This project aims to model coupled physics in a welding arc, with the intention of providing a general quantitative set of equations to output a look up table for ease of use in both research and industry. This work will generalize current data that currently is not being used in the industry; once used it is expected to optimize certain industrial processes with benefits for research and in situ practices. It will also allow the welders to become familiar to plasma phenomena used in their practices and to have a better understanding of their valuable work to optimize operational procedures.

As the main goal of this project we intend to model (using Matlab) a specific area in the cathode where the plasma is created being of greater importance since it is the first part of the welding arc, the beginning of the interaction of the gases. From this area all other interactions are derived such as it with the column zone and further with the welding pool, heat transfer phenomena. It is of great importance to notice this work involves self developed equations and Squires solutions (used to model fluid behaviour) for this physical phenomena.



P84. Describe and re-unite a dinosaur skull with its skeleton

Area(s) of study: Natural sciences & engineering

Khoi Nguyen*, Corwin Sullivan, Phil Currie | FACULTY OF SCIENCE

Centrosaurus apertus is a species of horned dinosaur known from multiple specimens from Dinosaur Park Formation. However, specimens collected east of the South Saskatchewan River were suspected to have some distinct features in the skull. A skeleton collected from this region in 1972 was taken out from collections for study, but the block containing the skull was missing. Two other isolated skulls were later located in collections and we suspect that one of them is the missing skull. The first objective of this project was to determine which skull belongs to the specimen by analyzing both the fossils and their surrounding sediments using various lines of evidence like x-ray fluorescence, palynology, and old field notes/photographs. After the true skull had been found, it got a systematic description and phylogenetic analyses to determine its evolutionary relationship to other related species. We hypothesized that the specimen belonged to a new morph/species of *Centrosaurus* and might represent some biogeographical variation. Although the project is still ongoing because more materials will be excavated next Spring, we have determined the true skull of the specimen and performed some analyses on it. These analyses did not yield conclusive evidence to support a new species despite some marked differences when we did comparative analyses against four other *Centrosaurus* skulls in collections. The study has also highlighted some problems with how we currently classify different horned dinosaurs and the importance of keeping good historical records for later generations.

P85. Optical Fiber Integrated Reconfigurable Nanophotonic Switches And Sensors

Area(s) of study: Natural sciences & engineering

Maximilian Maier*, Behrad Gholipour | FACULTY OF ENGINEERING

The integration of nanophotonic and plasmonic devices in future network and sensing architectures will inevitably involve interacting with fields that are guided by an optical fibre as it is the most mature widely used network level photonic platform today. Here, our vision is to create a new family of optical fibre devices capable of high-resolution sensing with nonlinear dynamically tunable properties arising from their integration with nanophotonic devices (e.g. metamaterials). Metamaterials are a low physical footprint emerging technology paradigm for controlling the propagation of light and its interaction with matter through subwavelength nanostructuring. These devices can be designed to possess reconfigurable properties making them ideal for next generation telecommunication network switches and routers. Furthermore, they can be designed to be highly sensitive to specific parameters in their surrounding environment, making them ideal for future sensing technologies in emerging internet of things (IoT) platforms. Taking advantage of their miniature physical footprint, entire systems can be integrated on a single optical fibre, thinner than a human hair. Therefore, in this project, we pursue the design of metamaterial switches and sensors and their integration on i) side-polished silica fibres and, ii) on the tip of commercial and specialty fibres. These devices will be capable of nonlinear spatial and intensity light modulation, data storage and environmental sensing.

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P86. An intelligent IoT-based data acquisition system applied to indoor farming

Area(s) of study: Natural sciences & engineering

Sofia Gelio da Silva* | FACULTY OF ENGINEERING

Food security, soil degradation and climate change are among the most important global challenges for food production. Some efforts have been made to overcome these issues toward sustainable farming. Concepts such as precision farming are now being applied both into traditional and indoor farming techniques. Aiming to make indoor farming more reliable, IoT (Internet of Things) technologies and Automated systems have been recently introduced towards the achievement of precision farming. IoT is the concept of connecting any device to the internet and to other connected devices to share data without requiring human interaction. Therefore, through this technic is possible to acquire and analyze data from environment to control its crucial aspects according to the species of the crops. However, this type of system must be optimized to achieve feasible commercial implementations with optimal parameters of production. In this project, an automated mechanism for data acquisition of characteristics of an indoor farming environment is proposed. Six different parameters are taken into account: light intensity, air temperature, air humidity, and water temperature, electroconductivity and ph. These measurements are stored in a database through scheduled scripts implemented in Python language in a Raspberry Pi 3 microcontroller. The availability of this database in the future can support the development of algorithms for prediction of crops grown rates and quality assessments in a wide range of domains, as hydroponics, aquaculture, aquaponics and aeroponics.

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P87. An intelligent vision-based algorithm for automatic crack detection in a robot-assisted

Area(s) of study: Natural sciences & engineering

Pedro Pedrini* | FACULTY OF ENGINEERING

According to the Government of Alberta, the province of Alberta, in Canada, is one of the largest oil deposits in the world and produced 80 percent of Canada's crude oil in 2018, representing a GDP of more than \$90 billion. In this industrial sector, many tasks involving pipelines are dangerous, such as welding pipes and repair defects. Combining those factors with new innovative applications for mobile robots in the industry, this project aims to assist the manufacturing and repairing tasks in oil and gas pipelines using autonomous robotic technology. Therefore, the project approaches the development of an intelligent algorithm based on image recognition of cracks implemented in Python and Robot Operating System (ROS) environment. A camera located on the robot arm captures the image for the algorithm analyses the data on the image and generates an output for the robot intelligent decision-making, which consists of detection, recognition, and localization. Thus, making possible to control the mobile robot arm in complex scenarios for distinguished tasks. The possible applications of this project can be generalized to many other domains including manufacturing, construction, medical and precision farming.

P88. Cyanobacteria-dominated microbial accelerated the carbonation in Kimberlite

Area(s) of study: Natural sciences & engineering

Xiayan Zhang | FACULTY OF SCIENCE

Microbially facilitated carbonation via Cyanobacteria-dominated microbial is expected to accumulate in a sample of smectite-rich kimberlite (diamond) mine tailing as a method to accelerate the process for the atmospheric CO₂ capture and precipitation of carbonate minerals. Tailings were leached using various chemicals such as dilute acid to obtain a microenvironment with high concentrations of adsorbed magnesium and calcium, which is suitable for incubation of phototrophic Cyanobacteria. The colonization in aquarium and several leachates generated the nucleation site for microbial carbonate precipitation reactions. With samples dehydrated through critical point dry, scanning electron microscopy and transmission electron microscopy were used to reveal to locate carbon sequestration and identify the Cyanobacteria-dominated bio-film, especially directly on filamentous organisms. This study is the first step towards the photosynthetic biocatalysts for carbon Sequestration.

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P89. The role of a novel protein in a mouse model of malaria

Area(s) of study: Natural sciences & engineering

Naomi Perkins*, Catherine Mitran, Stephanie Yanow

FACULTY OF SCIENCE

Malaria is a life-threatening disease that causes significant mortality. In 2018, malaria killed 405,000 people worldwide, with over 90% of deaths occurring in sub-Saharan Africa. In the face of growing drug resistance and no effective vaccine, there is an urgent need to identify new prevention and control strategies to combat this disease.

Mouse malaria models allow researchers to study different aspects of the malaria parasite in ways that are not possible with human studies. These animal models are particularly useful to study disease development and the host immune response to infection. We work with the *Plasmodium (P.) chabaudi* model, as it displays striking similarities to *P. falciparum*, the parasite that is most lethal in humans.

Using this mouse model, we discovered a protein, which we named PcDBP. This protein shares structural similarities with several proteins that mediate disease development. In preliminary studies, mice that were immunized with PcDBP then challenged (infected) with *P. chabaudi* had a reduced parasite burden and fared better clinically compared to controls. Our hypothesis is that PcDBP plays a critical role in parasite invasion or sequestration that is conserved in human malaria species.

The focus of my project is to further characterize the role of PcDBP primarily through immunofluorescence assays. I will be looking at two main aspects of protein expression: when PcDBP is expressed in the parasite lifecycle and where the protein localizes. Characterizing these two aspects could help indicate function.

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P90. Earthworm invasion in The Boreal Forest: implication for Soil Carbon Storage

Area(s) of study: Natural sciences & engineering

Samantha Sales de Vilhena*, Justine Lejoly, Sylvie A

Mercier Quideau | FACULTY OF AGRICULTURAL, LIFE & ENVIRONMENTAL SCIENCES

Earthworms influence the carbon cycle to incorporate organic matter from the forest soil into the mineral soil, leading to a reduction in forest soil and an initial release of CO₂ into the atmosphere. Boreal forests are known to be the largest terrestrial carbon sink on Earth and have developed without earthworms since the last glaciation. The recent invasion of earthworms into boreal forests caused by human activities is another factor that can affect the carbon balance and climate change.

The relationship between carbon and earthworms is complex, the rate or magnitude of this change for carbon dynamics is still not fully understood. As they occupy more areas of the world, will they add more carbon to the atmosphere or reduce it? Many questions need to be answered.

The Soil Biogeochemistry research group has projects about Biogeochemistry and microbial activity of soils in the boreal forests of western Canada, reclamation and montane cordillera, the influence of climate on the distribution and composition of carbon in forest soils, earthworm invasion, vegetation, and soil type. One of them is this ongoing study which aims to investigate the implications for soil carbon storage after the earthworm invasion in the boreal forest.

The methods used so far are Munsell color chart; hydrometer method; Walkley-Black procedure and laboratory incubation. After obtaining the data and analysis, the results should contribute to increasing knowledge and understanding of earthworm invasion and how they affect the carbon balance of the invaded ecosystem and climate change.

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P92. A Comparative Case Study Between Alberta and Australia: Exploring the Effects of Climate Change on the Immunological Response of Wildlife and Livestock Species and Subsequent Prevalence of Disease

Area(s) of study: Health sciences, Other/interdisciplinary

Keely Monaghan | FACULTY OF SCIENCE

The topic covered in this project is certain species' susceptibility to stressors caused by climate change and how this can affect entire populations and ecosystems. Many wildlife and livestock species experience increased stress from events directly associated with climate change, like heatwaves, flood, drought etc., which weakens the immune response, making the species more susceptible to disease, and accelerating the rate of extinction of already-endangered species. I will explore how the prevalence of certain infectious diseases are influenced by climate change stressors, and how the type of environment that the animal hosts are native to influences this trend (ie. Are species from colder environments, like Alberta just as effected as species from Australia?). I am including livestock species to demonstrate how this issue directly relates to human interests and food availability in the future. I hypothesize that species world-wide will be susceptible to immunological break-downs, but the rate at which we see this happening may be higher in hotter ecosystems, like Australia. This has been suggested in the literature. My approach to this topic and case studies will be to analyze literature on disease prevalence in animals, and to look at available statistical data, and conduct a review of it. I will also speak with industry professionals (such as veterinarians, farmers etc.) as necessary. These results are important because they show the wide-reaching effects of climate change and can potentially predict future population declines of endangered/threatened species, including livestock, which has direct consequences on human activity and well-being.

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P93. CryoTein: An Antifreeze Protein Approach to Subzero Organ Preservation

Area(s) of study: Health sciences, Natural sciences & engineering, Other/interdisciplinary

Jesse Lee*, Dr. Ratmir Derda | FACULTY OF SCIENCE

Over 60% of all donated organs go unused and are ultimately thrown out because of incompatibility with local patients, there is a need for improved organ preservation that can allow for global shipping. Typically, organs are stored in a preservation solution that is cooled down to 4°C, which allows for a limited period of organ viability. Ideally, organs should be stored at subzero temperatures, and slow the metabolism to a halt, but it is currently impossible to do so without causing ice crystals to form and damage the organ. With a new approach using engineered antifreeze proteins derived from winter flounder, there is a potential method for suppressing ice crystal formation, and preserving the organ in a stable supercooled solution. To detect for antifreeze activity, there is a method available by creating microdroplets of solution containing antifreeze proteins, dropping them in an oil medium that has a density between that of water and ice, and attempting to freeze them in a freezer. If the droplets freeze, they will automatically rise to the surface of the oil. When comparing this is a pure water control, the longer the time the droplets containing antifreeze stay liquid, the more effective the protein is. Engineered proteins are also tested with tomatoes to simulate a human organ.

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P94. The Effect of Body Position on Modulating Neural Control of the Chest Wall

Area(s) of study: Health sciences, Natural sciences & engineering

Mohammad Ghasoub*, Alesha Reed, Jacqueline Cummine, Carol Boliek | FACULTY OF SCIENCE

Recent techniques used for studying speech disorders have begun to investigate the neuromuscular control of speech by analyzing the frequency content of electromyography (EMG) recordings. This correlational analysis of similarity in the frequency domain between two muscles is referred to as intermuscular coherence (IMC). IMC provides information regarding the neuromuscular control underlying muscle activity. Measurements of IMC range between 0 and 1, with the latter indicating complete overlap in frequency content of two muscles. Recent studies have explored IMC in chest wall muscles during different speech tasks, however, the influence of body position and the effects of neuromuscular control within and across speech systems has yet to be investigated. Fifteen adults (ages 18-25 years) performed six speech and non-speech tasks designed to manipulate lung volume and neuromuscular control and coordination across respiration, laryngeal, and articulatory subsystems, in upright and supine body positions. IMC measurements were derived from chest wall muscles. Paired samples t-tests suggest that IMC did not change as a function of body position, however, tasks requiring coordination across systems had significantly lower IMC than tasks involving respiration alone. Tasks requiring high lung volume also had lower IMC relative to low lung volume tasks. Results suggest that IMC in the chest wall is sensitive to manipulations of lung volume and degree of coordination across speech systems. Our findings suggest that IMC may serve as an alternative technique for studying speech motor control.



P95. An investigation of the contribution of integrity in motor pathways to reading performance in skilled and unskilled readers

Area(s) of study: Health sciences, Natural sciences & engineering

Sarah Sweneya*, **Alesha Reed**, **Kulpreet Cheema**,
Jacqueline Cummine | FACULTY OF EDUCATION

Reading impairment (RI) affects approximately 10% of the population, affecting a person's spelling, reading speed, and reading comprehension. Dyslexia is the most common reading impairment and involves difficulties with word recognition, decoding ability (i.e., the ability to correctly pronounce words), and spelling. While the loci of reading impairments have been extensively studied, only recently have researchers begun to investigate the involvement of the motor system in reading impairment. Studies have demonstrated overlap between the networks involved in speech motor control and those involved in reading. In order to further investigate this relationship, the connection between white matter pathways associated with speech motor control and reading performance must be explored. Diffusion tensor imaging allows researchers to assess the integrity of these pathways by measuring the flow of water along axons. A total of 31 skilled and impaired readers (mean age = 22.5 years) underwent an MRI and were administered reading assessments. Tractography was used to isolate the posterior limb of the internal capsule (PLIC), an area rich in the corticobulbar tract fibers used in speech motor control. Independent samples t-test found no significant difference in white matter integrity between groups. Despite similarity in tract integrity, Pearson correlation found a significant relationship between integrity in the right-PLIC and performance on reading assessments in the RI group. These results provide further support for the overlap between motor and reading networks in individuals with dyslexia. Furthermore, it provides evidence supporting the compensatory role of the right hemisphere in these individuals.



P96. Neural Control of the Chest Wall During Static and Dynamic Muscle Contraction

Area(s) of study: Health sciences, Natural sciences & engineering

Anusha Khepar*, **Alesha Reed***, **Jacqueline Cummine***,
Carol Boliek | FACULTY OF SCIENCE

One method of investigating the neural signalling mechanisms underlying the motor system is through the measurement of intermuscular coherence (IMC). IMC is a correlation in the frequency domain between the electromyographic (EMG) signals of two muscles. Preliminary research in fine motor control suggests that IMC decreases during dynamic (gradual increase in contraction amplitude), relative to, static activation (sustained contraction). Early research in the chest wall indicates that IMC changes as a function of lung volume and tracheal pressure, however studies have yet to investigate the effects of muscle activation patterns (i.e., static vs dynamic activation) in this system. In order to make inferences regarding these more complex task requirements (i.e., respiratory coordination with tracheal pressure), it is critical to first understand how type of muscle activation influences IMC in the chest wall. This study investigated changes in IMC between chest wall muscles of 21 neurotypical adults (18-25 years). Three tasks eliciting different types of muscle contractions were performed: a control task involving minimal activation (rest breathing), a high amplitude, dynamic contraction (maximum expiration lung volume) and a high amplitude, static contraction (sustained maximum contraction). Paired sample t-tests found significantly higher IMC during the control task, relative to static ($p < 0.007$) and dynamic ($p < 0.000$) muscle contractions. No differences were found between static and dynamic tasks. These results expand our understanding of neuromuscular control of the speech mechanism by providing the information necessary to interpret the effects of complex task demands in the chest wall.

P97. Managing Incontinence — A Community Based Participatory Research Approach

Area(s) of study: Health sciences

Marina Kirillovich, Saima Rajabali, Adrian Wagg | FACULTY OF SCIENCE

Urinary incontinence (UI), the complaint of involuntary leakage of urine, has a substantial impact on the quality of life of older adults. Most UI research is driven by researchers and lacks the patient perspective. The goal of this study was to gain the perspective of older adults in formulating a research agenda, tailored to address their questions and improve their experience with managing UI. Using a community based participatory research framework, an advisory group of eight older adults with UI was recruited to be on the research team. An initial focus group was conducted to learn about their research needs. Nominal Group Technique was used and data was analyzed thematically. Employing the Delphi consensus method, an online questionnaire containing 20 priorities for future UI research and education was developed. The online questionnaire was advertised across Canada. 59 older adults with UI rated each priority on a Likert scale in the first round. The second round received 50 responses, an 85% response rate. A total of 11 priorities of $\geq 80\%$ agreement were retained. The highest rated priorities included relationship between physical activity and UI; support for those with UI; causes of UI and its management; sleep and UI; and public restroom accessibility. Findings from this study will help researchers and healthcare professionals understand and address the education and research needs of older adults with UI and will engage older adults in a conversation regarding UI to improve their experience.

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P98. Adoption and Maintenance of Healthy Aging Behaviours — A Photovoice Study

Area(s) of study: Health sciences

Ali Ramji*, Saima Rajabali, Adrian Wagg | FACULTY OF SCIENCE

Population ageing has a major impact on healthcare, economics, education, employment and social engagement. There is an opportunity to educate and empower seniors in healthy ageing behaviours. However, there is a need to understand from the perspective of older adults, factors helping or hindering them in maintaining healthy ageing behaviours after the completion of a health intervention. This project attempts to answer the question, “what are factors that influence the adoption and maintenance of healthy ageing behaviours by community dwelling older adults one year after receiving a peer delivered health education intervention?”. Data was collected from participants using a community based participatory research method called Photovoice, which involved older adults in all aspects of research. Participants took photos over two weeks of either barriers or facilitators for maintaining healthy ageing behaviours, wrote journal reflections about each photo, and took part in individual interviews and group discussions about the photos they took. Data analysis is ongoing, however preliminary results have brought about certain themes. Socialization, exercise, a healthy diet, hobbies, vacation and a youthful presence were seen as facilitators for healthy aging. On the other hand, accessibility, pets, television and medication were seen as facilitators by some and barriers by others. The findings from this study will help us understand how older adults maintain healthy ageing behaviours, and learn about the barriers and facilitators they encounter, which may be used to make health education interventions more effective and efficient.

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P99. An Investigation into Different Methods of Eliciting Vital Capacity Maneuvers

Area(s) of study: Health sciences

**Meghan Schulze, Alesha Reed,
Jacqueline Cummine, Carol Boliek**

Speech scientists use two primary methods to assess the respiratory system: digital spirometry to gain direct measurements of lung volume, and respiratory inductance plethysmography (RIP), which infers volume from movement of the chest wall. An important task in assessing how efficiently individuals are able to coordinate respiration, is a vital capacity maneuver (a maximum expiration following a maximum inhalation). This can be elicited through a forced vital capacity (FVC), which occurs quickly, or a slowed version, slow vital capacity (SVC). Studies using digital spirometry have found that these methods result in similar volumes, however the effectiveness of RIP to track chest wall movement during both types of VC maneuvers has not been evaluated. Given the speed of movement associated with FVC, it may be difficult for RIP to accurately capture the changes in lung volume. Fifteen neurotypical adults (18-25 yr) completed three different vital capacity maneuvers including a FVC, SVC-C (with verbal coaching), SVC-WC (without coaching). Lung volume during all three tasks were measured using RIP. Handheld digital spirometry recordings were made during FVC. Repeated measures ANOVA found no significant differences in the lung volumes derived from RIP in each task. Simple linear regression found a significant relationship in the FVC task between spirometry values and RIP derived lung volume at both high ($>4000\text{mL}$, $p<0.038$, $r=0.425$) and low ($<4000\text{mL}$; $p<0.000$, $r=0.697$) lung volumes. These results indicate that the accuracy of RIP during FVC may decline at higher lung volumes.

P100. Hepatoma Derived Growth Factor as a Potential Treatment for Autoimmune Demyelinating Diseases

Area(s) of study: Health sciences

Yutong Li*, Adrienne Watson, Anastassia Voronova

FACULTY OF SCIENCE

Oligodendrocytes, the white matter producing cells of the central nervous system, perform vital functions in communication and efficient information transmission. Oligodendrocyte formation in the developing brain is regulated by cell-to-cell communication between neural stem cells (NSCs) and a specific class of neurons, termed interneurons. These interneurons secrete over 50 ligands or signalling molecules that could potentially affect oligodendrocyte formation from NSCs. Identifying which ligands promote oligodendrocyte formation from NSCs is relevant to autoimmune demyelinating disorders of the central nervous system, such as Multiple Sclerosis (MS), where oligodendrocytes and white matter are damaged. Canada has one of the highest MS rates in the world and currently lacks therapies that enhance oligodendrocyte regeneration and remyelination (restoration of white matter). Thus, my studies can be used to inform novel remyelination therapies in the future.

Hepatoma Derived Growth Factor (HDGF) is one of the ligands secreted by interneurons, but its effect on NSCs and oligodendrocyte formation is unknown. To test this, primary mice (murine) NSCs were isolated and grown in the presence or absence of HDGF. My results indicate HDGF increased formation of mature myelinating oligodendrocytes from NSCs. I propose HDGF is a novel pro-oligodendrogenic molecule that could form the basis for remyelinating therapy in demyelinating disorders.

Future research includes elucidating whether HDGF plays a role in increasing the proliferation of mature oligodendrocytes in the murine brain, and in which brain region does HDGF reside.

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P101. Human Trafficking in Canada: A Scoping Review

Area(s) of study: Health sciences

Ashley Bulaong*, **Nicole MacLeod***, **Higinio Fernandez**,
Oluwabukola Salami | FACULTY OF NURSING

Purpose: The purpose of this project is to assess the scope, nature and range of existing literature; identification of unique features, challenges, risk mitigation strategies, and key considerations of previous research across the globe; and identification of key considerations in the development of this guideline.

Design: Currently, we are working on a scoping review that aims to include the available literature on human trafficking in Canada. This review is being guided by Levac's (2010) six-step scoping review methodology. We will potentially use eleven different electronic databases and regularly consult with a librarian to refine keywords and identify the most appropriate databases. The librarian and research assistants will perform searches and store search results on the online platform Covidence.org for article selection. A research assistant will further search for websites of human trafficking organizations (likely through google) to further identify additional research posted online. Two research assistants will independently select and review articles that meet the following inclusion criteria: 1) focus on human trafficking; and 2) completed primary data collection. Disagreements between the two reviewers will be resolved by the primary investigator.

Preliminary Findings: In process of database searching.

Keywords: Canada; human trafficking; scoping review

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P102. Health of African Immigrant Children in Oceania: A Scoping Review

Area(s) of study: Health sciences

**Afrina Tasneem* , Higinio Fernandez-Sanchez,
Bukola Salami** | FACULTY OF NURSING

The number of African nationals migrating outside of the African continent continues to rise. Many of these people are migrating to the Oceania region. Nonetheless, little is known about the health of African immigrants, especially African immigrant children.

Purpose: This research aims to evaluate the scope and range of the present collection of literature on the health of African immigrant children in Oceania countries, to exhibit current available research and to identify gaps in the existing literature.

Design: Work is in progress for a scoping review that targets to include the available literature on the health of African immigrant children in Oceania region. To accomplish this, we are using the five-step methodology for scoping reviews coined by Arksey and O'Malley (2005). We have explored ten different electronic databases available at the University of Alberta. The inclusion criteria were: health of African immigrant children, ages 0-18 years, African immigrant children in Oceania, and Articles available in English. Data analysis is being conducted using numerical analysis and thematic analysis. To aid in the analysis process, we are using Nvivo software.

Preliminary Findings: 12, 720 articles were obtained through the database search. However, only 16 articles met our inclusion criteria and were then included for analysis. Yet, we have found that most articles have a quantitative approach (n=14) and most African immigrant children come from East and Central Africa. The analysis is still under development and it is expected to be completed within a two-month period.

Key words: African immigrant children; Oceania; Australia, New Zealand; health; scoping review

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P103. Health of African Immigrant Children within Africa: A Scoping Review

Area(s) of study: Health sciences

Prudence Kithinji*, **Higinio Fernandez-Sanchez**,
Bukola Salami | FACULTY OF NURSING

An investment in adequate and sustained nutrition to improve health and wellbeing is an unquestionable goal captured by the UN Sustainable Development Goals. The African child who immigrates within Africa presents a unique population that should be examined. As a research assistant in the Faculty of Nursing, I am involved in a project on the overall health, including the nutritional health of African immigrant children within Africa. The purpose of this work is to assess the extent, range, and nature of the existing body of literature on the nutritional health of African immigrant children within Africa, to map out research activity and to identify gaps in the existing literature.

We are working on a scoping review that aims to include the available literature on the nutritional health of African migrant children. This review is being guided by the five-step methodology for scoping reviews described by Arksey and O'Malley (2005). The inclusion criteria for the selected articles are; nutritional health of African immigrant children, African immigrant children within Africa, ages 0-18 years, and articles available in English. Data analysis is by numerical and thematic analysis using Nvivo software.

The database search yielded numerous articles and after title/abstract screening, 32 articles were chosen for analysis. Most articles have a quantitative approach (n=27) and most African immigrant children come from Somalia. The analysis is still being conducted and it is expected to be completed within a two-month period.

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P104. Health of African Immigrant Children in Europe: A Scoping Review

Area(s) of study: Health sciences

Olabisi Olagunju*, **Higinio Fernandez-Sanchez**,
Bukola Salami | FACULTY OF NURSING

As the world continues to interconnect, the number of people migrating across international borders is on the rise. African nationals, including children are among the primary international immigrants.

Purpose: The purpose of this work is to extract and assess the essence of the existing body of literature on the health of African immigrant children in Europe, to map out research activity and to identify gaps in the existing literature.

Design: This scoping review aims to include the available literature on the health of African immigrant children in Europe. This review is being guided by Arksey and O'Malley's (2005) five-step methodology for scoping reviews. Ten electronic databases available at the University of Alberta were searched. The inclusion criteria for the selected articles included: health of African immigrant children, ages 0-18 years, African immigrant children in Europe, and Articles available in English. We are analyzing data using numerical analysis and thematic analysis. Nvivo software is being used to help with the analysis.

Preliminary Findings: The database search yielded 12,720 articles. However, only 33 articles met the inclusion criteria and were then included for analysis. The preliminary findings have shed light over the type of design employed; all the articles except one have a quantitative approach (n=32) and most African immigrant children come from countries in sub-Saharan Africa such as, Morocco, Algeria and Somalia. The top country of destination for the children in Europe is Netherlands closely followed by Sweden and UK. The analysis is still work in progress we expect to complete it in two months.

Key words: African immigrant children; Europe; health; scoping review

P105. Health of African Immigrant Children in Asia: A Scoping Review

Area(s) of study: Health sciences

Beatriz Parreira Santos, Higinio Fernandez-Sanchez, Bukola Salami | FACULTY OF NURSING

As a research intern from University of Sao Paulo, Brazil in the Faculty of Nursing, University of Alberta, I am involved in a project about the health of African immigrant children located in Asia. Purpose: The purpose of this work is to assess the extent, range, and nature of the existing body of literature on the health of African immigrant children in Asia, to map out research activity and to identify gaps in the existing literature.

Design: Currently, I am working on a scoping review that aims to include the available literature on the health of African migrant children in Asia. This review is being guided by the five-step methodology for scoping reviews described by Arksey and O'Malley (2005). We searched ten different electronic databases. The inclusion criteria for the selected articles were: health of African immigrant children, ages 0-18 years, African immigrant children in Asia, and Articles available in English. We are analyzing data using numerical analysis and thematic analysis. We are using Nvivo software to help with the analysis.

Preliminary Findings: The database search yielded 12,720 articles. After duplicates were removed there were 6,002. After title/abstract screening, there were 1,675 and 380 after full-text screening. Finally, 25 articles were included for analysis. Thus far, we have discovered that most articles have a quantitative approach (n=24) and most African immigrant children come from Somalia and Ethiopia. The analysis is still being conducted and it is expected to be completed within a two-month period.

P106. Health of African Immigrant Children in North America: A Scoping Review

Area(s) of study: Health sciences

Carolyne Laurie Benicia dos Santos, Higinio Fernandez-Sanchez, Bukola Salami | FACULTY OF NURSING

As a research intern from Faculty of Philosophy, Sciences and Letters of Ribeirão Preto, University of Sao Paulo, Brazil, I am involved in a project about the health of African immigrant children in North America.

Purpose: The purpose of this project is to map out the extent, range, and nature of research activity on the health of African immigrant children in North America, and to identify research gaps in the existing literature.

Design: This review was guided by the five-step approach to scoping reviews of Arksey & O'Malley. The inclusion criteria for the selected articles were: health of African immigrant children; ages 0-18 years, African immigrants in North America, and articles available in English. We are analyzing data using numerical analysis and thematic analysis. We are using Nvivo software to help with the analysis.

Preliminary Findings: This research yielded 12,720 records. After duplicates, were removed there were 6,002. After title/abstract screening, there were 1,675 and 380 after full-text screening. Finally, 34 articles were included for analysis. Thus far, we have discovered that most articles have a quantitative approach (n=25) and the United of States is the primary place of destination (n=23). The analysis is still being conducted and it is expected to be completed within a two-month period.

P107. The effect of preoperative carbohydrate loading on postoperative insulin resistance in adult eligible surgical candidates

Area(s) of study: Health sciences

Gabrielle Keyes*, **Sou Hirabayashi***, **Chiamaka Edeogu,**
Ryan Taje* | FACULTY OF KINESIOLOGY, SPORT, AND RECREATION

Our research focuses on the postoperative effects of preoperative carbohydrate loading (PCL)—consuming a set amount of carbohydrates prior to surgery—on postoperative insulin resistance (PIR) in adult eligible surgical candidates. The traditional preoperative practice has been fasting (both food and beverage) for twelve hours, however evidence shows there is no increased risk of aspiration (airway obstruction) when food is consumed up to 6 hours prior and clear beverages up to two hours prior to surgical procedures. The typical PCL protocol suggests ‘loading’ individuals with 100 grams of carbohydrates the night before surgery and 50 grams two hours prior to the surgery in the form of a specially formulated beverage. Research suggests PCL elicits numerous benefits—most importantly reducing PIR. Insulin prevents the body’s blood sugar levels from rising excessively (hyperglycaemia, a common postoperative complication as a result of insulin resistance). Surgeries performed following the traditional fasting protocol increase the likelihood of PIR occurrence and severity in the postoperative state; PCL has been found primarily to reduce PIR and promote a quicker recovery. Other benefits include reductions in postoperative infections (exacerbated by insulin-related postoperative complications), shorter length of hospital stay, and prevention in loss of muscle mass which facilitates recovery. There is significant expert support for the implementation of PCL for the studied demographic; guidelines regarding PCL are continuously being developed and further improved based on research findings and experiments, and may be positioned to alter the current status quo for patient surgical preparation.

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P108. The death of pancreatic delta cells and their role in Type 2 Diabetes during development

Area(s) of study: Health sciences

Ashley Zubkowski* | FACULTY OF SCIENCE

Type 2 Diabetes (T2D) has been diagnosed in 8.5% of adults in the United States of America. Many factors contribute to the onset of this disease, and some patients have a predisposition to developing T2D. As postnatal rodents undergo a developmental period similar to the third trimester of human gestation, alterations to the pancreas at this time can have lasting repercussions in adulthood. This literature review analyzes four main articles with multiple background information references.

This paper confirms that apoptosis, controlled cell death, is present and capable of being overstimulated by cytokines, immune cell signalling proteins, in postnatal rodent islets. Maturation of immune tissues and apoptotic cell markers were both found to occur around postnatal day 14, coinciding with the time period that the pancreas is remodelled from a fetal to a more adult-like morphology. A predisposition to T2D is present within baboon and mice populations that have dysregulated δ cells. δ cells are a type of pancreatic islet cell which secrete somatostatin to modulate β and α cell secretions. When somatostatin receptors were blocked in postnatal rodent pancreata, they were found to have problems regulating their blood glucose levels. When combined, these studies will indicate that in the postnatal development of pancreatic islet cells, dysregulated δ cell apoptosis can lead to a diabetic predisposition.

In summary, a decrease in postnatal pancreatic δ cells, potentially through an increase in cytokine-induced apoptosis during pancreatic remodelling, can lead to dysregulated insulin synthesis and secretion, promoting T2D onset later in life.

P110. Photobiomodulation can partially prevent damage to mitochondria caused by exposure to oxidative stress

Area(s) of study: Health sciences

**Hélène Lemieux, Woo Hyun Han, Martin Lessard,
Heather Mast, Anaïs Anfray, Claudia Holody** | CAMPUS SAINT-JEAN

Photobiomodulation (PBM) is a non-invasive use of near infrared light to heal or prevent cellular damage. PBM have multiple beneficial effects which include protection against oxidative degeneration, a natural process of ageing. Research has shown a positive effect of PBM on the mitochondrial enzyme cytochrome c oxidase (an enzyme that transport electrons in the mitochondria to produce cellular energy). However, the literature includes some contradictory results as well as evidence of effects on other mitochondrial components. Consequently, the present study is aimed at providing a more accurate understanding of the functional changes to mitochondria in response to PBM in normal conditions or as a protection against oxidative stress injuries. Using flatworms, we measured mitochondrial function via high-resolution respirometry (Oxygraph 2k; Oroboros Instruments Inc.). The oxidative stress injuries were induced by exposing the animals to hydrogen peroxide (H₂O₂). Four treatment groups were included: (1) control, without PBM and H₂O₂, (2) PBM without H₂O₂ (3) H₂O₂ without PBM, and (4) treated with both PBM and H₂O₂. PBM therapy applied to the flatworm previous to H₂O₂ exposure successfully restored certain mitochondrial pathways capacity to the level of the control, pointing toward a protective effect of PBM. Oxidative stress comes with ageing and decreases physiological functions. These findings help understand the effect of PBM in terms of its mechanism of action and effect on protection against oxidative stress to promote better health.

P111. The Eye's Immunological Defenses in Gene Therapy

Area(s) of study: Health sciences

Kimberly Papp*, Geoff Casey, Ian MacDonald | FACULTY OF SCIENCE

Medicine is at the cusp of implementing effective gene therapies that treat patients with genetic diseases. Gene therapy aims to provide a wild-type (or normal) copy of a gene that a patient does not have in their own DNA due to mutations. The wild-type gene copy is usually delivered to the patient using viral vectors (engineered viruses). Genetic technology is ready for gene therapy to succeed; however, until recently it has often been overlooked that the patient's immune system is designed to eliminate foreign agents such as viral vectors. This is holding back the success of gene therapy in curing patients' genetic diseases.

Our laboratory looks at genetic conditions of the eye, with a specific interest in choroideremia. This disease affects the retina and always progresses to blindness, and there are currently no effective treatments available. Choroideremia would be a great candidate for gene therapy.

We have grown retinal pigment epithelium (RPE) cells, which are the cells that form the blood-retina barrier and are affected by choroideremia. Our goal with this research is to assess the RPE's response to viral vectors and to immune chemicals that might be present during gene therapy conditions, so that we can find out what aspects of the immune response should be targeted and regulated during gene therapy. The goal of this research is to discover how gene therapy researchers should modulate the retina's immune response so that gene therapy can be successful.

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P112. Characteristics of 274 *H. pylori* culture-positive participants in community-driven research projects in Arctic Canada

Area(s) of study: Health sciences

Mayla Zanchetta*, Janis Geary, Katharine Fagan-Garcia, Taylor Cromarty, Karen Goodman | FACULTY OF MEDICINE & DENTISTRY

Helicobacter pylori (Hp) is a common bacterial species that colonizes the stomach lining. Hp infection causes stomach diseases, ranging from chronic inflammation to erosions and ulcers of the stomach lining and stomach cancer. The Canadian North *Helicobacter pylori* (CANHelp) Working Group is a multidisciplinary team that conducts community-driven projects to address community concerns about Hp infection.

The CANHelp Working Group has an ongoing bacterial genomics project focused on identifying Arctic Indigenous Hp genotypes of public health significance and estimating associations of these genotypes with disease severity. During 2008-2017, consenting project participants in 7 communities in the Northwest Territories and Yukon underwent endoscopy, contributing stomach biopsies for microbiological tissue culture. These samples yielded a collection of 274 Hp specimens. A thorough description of the participants from whom these Hp were sampled has yet to be completed.

The aim of this project is to produce a catalogue of personal characteristics (demographic and socio-environmental factors, symptoms, and other relevant self-reported clinical history), endoscopy findings, and histopathologic assessments of stomach tissue of participants who contributed Hp specimens. The analysis will tabulate frequency distributions of variables to be catalogued using STATA14. Using these tabulations, a catalog will be created in an Excel spreadsheet, with a record for each participant in a row containing the value for each variable in columns. This catalog will be a repository of human host characteristics for use in all CANHelp bacterial genomics analyses. A report, including tables, figures, and narrative text, will describe the population of participants in the catalog.

P113. A machine learning-based measurement method to diagnose hip dislocation in children with cerebral palsy

Area(s) of study: Health sciences

Minh-Binh Le*, Thanh-Tu Pham, Lawrence H. Le,
John Andersen, Edmond H. Lou | FACULTY OF MEDICINE & DENTISTRY

Hip dislocation in children with cerebral palsy (CP) has a negative impact on patients' life. Migration percentage (MP) is one of the commonly used evaluation methods to determine the severity of hip displacement. However, the manual measurement is time-consuming and requires expert knowledge to identify the reference landmarks for the measurements. In this work, we proposed a convolutional neural network computational method by fine-tuning the architectures from ImageNet to automatically calculate the MP values. The Inception-ResNet v2 was refined by appending two more fully connected layers with batch normalization at the end of the architecture to predict landmarks' locations directly. The detected landmarks' positions were adjusted to more precise locations by translating them to the contours within the region of interest area surrounding the predicted points. These landmarks from the left and right hips assisted the calculation of the MP values. The used architecture was trained and validated using a dataset of 122 X-ray images, 244 hips in total, from children with CP without surgeries. Mean absolute difference and the intra-class correlation coefficient of the comparison between the calculated MP values measured from the machine learning method and manual labelling method in 110 hips were $6.1 \pm 5.2\%$ and 0.93, respectively. The accuracy and the reliability of the MP values calculated from the proposed machine learning method were excellent to assist clinicians to evaluate the hip dislocation condition.



P114. Evaluation of qPCR Assays for Molecular Serotyping of Shiga Toxin-Producing *E. coli*

Area(s) of study: Health sciences

**Jonas Szelewicki, Brendon Parsons, Colin Lloyd,
Linda Chui** | FACULTY OF MEDICINE & DENTISTRY

Shiga toxin-producing *Escherichia coli* (STEC) produce toxins that cause infection ranging from mild diarrhea to potentially life-threatening complications including hemolytic uremic syndrome, especially in young children. STEC are classified by its O-antigen, a component of its cell membrane, with O157 representing the most studied serotype. Recent improvements in detection methods of non-O157 STEC indicate that the frequency of non-O157 STEC infections is higher than O157 STEC. Current turn-around time of 3 to 4 weeks for conventional STEC serotyping at the National Microbiology Laboratory in Winnipeg delays outbreak investigation. The objective of our study is to evaluate the specificity and sensitivity of two assays for serotyping the six most common non-O157 O types ('Top 6': O26, O111, O45, O121, O103, O145), followed by determination of O-type of STEC directly from stool and comparison with results from conventional serotyping. These molecular assays accurately predicted the O-type of Top 6 STEC isolates from several countries with 100% specificity and limit of detection of at least 100 cells and accurately predicted the O-type of Top 6 STEC in stool (including mixed infection) with a 48 hour turn-around time. Young children with STEC infection are at high risk of developing complications. Early reporting will guide treatment (hydrotherapy, cessation of antibiotics), and improve disease outcome. Furthermore, rapid reporting will allow a timely response for public health to initiate food recall. Data generated in this study will be collated for analysis, publication, and implementation of this new diagnostic test for rapid identification of STEC in Alberta.

P115. Polysialic acid in immune regulation regarding female and male immune differences.

Area(s) of study: Health sciences

Samantha Rodriguez*, Lisa Willis | FACULTY OF SCIENCE

Polysialic acid (polySia), a long homopolymer consisting of α 2,8-linked sialic acid, is a cell surface glycoprotein modification found in human neuronal and immune cells. PolySia is best known for its role as a modulator of NCAM, key in neural cell migration and adhesion. NCAM is also seen in immune natural killer (NK) and NKT cells, suggesting a similar role in the immune system. As polySia is required for cell migration and regulation of cell adhesion, overexpression of polySia correlates with increased metastasis and poor prognosis in different cancers. This correlation suggests polySia's possible role in other diseases involving the immune system. Systemic lupus erythematosus (SLE) is an autoimmune disease in which autoreactive B and T cells are not removed from the body and target "self" cells, causing a hyperactivity of the immune system against its own tissue. It is seen disproportionately in women compared to men, so we hypothesized male human serum samples would have significantly higher polySia contents than female. The large and highly anionic nature of polySia makes its identification difficult, so an improved sandwich ELISA was developed until quantification of polySia in human serum was possible. As expected, men had significantly higher polySia content than women, but none of the immune cells or proteins previously known to be polysialated accounted for this difference. Identifying the location of polysialated proteins in the immune system is key in understanding why SLE it found disproportionately in women and may provide a possible therapeutic target.



P116. Biomechanics of the Support Limb in Instep Soccer Kicks from Four Angles of Approach

Area(s) of study: Health sciences

Alexa Adams* | FACULTY OF KINESIOLOGY, SPORT, AND RECREATION

Kinematic and kinetic analyses of sports skills may provide insight as to what factors may regulate technical execution, influence performance, and increase injury risk. The support limb has been overlooked in soccer research during tasks such as kicking. The purpose of this project was to examine the effects of approach angle on kinematics and kinetics of the support limb during an instep soccer kick. One experienced female soccer player performed in-step kicking trials from four different approach angles: 0 degrees, 30 degrees, 60 degrees, and a self-selected angle. At each angle, the subject performed three in-step kicks with her dominant kicking limb. The support limb was planted on a force platform and limb motion was recorded using a 3D motion capture system. Lower extremity net joint moments, ground reaction forces, segment angles, and joint angles were compared between angles of approach using data collected via force platform. The joint and segment angles of the support limb followed a similar pattern at each approach angle which shows that the point of contact between the foot and the ball was similar regardless of approach angle. Foot velocity at ball contact was used as a measure of kicking performance. The highest foot velocity occurred with the 30 degree approach. In the 30 degree approach, large hip extensor and adductor net joint moments were observed in the support limb. The results from this case study indicate that manipulating approach angle can optimize instep kicking performance, possibly by modifying hip muscle utilization.

P117. High-levels Of 'Natural' ABO Antibodies Are Produced In Female Vs. Male Mice

Area(s) of study: Health sciences

Bushra Anjum*, Ibrahim Adam, Jordana Fersovich, Maurits Sulzer, Jean Pearcey, Kesheng Tao, Bruce Motyka and Lori J. West | FACULTY OF SCIENCE

Purpose: The ABO histo-blood group is a barrier in solid organ transplant; however, infants can successfully receive an ABO-mismatched heart due to low/absent levels of natural ABO antibodies. A better understanding of the specificity and the production of ABO antibodies may allow for successful ABO-mismatched transplantations at older ages. Here, we sought to determine the 'isotype' (IgM/IgG) and specificity (ABH subtype) of ABO antibodies produced naturally or induced by sensitization in mice as a function of age and sex.

Methods: Mice (BALB/c strain) were assessed for natural ABO antibody production over time (n=32/39, female/male; age 1-18 months), or challenged with human A red blood cells (5 weekly intraperitoneal injection) beginning at 5 weeks of age to measure induced ABO antibody production (n=13/8, female/male; age 1-3 months). Production of ABO antibody was determined by hemagglutination assay and ABH-glycan microarray.

Results: Female mice produced markedly higher natural anti-A antibodies compared with male mice. With age, natural anti-A antibodies shifted from an IgM to IgG isotype in females but remained predominantly IgM in males. Most natural ABO antibodies were specific to antigen subtypes III/IV; specificity to subtypes I and II were absent or very low. In contrast, following A-antigen sensitization, both female and male mice produced comparable quantities of IgM and IgG anti-A antibodies with specificities for all subtypes (I-VI).

Conclusion: Male and female mice show previously undescribed differences in natural ABO antibody production. Future studies will explore mechanisms for these sex differences and relevance to humans.



P119. Hepatitis C Vaccine Effective Against Combination Escape Mutants

Area(s) of study: Health sciences

Anson Wong*, Owen Smith, Patrick Paszkowski, Lorne Tyrrell, John Law and Michael Houghton | FACULTY OF SCIENCE

Hepatitis C (HCV) is a virus that infects over 70 million people worldwide and is the leading cause of liver transplantations in North America. Our lab is developing a glycoprotein E1E2 (gpE1/gpE2) HCV vaccine that elicits multiple antibodies which can neutralize the virus and provide cellular immunity. This is consistent with results showing individual monoclonal antibodies (mAbs) targeting conserved regions of the HCV virus and providing neutralization. Previous work has shown that our candidate vaccine elicited antibodies that targeted similar epitopes as these effective mAbs. Despite this, more recent studies have identified emerging escape mutants that could render these mAbs ineffective. Currently, it is not clear whether these escape mutations could overcome the protection conferred by our vaccine induced sera. As such, we tested the neutralization activity of our gpE1E2 vaccine induced sera against virus encoding escape mutations. To test this, we first sub-cloned various escape mutations in the viral genome. We then exposed cells to our new virus mutants in the presence of immunized sera and individual mAbs. Using a luciferase assay signal (RLU), we then measured and normalized the neutralization activity. Our results indicate that the goat antisera retained the ability to neutralize virus encoding individual and combination escape mutations while mutant viruses were resistant to target mAbs. Our experiments demonstrate that the vaccine can induce protection against HCV escape mutants and provide further support for the continual development of our gpE1/gpE2 vaccine. An effective prophylactic vaccine will contribute greatly towards the effective elimination of HCV.

P121. Can Cancer Treatments Effectively Treat Cerebral Malaria?

Area(s) of study: Health sciences

Micheal Hawkes, Hannah Brooks, Urvi Rai | FACULTY OF SCIENCE

Cerebral Malaria (CM) is one of the leading causes of Malaria related death among children in Africa caused by the *Plasmodium falciparum* parasite found most present in Sub-Saharan Africa. Although treatments for CM have been found and work well, for the most part, an 8% mortality rate remains among children affected by CM. This resistant mortality rate could be the result of the consequential increase of permeability of the Blood Brain Barrier (BBB). This increase of permeability of the BBB is caused by an induced inflammatory response. This inflammatory response is activated by immune cells and cytokines in response to the attachment of *P. falciparum* to the endothelial cells that form the monolayer that lines the BBB. Pathways used by immune cells to activate an inflammatory response in CM is similar to pathways used to promote tumor growth by some tumor cells. The FDA has approved some pathway inhibitors for tumor growth which have been clinically studied. Therefore, we hypothesize that if the inflammatory response induced by immune cells can be suppressed by inhibitors used to suppress tumor growth, the permeability of the BBB will decrease. Using a Transwell assay (TW) we are able to create a model of the BBB. *P. falciparum* infected red blood cells are placed on top of the monolayer created by immortalized Human Cerebral Microvascular Endothelial Cells (hCMEC/D3), followed by one of the three FDA approved drugs and a fluorescence probe. The permeability of the monolayer, which essentially tests the effectiveness of the drug, is tested by measuring the resistance of the monolayer and the concentration of fluorescence present on the top and bottom chamber of the TW. If one or two FDA approved drugs result in decreased monolayer permeability, then the overall mortality rate that remains can be decreased.

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P122. A Novel Surgical Treatment for Patients with Severe Ulnar Injury

Area(s) of study: Health sciences

**Mary Cheuk, Simon Wu, Matthew Curran, Jaret Olson,
Michael Morhart, Rajiv Midha, Chris White, Alex Platt,
Ming Chan** | FACULTY OF SCIENCE

Ulnar nerve compression injuries can lead to severe nerve degeneration. Recent animal studies show that end-to-side (ETS) connection of ulnar nerve to a donor nerve provides a conduit for trophic support, enhancing regeneration. However, due to limited evidence in clinical literature, it is unclear if this confers the same benefits in humans.

This study tested the hypothesis that ETS surgery allows crossover reinnervation from donor nerve to intrinsic hand muscles, while enhancing regeneration of ulnar nerve fibres from the elbow.

We compared three cohorts of ulnar nerve patients who underwent different surgical interventions: i) ETS surgery using a branch of the anterior interosseous nerve at the wrist with decompression at elbow; ii) End-to-end (ETE) surgery with decompression; iii) decompression alone. Physiological and functional outcomes including compound muscle action potential (CMAP), pressure sensitivity, and key pinch strength were recorded at baseline, with yearly follow-up assessments.

Baseline physical attributes were similar, but ETE group had more severe injuries, shown through lower CMAP amplitudes and key pinch strength. Nevertheless, ETE group showed greater improvements in outcome measures because of crossover reinnervation. Contrarily, the ETS group showed no evidence of crossover, where recovery was similar to the decompression-only group.

Findings failed to support our hypothesis, as there was no crossover from donor nerve in the ETS group or enhanced regeneration in ulnar nerve fibres. This may be due to interspecies differences, since rodent nerves have greater regenerative abilities. In appropriate cases, ETE transfers may be the preferred option for severe ulnar nerve injuries.



P123. Biomarkers for Inner Ear Disorders. A Non-Systematic Review on the role of biomarkers in hearing and balance disorders.

Area(s) of study: Health sciences

Zaharadeen Jimoh*, Sandra Campbell, Julianna Zenke, Agnieszka Szczeppek, Nahla Gomaa | FACULTY OF SCIENCE

The concept of biomarkers related to inner ear diseases is in its early stages, but biomarker discovery has expanded to include blood-based markers, heat shock protein, and markers of autoimmune diseases among others along with an increase in terminology. There is no precise classification/clarification of evidence levels that are acceptable for the biological agent or response to be considered a biomarker, or for practical application of biomarkers in inner ear diseases.

The objective of this work is to conduct an up-to-date, in-depth review of biomarkers relevant to inner ear disorders of hearing and balance.

A database search was conducted by an expert librarian on the following databases: OVID Medline, Ovid EMBASE, EBSCO COINAHL, CA PLUS (Scifinder), WOS BIOSIS, WOS Core Collection, Proquest Dissertations and Theses Global, PROSPERO, Cochrane Library, and BASE (Bielefeld Academic Search Engine) using controlled vocabulary (e.g. MeSH, Emtree etc.).

1502 studies were included in the initial search. Of these, 34 studies satisfied the inclusion/exclusion criteria after duplicate removal, title, and abstract screening. PRISMA was then used along with a full-text extraction.

This review depicts the major categories for classification of inner ear biomarkers, with study evidences, and limiting factors to reach a consensus on biomarker specificity to clinical applications. Given traditionally invasive sampling methods, usability, measurability, and specificity of inner ear biomarkers are greatly hindered.

This review shows the discrepancy in literature between the evidence levels of studies conducted versus actual specificity of biomarkers or clinical applicability, due to difficulty in setting achievable objectives of these studies.

P124. The Role of Electronic Personal Health Records and Patient Portals in the Management of Chronic Respiratory Conditions: a Scoping Review Protocol

Area(s) of study: Health sciences

Ariadna Rolo Codorniu * Jenna Macklin *, Tatiana Makhinova, Olga Petrovskaya | FACULTY OF NURSING

The Role of Electronic Personal Health Records and Patient Portals in the Management of Chronic Respiratory Conditions: a Scoping Review Protocol

Background. In November 2019, Alberta Health Services launched a province-wide clinical information system, Connect Care, which implements an electronic patient portal. Online portals allow patients to access their personal health information. Empirical research indicates positive effects of patient portals for patients living with chronic respiratory illness (eg, asthma, COPD) such as improved symptom management and well-being. However, there are no reviews summarizing evidence on the effects/outcomes of patient portals for patients with asthma or COPD and for health service provision. To address this gap, we have designed a scoping review. This poster presents a scoping review protocol of the effects of patient portals in this understudied clinical area.

Research question. For chronic respiratory conditions such as asthma and COPD, what are the effects of Personal Health Records and Patient Portals on patient and health provider experiences, and clinical and health system outcomes?

Design. The Joanna Briggs Institute Scoping Review methodology modified by Tricco et al. (2018).

Methods and analysis. We searched electronic databases using a rigorous search strategy. Three reviewers independently screened titles, abstracts, and full texts, applying inclusion and exclusion criteria. Studies that address tethered or stand-alone personal health records and/or patient portals in the context of chronic respiratory disease management were included (n=25). Data extraction and analysis will be guided by a theoretical framework (ie, four mechanisms explaining how portals help achieve positive outcomes; Otte Trojel et al 2014).

Ethics and dissemination. Human ethics approval is not required since this review encompasses only published data. We will publish a protocol and completed scoping review in peer-reviewed journals to inform future studies and clinical practice in Alberta and beyond.

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P125. Investigating the role of FOXC1 in Planar Cell Polarity

Area(s) of study: Health sciences

Lu Kun Chen*, Serhiy Havrylov, Paul Chrystal, Andrew Waskiewicz, Ordan Lehmann

FACULTY OF PHARMACY & PHARMACEUTICAL SCIENCES

Ulnar nerve compression injuries can lead to severe nerve degeneration. Recent animal studies show that end-to-side (ETS) connection of ulnar nerve to a donor nerve provides a conduit for trophic support, enhancing regeneration. However, due to limited evidence in clinical literature, it is unclear if this confers the same benefits in humans.

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P126. Cytokine transport in eosinophils following RSV stimulation

Area(s) of study: Health sciences

Ojas Srivastava*, Sarah Almas, Nawell Fayad, Paige Lacy

FACULTY OF MEDICINE & DENTISTRY

Asthma is a chronic respiratory disease affecting approximately 350 million people worldwide. Eosinophils are white bloods that are heavily implicated in asthma pathology and contain storage compartments with pro-inflammatory cytokines and chemokines. Specifically, eosinophils store and secrete cytokines, including interleukin 9 (IL-9) and chemokine RANTES, that exacerbate the asthmatic phenotype. Eosinophils are elevated in infants infected by respiratory syncytial virus (RSV). Clinical links have been established between RSV-induced lung problems and asthma development later in life. We hypothesize that eosinophils secrete IL-9 and RANTES using distinct trafficking pathways in response to RSV stimulation. The objective of this study was to determine the localization of IL-9 and CCL5/RANTES in eosinophils to understand the mechanisms involved in their release through stimulation with RSV.

Methods: We isolated eosinophils from human peripheral venous blood and stimulated them with RSV. Cells were double immunolabelled with antibodies specific to IL-9 or RANTES and colocalized with intracellular membrane markers. Recycling endosomes (RE) are an intracellular marker responsible for trafficking molecules within the cell through vesicles. Cells were imaged using DeltaVision superresolution microscopy.

Results: Increased IL-9 colocalization was found with REs markers at 4 hours RSV ($p < 0.0001$). Decreased RANTES intensity and colocalization with REs marker was found between 0 hours to 24 hours of stimulation ($p < 0.0001$).

Conclusions: These results indicate that IL-9 and RANTES are trafficked through REs in eosinophils upon RSV infection. These novel findings elucidate the pathophysiological mechanisms underlying asthma and provide insights for the development of therapeutic targets.



P127. Role of White Blood Cells in Asthma and Allergies

Area(s) of study: Health sciences

Nawell Fayad, Ojas Srivastava, and Nicolas Touret

FACULTY OF MEDICINE & DENTISTRY

Asthma is a major chronic disease that significantly impacts our livelihood and economic well-being. A prominent inflammatory cell type in asthma is the eosinophil, a highly granulated white blood cell that undergoes activation to release potent signaling factors known as cytokines. These cytokines, including interleukin-9 (IL-9) and interleukin-13 (IL-13), that can worsen the immune response towards an allergic phenotype. The intracellular sites of storage of IL-9 and IL-13 and their trafficking mechanisms are unknown. We hypothesize that IL-9 and IL-13 are found preformed in eosinophil crystalloid granules and other intracellular organelles. To test this, eosinophils were purified from human peripheral blood, adhered to glass coverslips and stimulated with 5 μ M platelet activating factor (PAF), a potent secretagogue. Cells were labelled with specific fluorescent markers specific to IL-9 or IL-13 and secretory organelles (CD63 for crystalloid granules, transferrin receptor [TfnRc] for recycling endosomes). We imaged cells using DeltaVision super resolution microscope and determined whether these cytokines localize to known organelles by calculating the Pearson's correlation coefficient. Colocalization of IL-9 with recycling endosomes continually increased over the 60 minutes PAF stimulation (0.47 to 0.60, $p < 0.0001$). In contrast, colocalization of IL-13 and CD63 showed a drop after 5 min of PAF stimulation (0.73 to 0.67, $p < 0.0001$). These results indicate that both IL-9 and IL-13 are stored in crystalloid granules, while only IL-9 is trafficked through TfnRc+ recycling endosomes. Understanding mechanisms involved in IL-9 and IL-13 release combined with future studies will provide insight into potential targets for pharmaceutical interventions.



P128. Synthesis of peptide macrocycles using 1,5-dichloro-2,4-pentadione

Area(s) of study: Health sciences

Arunika Ekanayake, Raja Mukherjee, Lena Sobze*, Ratmir Derda

CAMPUS SAINT-JEAN

Peptide based drugs play an essential role in pharmacotherapy, due to their high selectivity, effectiveness and overall safety. There are over 60 peptide drugs that are FDA-approved, 140 peptide drugs are currently in clinical trials, and around 500 therapeutics peptide in preclinical development. Peptide therapeutics is a rapidly developing field with millions of dollars having been invested by various pharmaceutical companies. In this project we aimed to make lead compounds, by the cyclization of different unprotected peptides, using the linker dichloro-diketone to create macrocycles (protected cyclic peptide). This macrocycle could then undergo another modification, with no effect on the peptide. Using analytical chemistry techniques such as HPLC (High-performance liquid chromatography) and LC-MS (Liquid chromatography-mass spectrometry) we were able to separate and identify the modified peptides and characterize them. The purpose of this project is to optimize the conditions of the reactions on peptides in an aqueous system, and then apply these same conditions onto bacteriophage libraries (which consists of millions to billions of peptides). The bacteriophage libraries will allow us to modify billions of peptides instead of single peptide, which can lead to a larger pool of targets to select lead compounds from.



P129. Synthesis of peptide macrocycles using 1,5-dichloro-2,4-pentadione

Area(s) of study: Health sciences

Tipples, S., Burt, J., Nelles, K., Gee, M., Dixon, R., & Camicioli, R.

FACULTY OF ARTS

Cognitive reserve protects individuals from the impact of insults including neurodegenerative disease associated with cognitive decline. This has been most commonly examined in the context of aging and dementia, with limited research in the area of Parkinson's disease. Reserve reflects life experiences (e.g. education, occupation, cognitive and physical activity) and can contribute to resilience (lack of domain specific decline in the setting of a physiological insult, such as a neurodegenerative disease).

We hypothesize that CR will be associated with better cognition and resilience to cognitive and physical decline in PD. We will operationalize factors associated with reserve and resilience in PD. We will also examine the impact of protective and risk factors on cognitive status (PD with normal cognition vs. cognitive impairment).

The Biocog-PD study recruited approximately 50 PD prevalent cases on treatment. Patients were assessed at 18-month intervals for 2 follow up visits with standardized clinical, motor, and cognitive assessments. MRI brain imaging will assess atrophy, cerebral circumference and intracranial volume. Demographic information (sex, age), medical history, environmental factors (namely exercise and education) has will included in the analysis. The impact of these factors on declining cognitive status will be examined.

This research can help to identify risk and protective factors contributing to cognitive resilience and cognitive reserve. Identifying risk factors can help to create both individualized management of patients who are at risk for cognitive decline and aid in the development of public health approaches for interventions in patients with PD.



P130. A Nup170 point mutation affects nuclear organisation in Budding Yeast

Area(s) of study: Health sciences

Ashwini Premashankar*, **Natasha Saik**, **Christopher Ptak**,
Richard Wozniak | FACULTY OF SCIENCE

The DNA of a eukaryotic cell is enclosed into the nucleus by the nuclear envelope (NE). Some DNA, such as telomeres (the ends of chromosomes) are tethered to the NE to mediate the silencing of genes located in these regions. The tethering of telomeres to the NE and the silencing of genes at the telomeres are mediated by proteins that bind sub-telomeric chromatin and the NE. We have studied the role of a structure termed the Nuclear Pore Complex (NPC) in telomere tethering and gene silencing in Budding Yeast (*Saccharomyces cerevisiae*). This relatively simple single-cell eukaryotic model organism can be used to understand the higher-order chromatin organisation. Our work has focused on an NPC component termed Nup170. This protein also interacts with proteins that bind to sub-telomeric chromatin like Sir4 to mediate telomere tethering to the NE and gene silencing. A single point mutation in Nup170 causes genes in the telomere to no longer be silenced. Using a variety of assays, I have found that the Nup170 point mutation disrupts telomere tethering to the NE, the assembly of telomere-associated chromatin, and the silencing of genes positioned near telomeres. However, the point mutation did not affect some other proteins that are known to be involved in telomere tethering. I concluded that the point mutation does affect some aspects of the telomere tethering process while not affecting others. This information and further studies in this area will help us determine all the proteins involved in genome organisation and their interactions.

P131. The Self-Management of Urinary Incontinence

Area(s) of study: Health sciences

Katherine Bedard*, Saima Rajabali, Adrian Wagg | FACULTY OF SCIENCE

Urinary incontinence (UI) has a significant impact on the quality of life. Of those with UI, only 15% seek help. Reasons for not seeking care include stigma, unawareness of available treatments and normalisation of the problem. Healthcare providers are often ill-equipped and have inadequate training in the area. Evidence suggests that UI can be improved by self-management and behavioural changes. Therefore, there is a need to equip both the health care providers and people with UI with evidence-informed tools regarding self-management. To this end, we developed an evidence-informed slide deck containing information regarding the self-management of UI. The slides were made following systematic review and synthesis of both grey and peer reviewed literature including PubMed and the Cochrane Database of Systematic Reviews. Search terms included UI, self-management, and pelvic floor muscle exercises. Each self-management technique was then either supported or dismissed according to the available evidence. The self-management techniques contained in the slide deck are not specific to any age demographic, and therefore can be used to educate anyone with UI. This slide deck may also be useful for educating those who are at risk of developing and will aid healthcare practitioners in primary care and in the continence field, such as nurse continence advisors and urologists, to deliver evidence-informed education to audiences such as those present at community engagement talks. The evaluation of the evidence-informed slide deck by healthcare providers as well as by people with UI is currently underway.

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P132. Functional near-infrared spectroscopy (fNIRS)-based neurofeedback: A literature review

Area(s) of study: Health sciences

Jenny Le*, Kerstin Konrad, Simon H. Kohl | FACULTY OF SCIENCE

Treatments for neuropsychiatric disorders are constantly being investigated due to the complexity and limited understanding surrounding the human brain. Technological advancements in neuroimaging, a desire for biologically noninvasive psychological treatments, and growing public awareness about the importance of improving mental health have driven the field of neurofeedback research. The use of functional near-infrared spectroscopy (fNIRS)-based neurofeedback in clinical settings has only begun to be recently studied. It is considered to be safe, cost-effective, and possess strong ecological validity as a neuropsychiatric treatment for a wide range of disorders.

fNIRS measures changes in oxygen concentration in the brain through the placement of light detectors on the scalp. Neurofeedback is the technique of receiving real-time feedback about one's brain activity and using self-regulation to modify the activity to improve brain function.

The current research examines the reporting and methodological quality of fNIRS-based neurofeedback studies in modulating behaviour, cognitive/affective processes, and brain function. 26 studies that examined the effect of fNIRS-based neurofeedback on psychological processes were included in the literature review. Both healthy participants and participants with neuropsychiatric and neurological disorders were included in these studies. As predicted, the reporting quality of best practices in the current literature is substandard on account of the field's novelty and lack of sufficient existing background literature to base procedural designs from. Modifications in the reporting and methodological procedures of future research is needed to understand the extent to which fNIRS-based neurofeedback can change psychological processes in both healthy and clinical populations.

P133. Plasmodial genotypes of pregnant and non-pregnant patients in Colombia with initial infection and recurrence by *Plasmodium vivax*

Area(s) of study: Health sciences

Yesica Duque*, Jaime Carmona-Fonseca, Olga Agudelo, María Yasnot, Amanda Maestre, Stephanie Yanow, Eliana Arango

Background: Malaria in pregnancy represents a health risk to the mother and her fetus, causing complications such as severe anemia, low birth weight and abortion. In *P. vivax* endemic areas, pregnant women also have a higher risk of developing recurrences, where parasites reappear in the blood after treatment of the initial episode.

Objective: To determine the *P. vivax* genotypes in the initial infection and in the recurrence of pregnant and non-pregnant patients with malaria.

Methods: The study included 41 pregnant and 46 non-pregnant patients with a single *P. vivax* infection. On the day of admission and the day of recurrence, with prior informed consent, a blood sample was taken for genotyping of parasites. Parasitological follow-up was performed for 4 months to detect recurrences.

Results: The frequency of recurrence in pregnant women was 46% (19/41), where 11% (2/19) were recrudescences and 89% (17/19) were relapses or reinfections. In non-pregnant patients, 13% (6/46) of infections were recurrences: 33% (2/6) were recrudescences and 67% (4/6) were relapses or reinfections. Of the total recurrences detected in pregnant women, 79% (15/19) of the parasitic were genotyped, of which 87% (13/15) were genetically heterologous and 13% (2/15) were homologous. In non-pregnant patients, 100% (6/6) of the parasitic were genotyped and all were genetically heterologous.

Conclusions: Pregnant women have more recurrent infections than non-pregnant patients; this is likely because they are not eligible to receive primaquine treatment to prevent recurrence. Most recurrences are genetically heterologous and probably correspond to the activation of hypnozoites acquired in previous infections.

P134. The Impact of Cannabis Exposure During Early Embryonic Development on Zebrafish Neural Activity and Movement

Area(s) of study: Health sciences

**Danika Bouvier*, Dr. Richard Kanyo, Laszlo Locskai,
Dr. Ted Allison, Dr. Declan Ali** | FACULTY OF SCIENCE

Cannabis is commonly used during pregnancy (Mark et al., 2015) despite very little research done on the consequences. In this study, we set out to investigate the potential alterations of neurodevelopment in zebrafish exposed to cannabinoids from 1-10 hours post-fertilization (zygote to gastrula stages). In particular, the goal is to determine whether zebrafish exposed to cannabidiol (CBD) and/or 11-hydroxy- Δ 9-tetrahydrocannabinol (THC) will exhibit reduced neural and/or locomotor activity as hypothesized. Unique from previous research, our project looks directly at neural activity using a fluorescent CaMPARI protein, which permanently turns red upon calcium entry into an active neuron in the presence of photoconversion light (Fosque, et al., 2015). Unlike most research, the negative isomer of THC is also studied. Furthermore, the main receptors involved in cannabinoid binding are characterized with appropriate receptor antagonists. To accomplish our goal, we exposed zebrafish embryos to CBD and/or THC with or without a receptor antagonist and subsequently measured the larvae's level of neural and locomotor activity at 4- and 5-days post-fertilization, respectively. Neural activity was assessed by measuring the red to green ratio of the larvae's hindbrain and optic tectum area. Locomotor activity information was obtained by tracking the larvae's mean activity (% rate) over an hour with the EthoVision program. The results show decreased neural activity and locomotion in zebrafish exposed to higher concentrations of either CBD or THC. This may be significant in elucidating the potential impact of marijuana exposure on embryonic neurodevelopment, which may be translational to humans and cannabis use during pregnancy.



P135. Impact of (-) THC and CBD on the Neural and Locomotor Activity of Zebrafish

Area(s) of study: Health sciences

Alexandria Olthuis*, Richard Kanyo, Ted Allison, Declan Ali

FACULTY OF SCIENCE

Marijuana is reported to be the most commonly used illicit drug during pregnancy and likely poses significant risk to human development. This drug contains chemicals known as cannabinoids that interact with CB1 and CB2 receptors throughout the body. Δ^9 -tetrahydrocannabinol (THC) is the primary psychoactive cannabinoid, whereas cannabidiol (CBD) is the main non-psychoactive cannabinoid. In this study, zebrafish embryos were briefly exposed to (-) THC, CBD, or CBD with CB1/CB2 receptor blockers AM-251/AM-630 during the critical stage of development known as gastrulation. Embryos were allowed to develop normally and were examined at 4 and 5 days post fertilization. Exposure to CBD resulted in significantly decreased neural and locomotor activity which was partially rescued by AM-251 and AM-630. (-) THC treated embryos also exhibited decreased activity levels, with exposure being slightly more detrimental to locomotor than to neural activity. Overall these findings indicate that acute exposure to (-) THC and CBD during gastrulation significantly impacts the embryonic development of zebrafish, and that in certain cases, AM-630/251 have the capacity to partially rescue zebrafish from CBD's adverse effects. Because the effects observed occurred well beyond the exposure time, it can be concluded that even brief exposure may have far reaching consequences. In the context of maternal marijuana use it is therefore imperative that women, who are planning to become pregnant or who suspect that they are pregnant, proceed with extreme caution when interacting with these substances.



P136. Developing Treatments for Spinal Muscular Atrophy Using Antisense Oligonucleotides

Area(s) of study: Health sciences

Maureen Kalio*, Tejal Aslesh, Toshifumi Yokota | FACULTY OF SCIENCE

Spinal muscular atrophy (SMA) is characterized by progressive muscle weakness and paralysis which results in death. SMA is caused by mutations in SMN1 gene. Humans have a backup gene, SMN2, that is nearly identical to the SMN1 gene but have small differences between them. Due to these small differences, 90% of the protein it produces, SMN proteins, are non-functional. SMN proteins are essential for survival in humans and the remaining 10% of functional SMN proteins produced are not enough to compensate for the loss of SMN proteins in the body. I am working on a new technology that will help increase SMN protein levels. The technology involves antisense oligonucleotides (AON) which are small DNA-like molecules that changes protein levels. The AON will bind to SMN2 gene that will allow the gene to be read correctly so a higher percentage of SMN proteins produced will be functional. This will restore SMN protein levels in the body back to within normal range. I tested its efficiency in SMA mouse models which have been genetically modified to exhibit similar symptoms to that of SMA patients. I observed that the AON did increase SMN levels in various organs like the brain, liver, heart and spinal cord. Mice treated with the AON showed increased body weight, improved body function and survived longer than mice that did not receive the treatment. I also observed that the treatment is not toxic to the mice. This study identifies a treatment that may be beneficial to SMA patients.



VISUAL EXHIBITS

Thursday, March 12th | 12:00 - 3:00 p.m.
Rutherford Library Foyer



E01. Abrupt Clarity

Area(s) of study: Other/interdisciplinary

Eden Redman | FACULTY OF ARTS

From my work over the past four years as a researcher of attentional neuroscience, I am committed to better understanding how & why consciousness arises. Currently, center stage to contemporary neuroscience research into consciousness, is the concept of self. Thus, in the following body of work I have chosen to focus on the boundaries of self, in particular where the concrete meets the abstract.

I am interested by what in totality constitutes the self and how it can be defined, in a complex, ever changing environment? What dictates the designation of self and others? What are the moral and practical implications in conceiving of self as an illusory construct?

In the following body of work, I took to visualizing and describing the human experience itself as an integrated node of a complex system. Setting it alongside the physical body and challenging commonly held beliefs of volition and ownership.

E02. Alex McPhee's Province of Alberta

Area(s) of study: Other/interdisciplinary

Alex McPhee | FACULTY OF SCIENCE

With the advent of the digital era, geographic data has become more and more openly accessible. At the same time, geographic research has become more and more specialized, to the point where the classic general-purpose reference map is in danger of becoming a lost art.

Digital technology and multi-scale displays have made technical cartography a lot more convenient, but there is still no replacement for information hierarchy—the very human art of deciding what should be seen first, what should be seen last, and what should be seen not at all. In order to ensure an accurate representation of Alberta's cultural and historical landscape, I visited every county in the province personally. The result is a map unlike any other.

Look for Treaty boundaries, Hutterite colonies, traplines, community halls, abandoned railway alignments, historically surrendered Indian reserves, and active mining leases—none of which are found on a conventional base map, and some of which have never been depicted on any map before. Remarkably, the entire project uses only free software and free data—no money has been spent on accessing any kind of proprietary digital resource.

Publication is forthcoming later in 2020. Until then, the map will continue being updated so it reflects as wide a diversity of perspectives as possible. Please contact the author about all questions, feedback, and—especially—errors.

SUSTAINABLE
DEVELOPMENT
GOALS





E03. Impetuous nature

Area(s) of study: Fine arts

Shruti Shah | FACULTY OF SCIENCE

The artwork aims to mimic nature and create the sense of eeriness and wonder elicited by the natural world. The paintings are geared to ignite the self transcendent emotions brought forth by seamless horizons on a sunny day or the prairie stillness post a rainfall. They aim to bask the audience within these feelings and inaugurate the feeling of “awe” initiated by natural landscapes and its inhabitants. I aim to conduct this through bright colors and texture created by the oil and acrylic medium on canvases. This style of painting is greatly inspired by Leonid Afremov, an Israeli-Russian painter who pioneered his unmistakable palette knife technique. I was inspired by his techniques and his ability to provoke a sense of romanticism and wonder within the audience. His art’s ability to evoke these feelings has been a subject of various academic discussions in the field of fine arts and psychology. My hope was to incorporate some of his techniques and color palettes into my work and aim to evoke certain feelings within the audience. Instead of telling a story or entertaining a theme, these series of paintings aims to spur the mystical and divine feelings elicited by nature and its inhabitants.

E04. Resistance: South Asia A Comic Book

Area(s) of study: Fine arts, Social sciences & humanities

Muhammad Ali Altaf, Kenn Puyat | FACULTY OF ARTS

In contextualizing the writings and theories of feminist Muslim thinkers, we noticed the recurring significance allotted to feminist moments of agency and grassroots organizations. Feminist thinkers, such as Abu Lughod and Saba Mahmood, had notable influence in South Asia. This comic book is merely an attempt at rewriting the narrative of Muslim women depicted in patriarchal society.

Muslim feminist theory, historical and contemporary research were studied as the frames were slowly pieced together. The circumstance and actions of Muslim women within different time periods and contexts had to be thoroughly considered. Specifically, we examined the following eras: the 19th century (the Sepoy Mutiny), the 20th century (the India-Pakistan partition), and the 21st century (India-occupied Kashmir). In conducting this research, prominent women figures/groups began to surface, those who had engaged in active resistance; a primary example of which was Begum Hazrat Mahal in the 1800s. Each figure of feminist resistance along with their historical contexts were transformed into a nine page graphic novel. By focusing on the women revolutionaries' perspectives during these times, we aimed to showcase notably intersectional strides towards feminist justice and anti-colonialism.

Western worldviews are routinely unacquainted with and misrepresent the status of women in regions of South Asia. So, in order to challenge any misinformed paradigms, each comic frame was filled with historical and contemporary insight into the South Asian context - a contrast to common white savior narratives seen in Western media, such film adaptations of "Pocahontas" or "Lawrence of Arabia."

SUSTAINABLE
DEVELOPMENT
GOALS





E05. Arbitrium

Area(s) of study: Other/interdisciplinary

Yekta Sharafaddin-zadeh* | FACULTY OF SCIENCE

The overarching theme of my art work can be understood through the white roses on display. Democracy began as a system implemented to create division of power for the empowerment of the people. Unfortunately, both historical and current trends narrate how this ideal and innocent notion of a purely democratic state has become tainted with the heinous qualities of mankind. Greed, envy, violence, resentment, domination etc. Through my art, I wish to spark a light and awaken the curiosity of my audience. I wish for them to question and criticize the world surrounding them. We are all directly or indirectly victims of the consequences of ill informed decisions made by those wielding a concentrated power. I wish for you to recognize the threat caused by giving too much power and reliance to small groups of people, who are at their essence, merely human. They are not gods nor are they invincible. So how confident can you really be in their decisions? Are you aware of whom you are granting this much power to? Are you aware of the real, concrete, and tangible consequences of their poor decisions? And if so, what will you do about it?



ADVANCED PLACEMENT AND INTERNATIONAL BACCALAUREATE HIGH SCHOOL POSTER SESSION

Wednesday, March 11th | 4:00 – 6:00 p.m.
CCIS Main Floor



H01. Emotional Denial in “The Turn of the Screw”

Katie Siddoway* | HARRY AINLAY HIGH SCHOOL

As individuals, we often struggle to understand the complex emotions that define us. Henry James exemplifies such a conflict in his 1898 novella *The Turn of the Screw* in the struggle his protagonist, the Governess, faces. Analysis of the novella’s subtext reveals that the Governess, by denying her growing romantic feelings, is futilely attempting to avoid her intense emotional conflict.

Initially, the novella seems to be an archetypal horror story in which a woman must fend off evil apparitions. However, when viewed through the lens of the “non-apparitionist” argument—a critical theory that has been popular since the novella’s publication—the apparitions are no longer considered tangible, but are insanity-induced hallucinations the Governess’ subconscious creates. Thus, as the tale unfolds through a letter the Governess writes in her presumed madness, she becomes an unreliable narrator whose account of the events is subject to scrutiny. This shifts the role of prominent characters like Miles, her charge, and Quint, an apparition, granting them symbolic significance relating to the Governess’ internal conflict. This raises the question—how do the characters of Miles and Quint act as symbols relating to the Governess’ romantic feelings, and how do they contribute to the novella’s exploration of the futility of denying natural emotions?

The Governess’ denial fuels both her inner struggle, as she grows increasingly paranoid of her emotions overtaking her, and the external conflict, as Miles and Quint reflect her inner turmoil. Through the Governess’ insanity and eventual breakdown, James demonstrates the repercussions of emotional denial.



H02. HITLER'S PERSONALITY

Youssef Hikal | HARRY AINLAY HIGH SCHOOL

I wanted to know more about how Germany lost World War two, and I knew that just reading articles alone won't really do much to me other than it will give me useless knowledge. I decided to research the topic to try to fully understand Hitler's personality, and incorporate more critical thinking in formulating my opinion on it. I decided the question to focus on to be: To what extent was Hitler's strategic interference a contributing factor in the defeat of Germany in the Battle of Stalingrad? I wanted to focus on Stalingrad because it was seen as the first big blow to Hitler's Germany. I found multiple books to help me on the topic and I analyzed the arguments made in each to establish my own. Although these findings of mine are not necessarily new, many actual historians researched the topic. The reason I wanted to do this topic is to satisfy my curiosity in the best way possible. I learned the importance of listening to others. That's something that Hitler did not do which cost him the war. Any research in past is supposed to him ya avoid mistakes made in the past.



H03. Period of a Pendulum at Various Amplitudes

Aneca Su | LILLIAN OSBORNE HIGH SCHOOL

The pendulum's applications have gone as far back as the first century, where it was utilized as a seismometer to detect the faraway tremors of earthquakes. Due to the significance of the pendulum in historical timekeeping, it was useful to calculate the period of a pendulum. There is a simple formula to determine the full amount of time it takes for a pendulum to swing from its initial raised position back to its original position; however, the formula only applies to smaller amplitudes (angles) because an approximation of the angle was made during derivation of the formula. Since real-world applications such as seismometers are rarely restricted to simple and ideal situations, the paper derives a formula that would model the period of a pendulum at any amplitude. Beginning with energy conservation, the investigation combines physics principles and mathematical approaches to create an approximate formula. To examine whether experimental results would correlate with theoretical predictions, an experiment was set up to record the period values of a pendulum at several large amplitudes. Slow-motion videos of the swinging pendulum were recorded, and period values were determined. Overall experimental data correlated with theoretical values, verifying its validity. This formula could be applied anywhere the period of a pendulum is relevant and could be especially important in situations involving precise measurements, for example determining the acceleration of gravity.



H04. Garlic as a Natural Antibiotic: More Than a Home Remedy

Allison Wan*, Diane Fischer | M.E. LAZERTE HIGH SCHOOL

Within each culture, there are numerous superstitions that pass from generation to generation. In regards to my own background, I wanted to explore my own grandmother's superstitions that she utilizes in her daily cooking: garlic. I sought to evaluate its antimicrobial power and holistically evaluate the benefits on our overall health. Overall, the killing power of garlic is not only applicable to everyday life as a low-level antibiotic, but could also be utilized against fighting other pathogenic bacteria.

In order to gauge the power and range of garlic, I evaluated the effects of increasing concentrations of garlic solution on the measured zones of inhibition—areas of bacterial clearance—against two different types of bacteria. The procedure was carried out using solution-soaked filter paper disks, and agar plates inoculated with either *Bacillus subtilis* or *Rhodospirillum rubrum*. I had 5 trials of each bacteria to test all the 0%, 20%, 40%, 60%, 80% and 100% concentrations.

Overall, the resulting zone of inhibition appeared the greatest at the 60% concentration, with subsequent increases and decreases surrounding 60%. Unexpectedly, there was contamination in all my trials against the *Rhodospirillum rubrum*. That indicates that garlic is only effective against one type of bacteria—in this case the Gram positive bacteria—and we can conclude that the range of garlic is somewhat limited. Despite this, its usage is still extremely diverse, especially because garlic is readily accessible to many. Further investigation could be taken to explore the components of garlic, and apply its antimicrobial effects against more harmful bacteria.



H05. Investigation of the Big Mac index's applications to purchasing power and real income

Marko Stefanov | OLD SCONA ACADEMIC SCHOOL

I would like to present my Extended Essay. The Extended Essay is a research paper part of the IB Diploma, where the student picks a topic to investigate and writes a 4000-word essay through the investigation. I decided to write my Extended Essay in the area of Economics, and selected the Big Mac Index as the subject to research. The Big Mac index is an index put forward by The Economist which uses the Big Mac as a "basket of goods" to compare purchasing power parity internationally. Purchasing power parity represents the difference between the average prices of goods between nations, adjusted for exchange rates. Essentially, this analysis tries to see the true prices of goods, and reveals currencies that are relatively over or undervalued. The Big Mac has been found by The Economist to serve as an accurate representative of a "basket of goods," which remains relatively standard internationally; there is little variance in the ingredients. My investigation aims to analyse what affects the Big Mac Index's accuracy, such as specific policies, cultures, or resources, the value of the Big Mac Index in revealing artificial exchange rates, and benefits and applications of potential modifications to the index.



H06. Which naturally occurring crystal creates the most voltage?

Sheher-Bano Ahmed | OLD SCONA ACADEMIC SCHOOL

Piezoelectricity is a form of electricity created when pressure is applied to a certain type of material, such as quartz. The pressure causes the internal structure of the material to realign, causing an electric potential to be created. This means that the ions inside the material separate slightly, allowing electricity to be created. This electricity can be measured using a voltmeter. I wanted to test which materials would produce the strongest piezoelectric effects. To do this, I tested the piezoelectric effect created by laying different weights on different types of crystals. I knew that the internal structure of the crystal played an important role in how successfully the piezoelectric effect is sustained, but I wanted to test what the best internal structure would look like. After conducting five trials, I discovered it was iolite which created the strongest piezoelectric effect. This is due to its non-symmetrical internal shape, which allows atoms to unalign when pressure is applied to the material. This causes the creation of separate negative and positive poles in the iolite, allowing voltage to be created. This finding can be used to create more efficient energy production technology. There are many piezoelectric technologies that already exist, however most of them use quartz. By using iolite, they can create more voltage overall.



H07. Assessing the Reliability of Rothman's Linear Equation for Baseball In Comparison to James' Pythagorean Win-Loss Theorem Using Statistical Analysis

Tristin Schlauch | OLD SCONA ACADEMIC SCHOOL

Since the release of Moneyball in 2002, sabermetrics, the statistical analysis of baseball, have slowly begun to change the way that managers, players, fans, and mathematicians alike understand the sport of baseball. Many conventional statistics are being replaced by sabermetricians through analyzing patterns in the old, raw stats and deriving new ones that are more accurate at depicting the game through objective, numerical evidence. One such example includes Bill James' Pythagorean Win-Loss Theorem, or Pythagorean Expectation. James, a well-recognized sportswriter and statistician, observed a relationship between the ratio of the number of runs scored by a baseball team to the number of runs that they surrendered and the ratio of the number of games won to the number of games lost. Based solely on this information, James derived a formula that could predict a team's winning percentage. Appearing to be quite complex, Stanley Rothman, a math professor at Quinnipiac University, attempted to derive a more simplistic, linear equation that fans would understand. But, how can we be certain that Rothman's equation demonstrates the same relationship as James' theorem? To what extent is Rothman's Linear Equation reliable in comparison to James' Pythagorean Theorem? Through empirical and statistical analysis of the past two decades of the MLB, including Poisson Distribution and the Chi-Square Test, I intend to assess the reliability and validity of Rothman's Linear Equation and determine whether it is an acceptable alternative prediction method.



H08. An Analysis of Meursault's Narration and Its Absurdist Links

Karen Therese Pangan | OLD SCONA ACADEMIC SCHOOL

My current research for my Works in Translation Essay explores the development of narration in various sources of literature and media. This will provide the grounds for my own analysis in the claim of unreliable narration within Albert Camus' novel *The Outsider*, as well as my later analysis on the communication of literature. Firstly, I read academic journals on the meaning of narrator reliability, to establish a foundation for my thesis. I later looked to academic critiques that explored the character of narrators I was exposed to with my English classes, such as "Porphyria's Lover", *Life of Pi*, and *The Great Gatsby*. Being able to apply these critiques towards works that I have previously studied helped me to find trends with the reliability of *The Outsider's* narrator, and enhanced my own personal engagement with the topic. After establishing the argument of my thesis, I decided to further investigate the implications of unreliable narration with regards to the narrator's connection with the audience. On a broader scale, this has implications on the idea of trust and the argument of literature's purpose of communicating a story effectively. I therefore read a few psychological articles that delved into communication and trust. While the development of my writing has strayed from the original plan, the research I have conducted prior to my final draft has proven itself imperative for my own personal knowledge and its influence on my WiT Essay.



H09. Determining the Optimal Nose Cone Shape to Maximize the Apogee of a Simulated Rocket

Steven Tang | OLD SCONA ACADEMIC SCHOOL

Given the increasing prevalence of rocket launches in recent years, the importance of designing more efficient rockets becomes increasingly necessary. The shape of the nose cone of a rocket affects the drag coefficient as well as the mass of the rocket, both factors that ultimately impact the maximum distance a rocket can deliver its payload to. A rocket launch involves a large magnitude of variables that must be tightly controlled to successfully and reliably launch payloads into space. An open source program, OpenRocket, was used to design and simulate rocket launches. For this investigation, the power series nose cones were chosen as they represented a wide range of shapes. It can be concluded that there is a strong directly proportional relationship between the inverse drag coefficient to mass ratio and the apogee of the rocket. From the analysis, the most optimal shape parameter for a power-series nose cone is 0.9, this shape has the best inverse drag coefficient-mass ratio and consequently also has the highest apogee of when compared with other shape parameters. A limitation of this investigation is that while the simulation provides a fairly accurate model for model rockets, it could not have accounted for all of the variables that exist in reality, and in full scale rockets in hypersonic airflow. In the future, real life testing will further verify the general validity of this model. The findings from this research can be applied to further optimize rockets, especially in the aerospace industry where efficiency is key.



H10. Climate Change or Climate Crisis: The Consequences of Rhetoric

Teaghan Haysom | STRATHCONA HIGH SCHOOL

The results of global climate change are already having effects on the environment. To convey the seriousness of the melting of glaciers, rising sea levels, and intense heat waves, it is critical that the people relaying information are doing so effectively. Rhetoric determines the efficacy of communication. The goal of this research is to analyze how fear invoking rhetoric affects an audience in regards to climate change. This study will analyze whether polarizing diction motivates people, creating the impression that the consequences are imminent, or conversely, if it facilitates eco-anxiety that discourages people from taking action. Historically, fear mongering language was effective at motivating action. Adolf Hitler is considered a great orator because he was able to motivate the Germans with spellbinding speeches. These speeches are characterized by their use of fear mongering to unite people behind a common goal. However, a study by UoA professor Dr. Lefsrud argues that polarizing diction is creating a gridlock in the Canadian energy debate; the inflated rhetoric may be harming the message. To reach a conclusion, I will have two groups of people read two versions of the same article about climate change - one employing passive rhetoric and the other using fear invoking rhetoric - and ask them to respond to a set of questions in order to gauge their willingness to become involved in climate activism. Determining what style of language is the most effective will determine the best way to engage the public in working towards sustainable solutions for our changing planet.



H11. Taking a Break from Summer Break: Exploring the Possibility of Year Round Schooling for Edmonton Public High Schools

Skylar Johnson | STRATHCONA HIGH SCHOOL

In the next eight years, Edmonton Public high schools are expected to have approximately one third more students than spaces available. This issue, called overcrowding, and can have negative impacts on learning and student engagement. In some cases, it can cause classes to take place in unfit locations, such as storage rooms. Overcrowding is not a new problem, and one solution that has been used in other jurisdictions is the introduction of multitrack year round schools. This model involves dividing students into tracks, each of which has different vacations throughout the year, meaning that one track will always be on break. In a four track system, this expands school capacity by a quarter.

This study aims to assess the feasibility of using a multitrack year round school system as a solution to overcrowding within Edmonton Public High Schools. This will be done by collecting data on the perspectives of local educational experts through interviews in order to evaluate the potential of this solution from a teaching and administration standpoint. This is important given the complexity of high school programming. Secondly, this study will examine the attitudes of families by collecting survey data, as community support is essential for a successful shift to year round schooling, and have been used by EPSB as determining factor in pilot projects in elementary and junior high schools. While a multitrack year round model would likely need to be supplemented by other measures to address overcrowding in EPSB schools, it is worth school board consideration.



H12. Truth and Reconciliation or Lies and Segregation

Haven Rice | STRATHCONA HIGH SCHOOL

In an attempt to repair the relationship between Indigenous and non-Indigenous Canadians, the federal government established the Truth and Reconciliation Commission (TRC) of Canada in 2008. Twenty-five years ago, a similar commission was formed in South Africa to eliminate segregation and address racism caused by apartheid, a decades-old system of legally enforced racial segregation in South Africa. The resulting program, completed in 2002, is considered to be a strong model for reconciling cultural and/or racial differences, especially because it is the first success of its kind. Recently however, South Africa's crime rate has begun to increase, and groups that once fought together for the rights of black people are beginning to turn on each other. It is theorized that these issues could have been offset by the work of reconciliation. My research will analyse the TRC's 94 goals, compare them to South Africa's goals and results, and attempt to determine the potential success of Canada's reconciliation initiative. I will develop a list of questions regarding Canada's current goals, their implementation and how the Canadian system is similar to South Africa's. These will then be approved by my mentor, Irene Fraser, who worked with the TRC to consider cultural sensitivities. I will then pose these questions to indigenous and non-indigenous leaders who are working to advance the TRC's goals in Canadian society. My research will gauge the potential success of the 94 goals and how their implementation could be altered to see a greater positive impact.



H13. Gen Z: A Status Update on the Meaning of e-Professionalism

Natalie Darrah | STRATHCONA HIGH SCHOOL

In 2018, Pew Research found that 97% of teens between the ages of 13 and 17 have and regularly use some form of social media. This mass participation in social media means teens are posting more content than ever before, and it is clear that Gen Z's relationship with online communication is different from any generation that preceded it. A variety of trends—including spam accounts and private stories—highlight this generation's casual approach to the curation of their online personas and their public image. As Gen Z begins to participate more fully in the workforce, their perspectives on public image, particularly in an online space, will only become more relevant to the modern workplace. Considering these trends, this research examines how Gen Z differs from older generations in their perceptions of online professionalism. To do this a survey will be conducted with members of several different age groups; it will provide participants with a variety of social media profiles with differing factors, about which they will later answer questions regarding their perception of the person's clarity, friendliness, responsibility, hireability, etc. An analysis of the data collected will then be conducted to determine if and how younger generations are more relaxed about online appearances, in a digital age that seems to be here to stay.



H14. Extremism in Politics and Diet: Is there a link?

Hannah Diner | STRATHCONA HIGH SCHOOL

Recently, the Western world has seen a spike in polarization and tension across the political spectrum. Since the election of US President Donald Trump there have been roughly 4,296 politically oriented protests in the United States with over 5.4 million attendees. Simultaneously, Western countries are experiencing a high rate of mental health issues, with psychiatric facilities severely overcrowded across Canada. With both issues posing a problem for Canadians, this study explores a possible connection between the two by measuring political extremism in individuals experiencing mental health issues, specifically eating disorders. While the cause behind the high rates of mental health issues and political polarization have both been studied, they are rarely thought of as intertwined; a link found between the two could aid researchers in better understanding the intrinsic motivation of polarization, as well as expand their knowledge on the effects of eating disorders. To determine if a connection is present, I am working with the Eating Disorder Program at the University of Alberta, one of the largest in Canada. Patients will fill out a survey, with the only personal information included being age and gender, that will assess where they fall on the political spectrum. I will then contrast this by conducting the same survey with people of the same age and gender, but without eating disorders, and compare the average of their answers. If the results of those with eating disorders are less centrist, it suggests a possible link between mental health issues and political polarization.



H15. Reclaiming Your Lungs: An Analysis of Methods of Quitting Vaping In Adolescents

Xavier Gonzalez Browne* | STRATHCONA HIGH SCHOOL

This study explores different methods of quitting vaping in casual and heavy adolescent users. Vaping nicotine differs from smoking cigarettes as vaping can provide a user with higher levels of nicotine than traditional cigarettes. In the case of Juul cartridges, up to 5 times more nicotine is delivered per inhalation than cigarettes. In addition, a nicotine user may be able to vape more often than smoke, thus allowing a vape user to have more nicotine in their bloodstream than with smoking. This can lead a vape user to become more addicted to nicotine compared to a smoker. With the recent influx of known health complications caused by vaping, many users are considering quitting. Currently, it is unknown whether traditional methods of nicotine cessation associated with quitting smoking are effective when quitting vaping. Therefore, more research is needed to determine effective quitting methods for vaping—especially in adolescents. This study is important due to it clarifying effective methods of cessation specifically within vaping, which may simplify a users path to being nicotine free. My research will be conducted by dividing subjects into two survey groups: former casual users and former heavy users to produce more specific results for each group. Individuals who have already successfully quit will be asked a series of questions about their prior usage, how they went about quitting, number of cessation attempts, and health effects related to quitting.



H16. Making Yourself At Home: The Story of Teenage Refugees From Syria

Eleanor Hastings | STRATHCONA HIGH SCHOOL

Within the past five years, the number of refugees that have come into Canada has increased immensely. Many of these refugees are coming from Syria, a war-torn nation, alongside their families. Upon arrival in Canada, teenage refugees are expected to attend high school just like every other adolescent in Canada. This study will examine the basic and emotional needs of a Canadian high school student, and if these needs are being met for Syrian refugees. First, a list of the basic and emotional needs will be curated by interviewing high school counselors and psychologists. Each need on the checklist will then be turned into a yes or no question to be asked to a sample group of 100 of the Syrian refugee students attending Queen Elizabeth High School, the school with the largest population of refugees in the Edmonton Public School District. This information will give our community valuable information on the effectiveness of the current efforts towards assisting the integration process within Edmonton so we, as a community, can improve our current methods and the quality of life in Canada for Syrian refugee students.



H17. The Science of Teaching Science: An Analysis of the Classroom

Cassidy Dreyer-Lude* | STRATHCONA HIGH SCHOOL

This study will explore how changing a teacher's typical teaching style affects student engagement and learning in the classroom. Since teaching is not a formulaic job, there is no one method for success. This study will help to expand what we know about keeping kids engaged and learning in order to allow teachers more freedom in their choices for teaching. With class size expected to increase dramatically over the coming years, keeping students engaged and learning could become a serious concern. Students who are engaged are more motivated to participate in school. This investigation will follow two secondary school instructors teaching in different science disciplines, each with two classes. Teacher A will be teaching Physics 20-1, while teacher B will be teaching Chemistry 20-1. We will survey students near the end of the unit using the Engagement versus Disaffection with Learning (EvsD) survey, taken from the National Mentoring Resource Center (NMRC). This survey measures how engaged or disengaged a student may be during a particular unit. In this unit, the teacher will modify one section to accommodate a different teaching style. Of the two classes that each teacher teaches, the instructor will apply a new teaching approach to only one of the classes; the remaining class will serve as a control. This work may suggest that a variety of teaching styles will increase student engagement. However, the scope of this project is unable to determine the implications of multiple style changes within one unit.

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D	Demonstration	Main Floor, CCIS	March 11, 10:00 a.m. – 3:00 p.m.
H	AP/IB (High School) Poster Session	Main Floor, CCIS	March 11, 4:00 – 6:00 p.m.
E	Visual Art Exhibit	Rutherford Foyer	March 12, 12:00 – 3:00 p.m.



Presentations with a globe icon involve students participating in a University of Alberta International visiting research internship, such as the University of Alberta Research Experience (UARE) program.



Presentations with the Sustainability Council logo have been identified by their authors as relating to sustainability.

About the Outstanding Sustainability Research Award

The Sustainability Council is proud to recognize the top undergraduate researchers who are building a better world. The winning projects demonstrate an integrated approach that considers human and environmental factors in the challenges we face and the solutions we need.

A panel convened by the Sustainability Council selects the top projects within this field for the award.

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